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By A. E. VAN VOGT

OCTOBER · 1940

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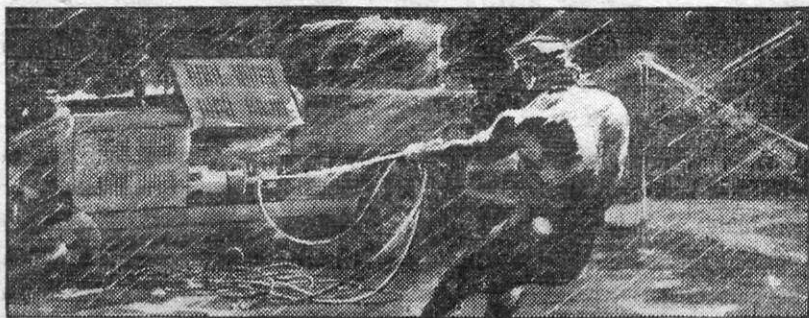
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CONTENTS OCTOBER, 1940

VOL. XXVI NO. 2

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SERIAL

SLAN **A. E. van Vogt** 9

Part Two of Four Parts

Continuing the first serial to win Astounding's rare NOVA award—the most powerful story of a superman science-fiction has produced!

NOVELETTES

FAREWELL TO THE MASTER . . . **Harry Bates** 53

The robot was motionless and immovable—till a newsman poked his nose in at the wrong time!

BUTYL AND THE BREATHER . . . **Theodore Sturgeon** 105

The Ether Breathers—remember them?—were shy. So the perfume magnate thought up an odor of a nature to bring 'em out. It wasn't a nice odor. The Ether Breather—

SHORT STORIES

WHITE MUTINY **Malcolm Jameson** 43

You don't have to shoot the captain to mutiny, and you don't have to beat the men to give good reason for a mutiny!

RUNAWAY CARGO **Nat Schachner** 83

A shipload of essence of hell shuddering toward Earth, rigidly secured on the transit beam—till the beam stations were sabotaged!

THE WARRIOR RACE **L. Sprague de Camp** 136

The Earth Savers at work! How to unconquer a thoroughly conquered Earth without weapons. Very sound—and very wacky!

ARTICLE

THE SEARCH FOR ZERO **Willy Ley** 122

Why did it take six thousand years for man to learn the boiling point of water—and only a few hundred from that to atomic power? A science article of an unusual and fascinating kind.

READERS' DEPARTMENTS

THE EDITOR'S PAGE 6

IN TIMES TO COME 87

Department of Prophecy and Future Issues.

ANALYTICAL LABORATORY 135

An Analysis of Readers' Opinions.

BRASS TACKS AND SCIENCE DISCUSSIONS 151

The Open House of Controversy.

Illustrations by Cartier, Kramer, Ley, Orban and Schneeman

COVER BY ROGERS

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

Monthly publication issued by Street & Smith Publications, Incorporated, 79 Seventh Avenue, New York City. Allen L. Grammer, President; Ormond V. Gould, Vice President; Henry W. Ralston, Vice President; Gerald H. Smith, Treasurer and Secretary. Copyright, 1940, in U. S. A. and Great Britain by Street & Smith Publications, Inc. Reentered as Second-class Matter, February 7, 1939, at the Post Office at New York, under Act of Congress of March 3, 1879. Subscriptions in Canada and Countries in Pan American Union, \$2.25 per year; elsewhere, \$2.75 per year. We cannot accept responsibility for unsolicited manuscripts or artwork. Any material submitted must include return postage.

Printed in  the U. S. A.

STREET & SMITH PUBLICATIONS, INC. • 79 7th AVE., NEW YORK

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WE CAN'T KEEP UP!

It was in June, 1938, that, in an editorial titled "Fantastic Fiction," I pointed out the number of times science-fiction had correctly prophesied inventions—and went on to say that I was sure that there was then living and working in the world the man who would be known as the discoverer of atomic power. I firmly believed then that before I died I'd see atomic engines. Another twenty, thirty, maybe forty years.

Now—it looks as though four or five years would be a better guess.

Since atomic energy is so very near commercial utilization now, it is being brought home very forcibly that science-fiction simply isn't keeping up with the advance. In 1938 I was defending the stand that science-fiction wasn't so wildly fantastic. From the looks of things, it is going to be a darned few years before the better half of science-fiction's basic ideas are snatched away from it; we aren't fantastic enough. Jules Verne's bright new dreams look rather silly now—his air machine in "Robur the Conqueror" is, as every twelve-year-old now knows, aerodynamically impossible. Most of his wild inventions are old stuff, and he's got 'em all wrong. There's no dream left in his stories, and, since they were built around those dreams, they seem silly.

First, read Arthur McCann's letter of apology in the current issue. It's mine, too; I should have spotted the error. Sorry—but we all make mistakes now and then. And that mistake was on the conservative side! A well-shielded atomic power plant shouldn't weigh more than twenty tons or so. Then—consider, in the light of that fact, these things:

No science-fiction author can ever again have his hero discover the secret of atomic power. That's done.

No science-fiction author can ever again have his hero discover a wonderful new chemical rocket fuel and make the first trip to the Moon. They'll use atomic fuel, and by the time Astounding's doubled its present ten-years-plus age, there's a very strong chance that we'll be able to print, as a cover, a full-color photograph of Earth taken from the surface of the Moon. Science-fiction authors wanting to write about Luna and Mars and Venus had best get it done—before the trips are done! (It's a hundred miles from New York to Philadelphia; it's five hundred million miles from New York to Jupiter. In one hundred pounds of U-235 there's about as much energy as in five hundred million pounds of chemical fuel. Atomic power is on the scale of the Solar System, not a mere terrestrial scale!)

Science is rapidly—so rapidly we can scarcely realize those dreams are come true!—ruling out one after another of the mighty wonders to be accomplished by science-fiction heroes. They aren't mighty wonders any more; they've become the world's daily work.

THE EDITOR.

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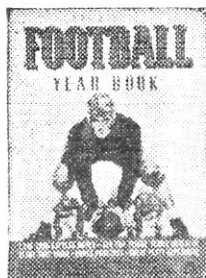
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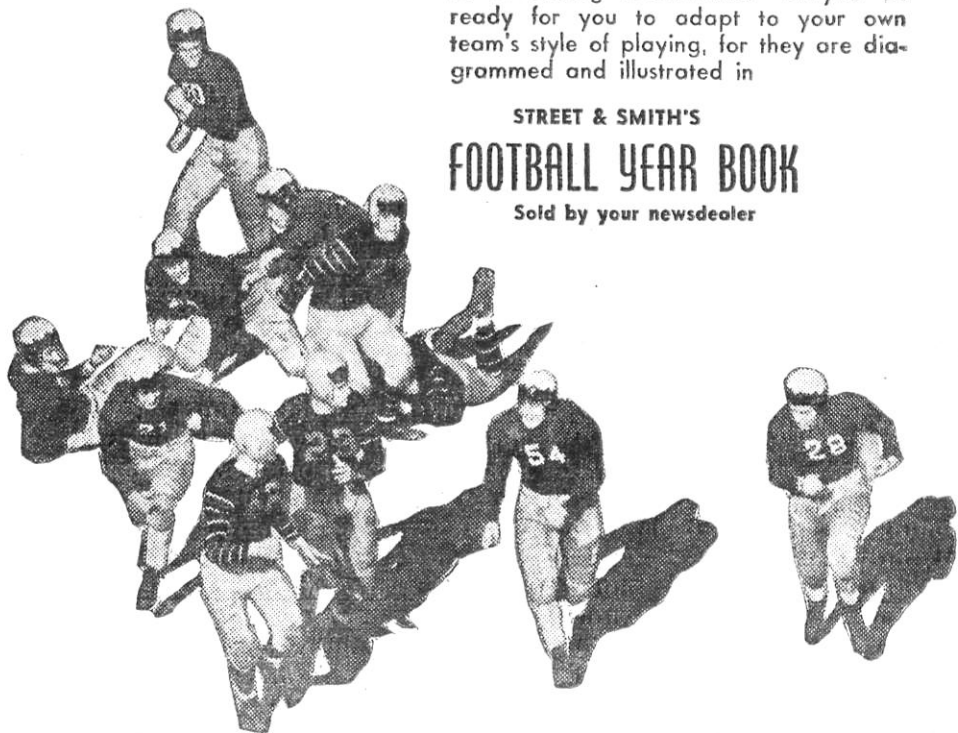
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SLAN

By A. E. van Vogt



SLAN

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Part II of Astounding's first NOVA serial. The tale of a superboy in a world that hates him—of a superboy hunted down not only by a world of humans—but by the infinitely deadlier tendrillless slan!

Illustrated by Schneeman

SYNOPSIS

Slans are a strange, superior race, resembling human beings, their only outward difference being the golden, thought-reading strands or tendrils in their hair. Inwardly, the difference includes a double heart, abnormal nervous and muscular strength and superhuman intelligence. Human beings and the dictator-government of Kier Gray accuse them of every known crime, the most vile being the use of mutation machines on human mothers with a resultant crop of monster babies. Slans are hated so ferociously that they are either killed at sight, or captured and executed.

Jommy Cross, a nine-year-old slan with the intelligence of a fifteen-year-old human being, is convinced that all these stories are lies, products of the incessant propaganda. His own purpose is to stay alive until he is old enough to use the great weapon his father has invented to bring about better relations between humans and slans. Wounded while escaping from the secret police, whose head is John Petty, a fanatic anti-slan, he is captured by an old woman junk dealer, a criminal named Granny. Realizing that her miserable shack provides an ideal hide-out, he agrees to steal for the old scoundrel.

Meanwhile, it is discovered that John Petty is plotting to usurp the power of Kier Gray; and that the chief of secret police proposes to accomplish this by the assassination of a slan girl, named Kathleen Layton. The dictator foils this entire plot, but John Petty's position is so strong that he remains in power.

While stealing jewelry for Granny, Jommy accidentally runs into a type of slan whose existence had not been suspected even by his parents—slans who cannot read minds, and who have somehow

rid themselves of the betraying mind-reading tendrils which constitute the true slan's greatest danger. He follows the man to AIR CENTER, and to his amazement discovers that this controlling center of the Earth's aviation industry is aswarm with these tendrillless slans.

Delighted, he reveals his identity as a slan—and then, to his dismay, coldly murderous thoughts leap into the minds of the two tendrillless slans to whom he has shown himself: "Kill the damned snake!"

Not realizing that their leaky mind shields have betrayed their thoughts, the two slans come toward him with hypocritical words of friendship. He is trapped there in the Air Center Building.

FOR Jommy, from the very first moment that he caught the "kill him!" thoughts of the two slans, it was not a question of what he should do—but whether he had time to do it. Even the devastating surprise of their coldly murderous enmity did not basically affect his actions or his brain.

He knew, without even thinking about it, that to run back along the corridors, trying to cover the hundred yards of straightaway marble floor, would be sheer suicide. His nine-year-old legs could never match the tireless endurance of two able-bodied slans.

There was only one thing to do; and he did it. With a boy's agility, he twisted to one side. There was a door there, one of the hundreds

that lined the corridor.

Fortunately, it was unlocked. Before his battering rush it opened as lightly as if it were made of fluff—yet so desperately careful was his control that the actual opening he allowed himself was only barely large enough for him to slip through.

He had a brief glimpse of a second, lighted corridor, empty of life; and then he was shutting the door, his strong, brown, sensitive fingers fumbling at the Yale lock. The latch and the lock clicked home with a sharp, hard, thrilling, metallic sound.

The very next instant there was a violent thud as two adult bodies dashed themselves in a wild abandon against the barrier. But the door did not even tremble.

Jommy realized the truth. The door was solid metal, built to withstand battering-rams, yet so wonderfully balanced that it had appeared weightless to his fingers. For the moment, he was safe!

His mind relaxed from its desperate concentration, and reached for contact with the minds of the two slans. At first it seemed as if their shields were too tightly held; then his exploring brain caught the overtones of chagrin and a grim desperation, an anxiety so terrible that it was like knives hacking at the surface of their thought.

"God Almighty!" one whispered. "Sound the secret alarm, quick! If the snakes find out we control Airways—"

Jommy wasted not another second. Every atom of curiosity in his brain was driving him to stay, to solve the bewildering hatred of the tendriless slan for the true slan. But before the irresistible dictates of common sense, curiosity retreated. He ran at top speed, knowing exactly what he must do.

He plunged on unhesitatingly, but he knew that by no conceivable logic could that gantlet of corridor be considered safe. At any moment a door might open; or wisps of thought warn him of men coming around some bend. With abrupt decision, he slowed his headlong rush and tried several doors. The fourth door yielded to pressure, and Jommy crossed the threshold with a sense of triumph. On the far side of the room was a tall, broad window.

It was but the work of a moment to push the window open and scramble out onto the wide sill. Crouching low, he peered over the ledge. Light came dimly from the other windows of the building, and by its glow he could see what appeared to be a narrow driveway wedged between two sheer precipices of brick wall.

For an instant he hesitated—then, like a human fly, started up the brick wall. The climbing was simple enough, enormously strong fingers searching with swift sureness for rough edges. The deepening darkness, as he climbed, was hampering, but with every upward step his confidence surged stronger within him. There were miles of roof here; and, if he remembered rightly, the airport buildings connected on every side with other buildings. What chance had slans who could not read minds against a slan who could avoid their every trap?

THE THIRTIETH, and top, story! With a sigh of relief, Jommy pulled himself erect and started along the flat roof. It was almost dark now, but he could see the top of a neighboring building that almost touched the roof he was on. A leap of two yards at most, an easy jump. With a loud *clang!* the clock in a nearby tower began to intone the hour. One—two—five—ten! And on the

stroke, a low, grinding noise struck Jommy's ears, and suddenly, in the shadowy center of that expanse of roof opposite him yawned a wide, black hole. Startled, he flung himself flat, holding his breath.

And from that dark hole a dim torpedolike shape leaped into the star-filled sky. Faster, faster it went; and then, at the uttermost limit of vision, a tiny, blazing light sprang from its rear. It flickered there for a moment—then was gone, like a star snuffed out.

Trembling, Jommy lay very still, his eyes straining to follow the path of the strange craft. A spaceship. By all the heavens, a spaceship! Had these tendrillless slans realized the dream of the ages—to operate flights to the planets? If so, how had they kept it secret from human beings? And what were the true slans doing?

The dull, scraping noise reached him again. Cautiously he crept to the edge of the roof and peered across. He could only vaguely see the yawning blackness lessen as the two great metal sheets slid together and the roof was whole again.

For a moment longer Jommy waited, then he bunched his muscles and sprang. Only one thought was in his mind now. To get back to Granny quickly and by as devious a way as possible. Back alleys, side streets, must be his route. For this ease of escape from *slans* suddenly seemed enormously suspicious. Unless, of course, they didn't dare set up safeguards for fear of betraying their secret to humans.

Whatever the reason, it was only too obvious that he still needed desperately the security of Granny's little shack. He had not the faintest desire to tackle a problem so complicated and murderous as the slan-human-tendrillless slan triangle had

become; no, not till he was full grown and capable of matching the incredibly sharp brains that were fighting this unceasing and deadly battle.

Yes, back to Granny, and by way of the store to get some peace offerings for the old wretch, now that he was certain to be late. And he'd have to hurry, too. The store would close at eleven.

AT THE STORE, Jommy did not venture near the jewelry counter, for the girl who objected to little boys was still at work. There were other richly laden counters, and he swiftly skimmed the cream of their smaller merchandise. Nevertheless, he made a mental note that, if he came into this store in future, he would have to be on the scene before five o'clock, when the evening staff arrived for their shift. Otherwise that girl could prove a nuisance.

Sated at last with stolen goods, he headed cautiously for the nearest exit, then stopped as a man, a middle-aged, paunchy person, walked by thoughtfully. The man was the chief accountant of the department store; and he was thinking of the four hundred thousand dollars that would be in the safe overnight. In his mind also was the combination of the safe.

Jommy hurried on, but he was disgusted with his lack of foresight. Of all the silly fools, stealing goods which would have to be sold, with the risk at both ends enormous compared to the simple business of taking all the money he wanted.

Granny was still where he had left her, but so agitated that he had to wait for her to speak before he could understand what she wanted.

"Quick," she breathed hoarsely, "get in under the blankets; a police-

man was just here warning Granny to move on."

It must have been at least a mile farther on that she stopped the cart, and tore the blanket off Jommy with a snarl of rage.

"You ungrateful wretch, where have you been?"

Jommy wasted no words. His contempt for this miserable creature was too great for him to speak to her more than he had to. He shivered as he watched the gloating eagerness with which she snatched at the treasure he dumped into her lap. The violence of her greed was almost incredible as she swiftly evaluated each item, and stuffed it carefully into the false bottom of the cunningly built cart.

"At least two hundred dollars for old Granny!" she rasped joyously. "Old Finn will give Granny that much. Oh, but Granny's smart, catching a young slan. He'll make not ten thousand but twenty thousand a year for her. And to think they offered only ten thousand reward! It should be a million."

"I can do even better than that," Jommy volunteered. It seemed as good a time as any to tell her about the store safe, and that there was no need for more shop-lifting. "There's about four thousand in the safe," he finished. "I can get it tonight. I'll climb up the back where it's dark, to one of the windows, cut a hole in it . . . you've got a glass cutter somewhere?"

"Granny can get one!" the old woman breathed ecstatically. She rocked with joy. "Oh, oh, Granny's glad. But Granny can see now why human beings shoot slans. They're too dangerous. Why, they could steal the world. They tried it once you know, in the beginning."

"I don't . . . know . . . very much about that," Jommy said slowly. He

wished desperately that Granny knew all about it, but he saw that she didn't. There was only the vaguest knowledge in her mind of that misty period when the slans—so human beings accused—had tried to conquer the world. She knew no more than he did, no more than all this vast ignorant mass of people.

WHAT was the truth? Had there ever been a war between slans and humans? Or was it just the same horrible propaganda as that dreadful stuff about what slans did to babies? Jommy saw that Granny's mind had jumped back to the money in the store.

"Only four thousand dollars!" she said sharply. "Why, they must make hundreds of thousands every day—millions!"

"They don't keep it all in the store," lied Jommy; and, to his relief the old woman accepted the explanation.

He thought about the lie, as the cart rattled on. He had uttered it in the first place almost automatically. Now he saw that it was self-protection. If he made this old rascal too rich, she would soon begin to think of betraying him.

It was absolutely imperative that, during the next six years he live in the security of Granny's shack. The question therefore became: How little would she be satisfied with? Somewhere he must strike a mean between her insatiable greed and his necessity.

Just thinking about that enlarged its dangers. In this old woman was an incredible selfishness, and a streak of cowardice that might surge up in a sudden panic of fear and destroy him before he could properly realize his danger.

No doubt about it. Among the known imponderables overhanging

the precious six years separating him from his father's mighty science, this gaunt, lecherous rascal loomed enormously as the most dangerous uncertainty factor.

VI.

JOMMY'S fifteenth birthday! Fleecy-white clouds misted the cheerful spring afternoon sunshine outside. And inside—Jommy Cross glanced at his watch and felt a thrill-tingle as the message of the hands read two o'clock. His six feet of muscles tensed, nerves flamed with the sudden tremendous knowledge that this was the day, this the hour!

The six years had been a dragging, wingless period, an almost intolerable stretch of time to be passed, yet in part at least those years were immensely valuable raw material that he molded skillfully to his will, an intricate design conceived and executed with the one overwhelming purpose of preparing himself for what he must do today—and on the tomorrows to come.

His whole life had been a pursuit of higher education. He followed learned men around the streets, picking their minds of knowledge. He lay on campus grounds, precariously hidden in scant brush, mentally following lectures. Books he had in plenty, but books were not enough. They had to be interpreted, explained.

There was mathematics, physics, chemistry, astronomy—all the sciences! His desire knew no bounds; it was the supply itself that gave out. Human beings could only offer the equivalent of three years' supply during those six years when his voracious mind nearly doubled in stature.

From a cautious distance, he watched the tendriless slans.

Nightly, their spaceships leaped into the sky; and the service was maintained on precision time. Every night at 10:00, the torpedolike shape jumped up, up; and every night at 2:30, another shark-shaped monster plunged down from space, silent and dark, and dropped like a ghost into the top of the same building.

Only twice during those years did the traffic suspend, each time for a month, and each time when Mars, following her eccentric orbit, teetered on the farthest side of the Sun.

He stayed away from Air Center. Because almost every day his respect for the might of the tendriless slans grew. And it seemed increasingly clear that only accident had saved him that day when he revealed himself to the two adults. Accident and surprise.

Of the basic mysteries of the slans, he learned nothing. To pass the time he indulged in orgies of physical activity. First of all, he must have a secret way of escape, just in case—secret from Granny as well as the world; and second, he couldn't possibly live in this horrible shack as it was. It took months to dig hundreds of yards of tunnel, months too to tear down the rotting, wretched internal structure of the four-roomed shack. He rebuilt it by little sections, filling the destroyed space with fine, paneled walls, shining ceilings and plastic floors.

Granny sneaked the new furniture in at night, past the still junk-laden yard, and the unchanged, unpainted exterior. But that required nearly a year in itself—because of Granny.

For years she had had to maintain herself at the highest pitch of alertness in order to make the barest of livings. And then, suddenly, that carefully built-up efficiency

was no longer needed. Her morale simply collapsed like a stuffed scarecrow. Where before an occasional binge had *had* to suffice, now she couldn't stay sober. For weeks on end, she lay in a drunken stupor surrounded by the gleaming bottles that unlimited income made possible.

Two o'clock plus an hour to get downtown. Silently, Jommy put on the shoes he had taken off when he lay down after luncheon. If he could slip out without the old woman hearing him, at least he would avoid her tiresome curses.

Briefly, he let his mind sink into hers—and, briefly, without the slightest sense of disgust, sampled the stream of her thought. The old fool was still drinking. She was wide awake and tossing on her bed; and, through her brain poured freely and furiously a welter of astoundingly wicked thoughts.

Jommy Cross frowned, and paused in the act of tying his second shoelace. Into the veritable hell of the old scapegrace's recollection—for she lived almost completely in her amazing past when she was drunk—had come a swift, cunning thought:

"—Got to get rid of that slan . . . dangerous for Granny now that she's got money. Mustn't let him suspect . . . keep it out of my mind so—"

Jommy Cross smiled mirthlessly. It was not the first time he had caught the thought in her treacherous brain. With sudden purposefulness he finished tying the shoelace, stood up and went into her room.

Granny lay, a gaunt, sprawled shape under sheets that were stained brown with liquor; her deeply sunken black eyes stared dully out of the wrinkled parchment of her face.

Gazing down at her, Jommy Cross felt a quiver of pity. It was not funny, this spectacle. Terrible and vicious as had been the old Granny, he preferred her as she had been then—tough-minded, independent, take-care-of-herself—to this weak old soak who lay like some medieval witch miraculously deposited in a blue and silver bed of the future.

Her eyes seemed to see him for the first time, clearly. A string of bloodthirsty curses reeled from her lips; then she snarled: "Waddya want? Granny wants to be alone."

The pity drained out of him. His eyes gazed at her coldly: "I just wanted to give you a little warning. I'm leaving soon, so you won't have to spend any more time thinking of ways to betray me. There aren't any safe ways. That treasured old hide of yours wouldn't be worth a nickel if they caught me."

The black eyes gleamed up at him with a drunken slyness. "Think you're smart, eh," she mumbled. The word seemed to start a new trend of thought that it was impossible for him to follow mentally. There was far too much chaos in that disordered mind. "Smart," she repeated gloatingly, "smartest thing Granny ever did, catching a young slan. Dangerous now though . . . got to get rid of him—"

"You old fool," Jommy Cross said dispassionately, "don't forget that a person who harbors a slan is automatically subject to death. You've kept that mud turtle complexioned neck of yours well oiled, so it probably won't squeal when they hang you, but you'll do plenty of kicking with those scrawny legs."

The brutal words spoken, he turned abruptly and went out of the room, out of the house. On the bus he thought: "I've got to watch her; and as soon as possible leave her.



Soldiery—soldiery coming down the corridor in answer to that alarm he'd been forced to set off—

Nobody who thinks in probabilities could intrust anything valuable to *that.*"

EVEN downtown, the streets were amazingly deserted. Jommy Cross climbed off the bus, conscious of the abnormal silence where usually there was bedlam. The city was too quiet, a very absence of life and movement.

He stood uncertainly at the curb, all thought of Granny draining from

him. He opened his mind wide.

At first there was nothing but a wisp from the half blank mind of the driver of the bus, which was disappearing now down the otherwise careless road. The Sun glared down on the plastic pavement. A few people scuttled hurriedly past, in their minds simply a blank terror so continuous and unvarying that he could not penetrate beyond it.

The silence deepened; and uneasy alarm crept into Jommy Cross. He

explored the buildings around him, but no clamor of minds came from them; nothing whatever.

What could be the matter?

The clatter of an engine burst abruptly from a side street. Two blocks away a tractor emerged, pulling a tremendous gun that pointed menacingly into the sky. The tractor chattered to the center of the street, unhooked from the gun, and bellowed off into the side street from which it had come.

Men swarmed around the gun, preparing it; and then stood by, looking up at the sky, waiting tensely.

Jommy Cross wanted to walk closer, to read their minds, but he didn't dare. The sense of being in an exposed and dangerous position grew into a sick conviction within him. Any minute a military or police car might roll past, and its occupants ask him what the devil he was doing in the street. He might be arrested, or told to take off his cap and show his hair and the golden threads that were his tendrils.

Something big was definitely up, and the best place for him was the catacombs, where he'd be out of sight, though in a different kind of danger.

He started hurriedly toward the catacomb entrance that had been his goal ever since leaving the house. He was turning into a side street when the loudspeaker at the corner clattered into life: a man's voice roared hoarsely:

"Final warning—*get off the street!* Get out of sight. The mysterious airship of the slan is now approaching the city at terrific speed. It is believed the ship is heading toward the palace. Interference has been set up on all radio waves, to prevent any of the slan lies from being broadcast— Get off the streets!

Here comes the ship!"

Jommy froze. There was a silver flash in the sky; and then a long, winged torpedo of glittering metal hurtled by straight above. He heard a staccato roar from the gun down the street; and the echo of other guns; and then the ship was a distant sparkling point, heading toward the palace.

Curiously, the Sun's glare hurt his eyes now. He was conscious of confusion. *A winged ship!* Scores of nights during these past six years, he had watched the spaceships soar up from the building in the tendrilless slan Air Center. Wingless, rocket ships, and something more. Something that made great metal machines lighter than air. The rocket part seemed to be used only for propulsion. The weightlessness, the way they were flung up as if by centrifugal force, *must* be—anti-gravity!

And here was a *winged ship*, with all that that implied; ordinary engines, rigid confinement to Earth's atmosphere, ordinariness. If this was the best the true slans could do, then—

Sharply disappointed, he turned and walked down the long flight of stairs that led to the public wash-room. The place was as empty and silent as the streets above; and it was a simple matter for him who had passed through so many locked doors, to pick the lock of the steel-barred door leading to the catacombs.

He was conscious of the tenseness of his mind as he stared through the bars of the door. There was a vague foreground of cement beyond, then a blur of darkness that meant more stairs.

The muscles of his throat tightened, his breath became deep and slow. He hunched his slim length

forward, like a runner getting ready for a sprint. He opened the door, darted inside, and down the long reach of dank, dark steps at top speed.

SOMEWHERE ahead, a bell began ringing monotonously, set off by the photo-electric cells whose barrier Jommy had crossed on entering the door—a protection set up scores of years ago against slans and other interlopers.

The bell was just ahead now; and still there was no mind stirring out of the dim corridor that yawned before him. Apparently none of the men working or on guard in the catacombs, was within hearing distance.

He saw the bell, high up on the wall, a faintly glimmering piece of metal, *brrring* away madly. The wall was smooth as glass, impossible to climb, the bell more than twelve feet from the floor. On and on it clanged; and still there was no clamor of approaching minds, not the faintest wisp of thought.

"No proof that they're not coming," Jommy thought tensely. "These stone walls would quickly diffuse thought waves."

He took a run at the wall, and leaped with desperate strength, up, up, straight toward the maddening instrument. His arm strained, his fingers scraped the marble wall, a full foot below that clangorous thing. He fell back, knowing his defeat.

The bell was still ringing, as he rounded a bend in the corridor. He heard it grow fainter and fainter, fading into the distance behind him. But even after the sound was gone, the ghost of it still went on ringing in his mind, an insistent warning of danger.

Querly, the sense of a warning

buzz in his brain grew stronger, until suddenly it seemed to him that the bell was actually there again, faint with distance. Stronger the feeling grew, until abruptly, realization came: There was another bell ahead, clanging as vociferously as the first one. That meant—he felt appalled—it meant a long line of such bells, sending out their alarms; and somewhere in that vast network of tunnels there must be ears to hear them, men stiffening and looking at each other with narrowed eyes.

Jommy Cross hurried on. He had no conscious knowledge of his route. He knew only that his father had hypnotized a picture of it into his mind, and that he need but follow the promptings of his subconscious and—

It came abruptly, a sharp mental command: "To the right!"

He took the narrower of the two forks—and came at last to the hiding place.

It was all simple enough, a cleverly loosened slab in the marble wall that slid out under the pressure of his strength, revealing a dark space beyond. He reached in; his groping fingers touched a metal box. He pulled it to him.

He was shaking now, his fingers trembling violently. For a moment, he stood very still, fighting for self-control; striving to picture his father standing here before this slab hiding his secrets, for his son to find if anything went wrong with his own personal plans.

It seemed to Jommy that this might be a cosmic moment in the history of slans, this moment when the work of a long dead father was passed on to a fifteen-year-old boy who had waited so many dreary thousands of minutes and hours and days for this second to come.

The nostalgia fled from him ab-

ruptly as a mist of outside thought whispered into his mind. "Damn that bell!" somebody was thinking. "It's probably someone who ran down when the slan ship came, trying to get away from expected bombs."

"Yeah, but don't count on it. You know how strict they are about these catacombs. Whoever started that bell is still inside. We'd better turn in the alarm to police headquarters."

A third vibration came: "Maybe the guy's lost."

"Let him explain that," replied the first man. "Let's head toward the first bell, and keep our guns ready. Never know what it might be, with so many slans in the world these days—the dirty skunks."

Frantically, Jommy examined the metal box for the secret of its opening. His hypnotic command was to take out the contents, and put the empty box back in the hole; and he had not the vaguest desire to disobey. The thought of grabbing up the box and running never even entered his head.

His whole body was aflame with the need for swiftness. There seemed to be no lock, no catch, nothing; but there must be something to fasten it down—Hurry, hurry! In a few minutes the approaching men would be passing directly over the spot where he was now standing.

THE DIMNESS of the long cement and marble corridors, the dank, underground odors, the consciousness of the thick cords of electric wires that ran by overhead, feeding millions of volts to the great city above; the whole world by the catacombs around; and even queer, vague memories of his past—these were the thoughts that raced through Jom-

my's mind, as he stared down at the metal box.

There was a blurred thought of drunken Granny, and of the terrible mystery of the slans; and it all mixed together with the approaching footsteps of the men. He could hear them plainly now, three pairs of them, clumping toward him.

With silent frenzy, Jommy Cross tore at the cover of the box, his muscles tensed for a terrible effort. He nearly lost balance, so easily did the unfastened cover lift up.

He found himself staring down at a queer, thick rod of metal that lay on top of a pile of papers. It struck him that he felt no surprise at it being there. There was instead, a faint relief at discovering intact something he had *known* was there. Obviously, more of his father's hypnotism.

The metal rod was a bulbous thing about two inches wide at the center but narrowing down at the ends. One of the ends was roughened, unmistakably meant to give the hand a good grip. There was a little button at the foot of the bulb part, convenient for the thumb to press it.

The whole instrument glowed ever so faintly with a light of its own. That glow and the diffused light from the corridor was just bright enough for him to read on the sheet of paper below.

This is the weapon. Use it only in case of absolute necessity!

For a moment, Jommy Cross was so intent that he didn't realize the men were upon him. A flashlight glared.

"What the—" one of the men roared. "Hands up, you!"

It was his first real, personal danger in six long years; and it felt utterly queer, unreal. The slow

thought crept into him that human beings were not very quick in their reflexes. And then he was reaching for the weapon in the box before him and, apparently without haste, he pressed the button.

If any of the men fired, the action was lost in the roar of white flame that flashed with inconceivable violence from the mouth of the tube of force. One moment, they were alive, rough built, looming shapes, threatening him; the next they were gone, snuffed out by that mad burst of virulent fire.

JOMMY looked down at his hand. It was shaking; his whole arm trembling. And there was a cold sickness in him at the way he had smashed three lives out of existence. There was a blur before his vision, that straightened out slowly, as his eyes recovered from the fiery dazzlement.

As his gaze reached farther out from him, he saw that the corridor was completely empty; not a bone, not a piece of flesh or clothing remained to show that there ever had been living beings in the vicinity.

Part of the floor was hollowed out, where that scorching incandescence had seared a concavity. But the slight, smooth depression it made would never be noticed.

He forced his fingers to stop trembling; slowly the sickish feeling crept out of him. There was no use feeling badly. Killing was a tough business, but these men would have dealt death to him without compunction, as men already had to his father and mother—and to countless other slans who had died miserably because of the lies these people kept feeding to each other, and swallowing without the slightest resistance. Damn them all!

For a moment, his emotions

writhed so violently within him that he was astounded. He thought: Was it possible that all slans grew bitter as they became older, and ceased feeling compunctions about the killing of human beings, just as human beings had no compunction about murdering slans?

Jommy's gaze fell on the sheet upon which his father had written:

—the weapon. Use it only in case of absolute necessity.

Memory flooded him of a thousand other instances of his parents' noble quality of understanding. He could still remember the night his father had said: "Remember this, no matter how strong the slans become, the problem of what to do with human beings remains a barrier to occupation of the world. Until that problem is settled with justice and psychological sanity, the use of force would be a black crime."

He felt better. There was proof. His father hadn't even carried with him a replica of this weapon, that might have saved him from his remorseless enemies. He had taken death before he would deal it.

Jommy Cross frowned. Nobility was all very well, and perhaps he had lived too long with human beings to be a true slan, but he couldn't escape the conviction that fighting was better than dying.

The thought stopped, alarm replacing it. There was no time to waste. He had to get out of here, and quickly! He slipped the gun into his coat pocket, swiftly caught up the papers in the box, jammed them into his pockets; then tossing the now empty, useless box back into place, he slid the stone into the hole.

He raced down the corridor, back the way he had come, up the steps—and stopped short within sight of

the washroom. A little while before, it had been empty and silent. Now, it was packed with men. He *couldn't* go in there. The men would see him come through the door, and know that something was wrong. He was trapped.

FOR long minutes Jommy waited there, poised yet indecisive, hoping the swarm of men would dwindle a little. A very chaos of thought from the men crowded into his brain, the clamor of it exceeding even the roar of raised voices that hammered out at him. There was an incredible complexity of thought, excitement, fear, worry; here were little men in whose brains thundered the realization that big things were happening.

The minutes dragged. Men came in; men went out; but there was no lessening of the crowd, no diminishing of the bedlam of noise and thought. The room rang with it, vibrated to every sound wave, every mind wave; and the echo of the discordant mixture poured through the iron bars of the door to where Jommy Cross waited in the dank-smelling dimness.

Behind him, the bell continued to ring; and sooner or later, there would be a brief hush, during which its *brrrr* of warning would penetrate to the men. Clutching the weapon in his pocket with one hand, Jommy stepped forward gingerly, and pushed the door open—shut it behind him softly, tensed for the slightest sign of alarm.

But the packed mass of men paid him not the least attention as he shoved his way through them, and, tingling in every nerve, went up to the street.

Amazement surged through him as he reached pavement level. The city was alive with people. Swarm-

ing crowds of them pressed along the sidewalks and on the thoroughfares. Police whistles shrilled hysterically, loud speakers blared, but nothing could stem the wild, excited anarchism of the mob. All transport was at a standstill. Sweating, cursing drivers left their cars standing in the middle of the street, and joined listeners before the chattering street radios, that kept up a machine-gun barrage:

"Nothing is known for certain. No one knows exactly whether the slan ship landed at the palace or dropped a message and then disappeared. No one saw it land; no one saw it disappear. It is possible that it was shot down. Then again it is possible that at this moment the slans are in conference with Kier Gray at the palace. Rumor to that effect has already spread, in spite of the noncommittal statement issued a few minutes ago by Kier Gray himself. For the benefit of those who did not hear the statement, I will repeat it. Ladies and gentlemen, the statement of Kier Gray was as follows:

"Do not be excited or alarmed. The extraordinary appearance of the slan ship has not altered the respective positions of slans and human beings to the slightest degree. We control the situation absolutely. They can do nothing anywhere, except what they have been doing, and that within rigid limitations. Human beings outnumber slans probably millions to one; and, under such circumstances, they will never dare come out in an open, organized campaign against us. So be easy in your hearts—"

"That, ladies and gentlemen, was the statement issued by Kier Gray, after the momentous event of today. The Council has been in continuous session since that statement was is-

sued. I repeat, nothing more is known for certain. It is not known whether the slan ship landed. No one from the city saw it disappear. No one except the authorities know exactly what happened; and you have just heard the only statement on the matter, given out by Kier Gray himself. Whether the slan ship was shot down or—”

The chatter went on and on. Over and over the statement of Kier Gray was repeated, the same accompanying rumors were given. It became a tiresome drone in the back of Jommy's head, a senseless roar from loudspeaker after loudspeaker, a jangling monotony of noise. But he stayed on, waiting for some additional information, eager with the burning eagerness of fifteen long years of wanting to know about other slans.

Only slowly did the flame of his excitement die. Nothing new was reported; and at last he climbed aboard a bus and headed for home. Darkness was settling over the hot spring day. A tower clock showed seventeen minutes past seven.

He approached the little junk-laden yard with his usual caution. His mind reached inside the deceptive, tumbled-down looking cottage, and touched Granny's mind.

He sighed. Still drunk! How the devil did that wrecked caricature of a body stand it? So much liquor should have de-hydrated her system before this. He pushed open the door, entered and shut it behind him—and then stopped short!

His mind, still in casual contact with Granny's mind, was receiving a thought. The old woman had heard the door open and shut; and the sound had jogged her mind briefly:

“Mustn't let him know I phoned the police. Keep it out of my mind

. . . can't have a slan around . . . dangerous to have a slan . . . police'll have the streets barred—”

VII.

KATHLEEN LAYTON clenched her fists into small, firm brown knobs. Every muscle and nerve in her slim, young body quivered in repulsion at the vague, crude wave of thoughts that beat at her from one of the corridors. Horrible seventeen-year-old Davy Dinsmore, searching for her, coming toward the marble parapet where she stood staring out at the city which was wrapped in the soft mists of the humid, hot spring afternoon.

The mists shifted in ever-changing design, became like white fleecy clouds that half hid buildings, then smeared into a haze that held locked within its flimsy texture the faintest tinge of sky-blue.

Queerly, the looking hurt her eyes, without actually being unpleasant. The coolness of the palace breathed out at her from all the open doors, and beat back the heat of the Sun, but the glare of it kept beating down relentlessly.

The wisps of ugly thought from Davy Dinsmore grew stronger, nearer. With a final shudder, Kathleen shut them out, and waited grimly for the youth to appear. It had been a mistake to welcome the attentions of that mealy-mouthed, mealy-brained confection of humanity. The idea that the nasty little boy, who had made her life miserable as a child, could now, when he was seventeen, be anything but equally nasty and vicious and dirty-minded, whether in friendship or in enmity . . . she preferred his enmity to the sticky, horrible type of love thoughts that infected his brain.

“Oh,” said Davy Dinsmore,

emerging from a door, "here you are."

She stared at him unsmiling. Davy Dinsmore at seventeen was a gangling youth, resembling in face his long-jawed mother who always sneered even when she smiled. But at least she was not continually wriggling inside with crawling worms of desire, unless it was the desire that ill befell a certain young woman slan.

"Yes," said Kathleen curtly, "here I am. I was hoping I'd be left alone for a change."

There was a toughness, she knew, in the fiber of Davy Dinsmore's make-up that made him immune to such remarks. A writhing play of thoughts erupting from his brain penetrated to her at this close range, informing her that "this dame was pulling the same coy stuff. But I'll thaw her out yet."

A mind-curdling experience lay behind that calm conviction. Kathleen closed her brain a little tighter to shut out the details of recollections that floated up from the complacent depths of the youth.

"I don't want you coming around me any more," Kathleen said with cold deliberation. "Your mind is a sewer of rottenness that makes me sick every time you come near me. I'm sorry I ever spoke to you when you first came ogling up to me. I should have known better; and I hope you realize I'm speaking to you plainly because otherwise you wouldn't believe I meant it. Well, I do, every word. Particularly the sewer part. Now, go away."

DAVY'S FACE had a bleached quality, but there was a rage in it and an intensity behind it that beat into her shielded mind. Instantly, she closed her brain still tighter, cutting off the dark stream of vituperation

that poured from him. It struck her abruptly that there was no fazing this creature unless she could absolutely humiliate him.

She snapped: "Beat it, you miserable, dough-fleshed thing!"

"Yaaah!" he snarled—and leaped for her.

Utter surprise! Not for a single second had she expected him to dare venture against her superior strength. Her lips tightened. Silently, she grabbed at him, easily evading his flailing arms, and jerked him off his feet. A little bit of what had scared him as a kid might do some good.

And then—rough fingers grabbed at her head, clutched a handful of hair, and all the silk, thin tendrils that lay there in golden, glittering threads.

"O. K.," he snarled, "now I've got you. *Don't let me down!* I know what you'd like to do. Get me down, grab my wrists, and squeeze till I let go. If you lower me so much as an inch, I'll give such a tug on those precious tendrils that some of them'll tear loose. I know you can hold me up without getting tired—so hold!

A sheer agony of dismay held Kathleen rigid. Precious tendrils, he had said. So precious that for the first time in her life she had to throttle a scream of unadulterated terror; so precious that in some insane way she hadn't vaguely expected that anyone would dare even to touch them. A half-swoon of her fright closed over her like a night of wild and terrible storm.

"What do you want?" she gasped.

"Now you're talking," crowed Davy Dinsmore, but she didn't need his words. She had his mind now, flooding into her.

"All right," she said weakly, "I'll do it."

"And be sure to lower me slowly," the youth snarled exultantly. "And when my lips are touching yours, see that the kiss lasts at least a minute. I'll teach you to treat me like dirt."

His lips were swimming above hers against the hazy background of his sneering face and avid eyes, when a sharp, commanding voice rapped out in surprise and rage from behind her:

"What's the meaning of this?"

"Huh!" stammered Davy Dinsmore. She felt his fingers leave her hair and tendrils; and with a gasp she flung him down; he staggered, then caught himself and stammered: "I... I beg your pardon, Mr. Lorry. I... I—"

"Beat it, you miserable hound," Kathleen cut him short.

"Yes, scram!" said Jem Lorry curtly.

KATHLEEN WATCHED Davy go stumbling off, his mind sending out thoughts of pure fright at thus having offended one of the big shots of the government. But when he disappeared, she did not turn to face the newcomer. Instinctively, she was aware of her muscles stiffening, as she kept her gaze and face averted from this man, the most powerful councilor on the cabinet of Kier Gray.

"And what was all that?" the man's voice, not unpleasant, came from behind her. "Apparently it was lucky I came up."

"Oh, I don't know," Kathleen replied coldly. "From the fire into the frying pan is hardly a change for me."

"Hm-m-m!" He came up beside her and she caught a glimpse of his strong, almost unbeautifully straight jaw line, as he leaned on the railing. "I appreciate your turning the old

proverb and making me the frying pan."

"No difference really," Kathleen said indifferently. "You both want the same thing."

He stood for a moment silent, but his thoughts had the same elusive quality as Kier Gray's. The years had made him a master of evading her special powers of mind reading. When finally he spoke, his voice was changed. It held a steel-hard quality: "No doubt your outlook on these matters will change after you become my mistress."

"That will be never!" snapped Kathleen. "I don't like human beings; I don't like you."

"Your objections are of no concern," the young man said coldly. "The only problem is, how can I take possession of you without subjecting myself to the accusation that I am in secret alliance with the slans. Until I have thought of a solution to that, you may go your way."

There was an icy certainty about this brilliant young man that sent a cold shudder through Kathleen. "You're quite mistaken," she said firmly. "The reason your intentions will inevitably fail is very simple: Kier Gray is my protector. Even you don't dare go against him."

Jem Lorry pondered that. Finally: "Your protector, yes. But he has no morals on the matter of a woman's virtue. I don't think he'll object if you become my mistress, but he will insist on my finding a propaganda-proof reason. He's become quite anti-slans these last few years. I used to think he was pro-slans. But now he's almost a fanatic on the subject of having nothing to do with them. He and John Petty are closer on the subject now than they ever were. Funny!"

He mused on that for a moment;

then: "But don't worry, I'll find a formula. I—"

A roar from a radio loudspeaker, cut off Lorry's voice: "General warning! A slan airship was seen a few minutes ago, crossing the Rocky Mountains, headed eastward. Pursuing aircraft were out-distanced, and the ship seems to be taking a straight line course toward the palace. People are ordered to go home immediately, as the ship will be here in one hour, according to present indications. The streets are needed for military purposes, and intruders will be mercilessly handled by the police and soldiers. Go home!"

The speaker clicked off; and Jem Lorry turned to Kathleen, a cold, sneering smile on his handsome face.

"Don't let that arouse any false hopes of rescue. One ship cannot carry important armaments, no matter what they are. It looks to me like a trip to give the more simple-minded human beings a thrill scare, preliminary to an attempt to open negotiations."

There it was again—the cool certainty of the man; his careful, swift, yet unhurried logic brought a queer hopelessness to Kathleen. This was no Davy Dinsmore, whose threats or desires could be dismissed with contempt.

AN HOUR later, Kathleen stood beside Jem Lorry as the silver ship slanted toward the palace. Closer it came, traveling quite slowly now; and the surge of emotions in her throat thickened; and her mind reached out toward it, trying to touch the powerful brains that must be there locked within the ship.

Lower the ship came, nearer, bigger it loomed, but still there was no answering wave of thought from the invisible occupants. Suddenly, a metallic capsule dropped from the

ship. It fell down, down—and struck the garden path, where it glinted like a dazzling jewel in the afternoon Sun.

She looked up; and the ship was gone. No, there it was. Briefly, she saw a silvery brilliance in the remote heights almost straight above the palace. It twinkled for a moment like an incredibly brilliant star—and was gone.

Her straining eyes retreated from their violent effort; her mind came back from the sky; and she grew aware of Jem Lorry again. He exulted:

"Whatever else this means, it's what I've been waiting for—an opportunity to present an argument that will enable me to take you to my apartments this very night. There'll be a Council meeting immediately, I imagine."

Kathleen drew a deep breath. She could see just how he might manage it; and the time had, therefore, come to fight with every weapon at her command. She said with dignity, her head flung back, her eyes flashing:

"I shall ask to be present at the Council meeting on the grounds that I was in mental communication with the captain of the slans aboard the airship." She finished the lie calmly: "I can clarify certain things in the message that will be found in the capsule."

She thought desperately: Somehow she'd read in their minds what the message was; and from that she could build up a semi-reasonable story of what the slan leader had told her. If she was caught in the lie, there might be some dark and dangerous reactions from these slan haters. But—she had to prevent them from consenting to giving her to Jem Lorry.

A SICKISH conviction of defeat came to Kathleen, as the realization struck into her that there would be only seven councilors present, including Kier Gray. She stared at them one by one, reading as much of their minds as she could; and there was no help for her.

The four younger men were personal friends of Jem Lorry. The sixth man, John Petty, gave her one brief glance of icy hostility, then turned away indifferently.

Her gaze fastened finally on Kier Gray. A little, anxious tremor of surprise whipped along her nerves, as she saw that he was staring at her with a laconic lifting of his eyebrows, and the faintest sneer on his lips. He caught her gaze and broke the silence:

"So you were in mental communication with the slan leader, were you?" He laughed harshly. "Well, we'll let that pass for the moment."

There was so much incredulity in his voice and expression, so much hostility in his very attitude, that Kathleen felt an uneasy relief when his cold eyes flicked away from her. He went on, addressing the others:

"It's unfortunate that five councilors should be in the far corners of the world. I do not personally believe in roaming too far from headquarters; let subordinates do the traveling. However, we cannot postpone discussion on a problem as urgent as this one. If the seven of us agree on a solution, we won't need their assistance. If we're deadlocked, we shall have to do a considerable amount of radio telephoning.

"Here is the gist of the contents of the metal capsule dropped by the slan ship: They claim that there are a million slans organized throughout the world—"

Jem Lorry interrupted laconically:

"Seems to me that our chief of the secret police has been falling down on the job, despite his much vaunted hatred of the slans."

Petty sat up and flashed him a cold glance. He snapped: "Perhaps you would exchange jobs with me for a year, and see what you can do. I wouldn't mind having the soft job of minister of state for a change."

Kier Gray's voice cut across the brief, harsh silence that followed Petty's freezing words: "Let me finish. They go on to say that not only does this organized million exist, but there is, in addition, a vast total of unorganized men and women slans, estimated at ten millions more. What about that, Petty?"

"Undoubtedly, there are some unorganized slans," the secret-police chief admitted cautiously. "We catch about a hundred a month all over the world, who have apparently never been part of any organization. In vast areas of the more primitive parts of the Earth, the people cannot be roused to antipathy to slans, in fact, accept them as human beings; and there are no doubt large colonies in some of these remote parts, particularly in Asia, Africa, South America and Australia. It is hundreds of years now since such colonies have actually been found, but we assume that they exist, having no doubt over the years developed self-protection to a high degree. I am prepared, however, to discount any activity from these remote sources. Civilization and science are built-up organisms, broadly based on the achievements, physical and mental, of hundreds of millions of beings. The moment these slans retreat to outlying sections of the Earth they defeat themselves, for they are cut off from books, and from that contact with

civilized minds which is the only possible basis for a greater development.

"The danger is not, and never has been, from these remote slans, but from those existing in the big cities where they are enabled to contact the greatest human minds and have, in spite of our precautions, some access to books. Obviously, this airship we saw today was built by slans who are living dangerously in the civilized centers."

KIER GRAY nodded. "No doubt much of what you surmise is true. But to get back to the letter, it goes on to say that these several million slans are only too anxious to end the period of strain which has existed between them and the human race. They denounce the ambition for world rulership which actuated the first slans, explaining that ambition as due to a false conception of superiority, unleavened by the later experience that convinced them they are not superior but different. They also accuse Samuel Lann, the human being and biological scientist who first created slans, and after whom slans are named—Samuel Lann: S. Lann: Slann—with fostering in his children the belief that they must rule the world. And that this belief, and not any innate desire for domination was at the root of the disastrous ambitions of the early slans.

"Developing this idea, they go on to point out that the early inventions of the slans were simply minor improvements of already existing ideas. There has been, they claim, no really creative work done by the slans in physical science. They also state that their philosophers have come to the conclusion that the slans are not scientifically minded in any true sense of the word, differing from present-day human beings in that

respect as widely as the ancient Greeks and Romans who never developed science, as we know it, at all."

His words went on, but for a moment Kathleen heard only with half her mind. Could that be true? Slans not scientifically minded? Impossible. Science was simply an accumulating of facts, and the deduction of conclusion from those facts. And who better could bring divine order from an intricate array of truths than the mighty-brained, full-grown, mature slan? She saw that Kier Gray was picking up a sheet of gray paper from his desk, and she brought her mind back to what he was saying.

"I'm going to read you the last page," he said in a colorless voice. "We cannot emphasize too strongly the importance of this. It means that slans can never seriously challenge the military might of human beings. Whatever improvements we may make on existing machinery and weapons will not decisively affect the outcome of a war, should such a disaster ever take place again.

"To our minds, there is nothing more futile than the present stalemate which, solving nothing, succeeds only in keeping the world in an unsettled condition and is gradually creating economic havoc from which human beings suffer to an ever-increasing degree.

"We offer peace with honor, the only basis of negotiation to be that slans must hereafter have the legal right to life, liberty and the pursuit of happiness."

Kier Gray laid the paper back on his desk, coldly flicked his gaze from face to face, and said in a flat, harsh voice:

"I am absolutely against any compromise whatever. I used to think that something could be done, but

no longer! Every slan out there"—he waved his hand significantly to cover half the globe—"must be exterminated."

THE ROOM, with its subdued lights and paneled walls seemed suddenly strangely dimmer to Kathleen, as if a shadow had fallen across her vision. In the silence even the pulsation of thoughts from the men was a quiet vibration in her brain, like the beat of waves on a remote, primeval shore. A whole world of shock separated her mind from the sense made by those thoughts—shock at the realization of the change that had taken place in Kier Gray.

Or was it change? Was it not possible that this man was as completely remorseless in his outlook as John Petty? His reason for keeping her alive must be exactly as he had said: for study purposes. And, of course, there was the time when he had believed, rightly or wrongly, that his political future was bound up in her continued existence. But nothing else. No feeling of compassion or pity; no interest in a helpless young creature for the sake of that creature. Nothing but the most rabid, materialistic outlook on life. This was the ruler of men whom she had admired, almost worshiped for years. This was her protector!

It was true, of course, that the slans were lying, but what else could they do in dealing with people who knew only hate and lies? At least it was peace they offered, not war—and here was this man rejecting, without even consideration, an offer that would end four hundred or more years of criminal persecution of her race.

With a start, she grew aware that Kier Gray's eyes were bent on her.

His lips curled in sarcastic mirth as he said:

"And now, let us hear the so-called message you received in your . . . er . . . mental communication with the slan commander."

Kathleen looked at him desperately. He didn't believe a word of her claim, and she knew better in the face of his scathing skepticism to offer anything but the most carefully thought out statement to the mercilessly logical brain of this man. She needed time.

"I—" she began. "It was—"

She suddenly realized Jem Lorry was on his feet, his face dark and frowning. "Kier," he said with deliberate slowness, "that was pretty sharp tactics, offering your unqualified opposition to a matter as important as this, without giving the Council a chance to discuss it. In view of your action, I am left no alternative but to state, with qualifications however, that I am in favor of accepting this offer. My main qualification is this: the slans must agree to be assimilated into the human race. To that end, slans cannot marry each other, but must always marry human beings."

Kier Gray stared at him thoughtfully, but without hostility: "What makes you think there can be issue from a slan-human mating?"

"That's something I'm going to find out," said Jem Lorry in a voice so casual that only Kathleen caught the intensity in it. She leaned forward, holding her breath. "I've decided to take Kathleen here as my mistress, and we shall see what we shall see. Nobody objects, I hope."

The younger men shrugged. Kathleen didn't need to read their minds to see that they hadn't the slightest objections. She noticed that John Petty was paying no attention to the conversation at all;

and Kier Gray seemed lost in thought, as if he hadn't heard either.

With a gasp she parted her lips to speak. Then shut them. A thought of mind-shaking proportions was suddenly hammering at her brain. Suppose that intermarriage was the only solution to the slan problem? Suppose the Council accepted Jem Lorry's solution! Even though she knew it to be based entirely on his passion for her, could she dare defend herself from him if there was the slightest possibility of those other slans out there agreeing to the plan, and thus ending four hundred years of unutterable misery and murder?

Slowly, hopelessly, she sank back into her chair, vaguely conscious of the irony of her position. She had come to the Council chamber to fight for herself, and now she didn't dare utter a word. Kier Gray was speaking again:

"There is nothing new in this solution offered by Jem. Samuel Lann himself was intrigued by the possible result of such a mating and persuaded one of his granddaughters to marry a human being. No children were born of the union."

"I've got to prove that for myself!" said Jem Lorry doggedly. "This thing is too big to depend on one mating."

"There was more than one," Kier Gray said mildly.

Another man cut in impatiently: "The important thing is that assimilation does offer a solution; and there is no doubt that the human race will dominate the result. We're three and a half billion to, say, five million, which is probably a closer estimate than theirs. And even if no children can result, our ends are served in that, within two hundred years—figuring their normal life

span at a hundred and fifty—there would be no slans alive."

IT STRUCK Kathleen with a hard, almost physical shock that Jem Lorry had won his point. She saw in the vague, surface part of his mind that he had no intention of bringing the matter up again. Tonight he would send soldiers for her; and no one could say afterward that there had been any disagreement in the Council. Their silence was consent.

For several minutes she was conscious only of a blur of voices; and of even more blurred thought. Finally, a phrase caught her mind; with an effort she turned her attention back to the men. The phrase: "—could exterminate them that way."

It was an electric instant before she grasped how far they had gone from the original plan during those few minutes.

"Let us clarify this situation," said Kier Gray briskly. "John Petty's introduction of the idea of using some apparent agreement with the slans for exterminating them seems to have struck a responsive chord which—again apparently—seems to have eliminated from our various minds all thought of a true and honest agreement based on, for instance, the idea of assimilation.

"The schemes are, briefly, as follows: Number one: To allow them to intermingle with human beings until everyone has been thoroughly identified, then clamp down, catch most of them by surprise and track the others down within a short time.

"Plan number two: Force all slans to settle on an island, say Hawaii, and once we've got them there, surround the place with battleships and planes, and annihilate them.

"Plan number three: Treat them

harshly from the beginning, insist on fingerprinting and photographing them; and on a plan for reporting to police at intervals, which will have both an element of strictness and fairness in it. This third idea may appeal to the slans because, if carried out over a period of time, will seem to safeguard all except the small percentage which will be calling at police headquarters on any particular day. Its strictness will have the further psychological value of making them feel that we're being hard and careful, and will therefore, paradoxically, gradually ease their minds."

The cold voice hammered on, but somehow the whole scene lacked reality. They couldn't be sitting there icily discussing betrayal and murder on such a vast scale—seven men deciding for all the human race on a matter of more than life and death. The blackest of black double-crosses.

"What fools you are," Kathleen lashed out. "Do you imagine for one minute that slans would be taken in by your silly schemes? Slans can read minds; and besides the whole thing is so transparent and ridiculous, every one of the schemes so open and bare-faced that I wonder how I could ever have thought any of you intelligent and clever."

They turned to stare at her silently, coldly; a faint, amused smile crinkled the lips of Kier Gray:

"I'm afraid you are at fault, not us. We assume that they are intelligent and suspicious, and therefore we do not offer any complicated idea; and that, of course, is the first element of successful propaganda. As for the reading of minds, we seven shall never meet the slan leaders. We shall transmit our majority opinion to the other five councilors,

who will conduct negotiations under the firm conviction that we mean fair play. No subordinate will have any instructions except that the matter is to be fairly conducted. So you see—"

"Just a minute," said John Petty; and there was so much satisfaction in his voice, such an exultant ring, that Kathleen jerked toward him with a start. "Our main danger is not from ourselves but from the fact that this slan girl has overheard our plans. She has said that she was in mental communication with the commander of the slans on board the ship which approached the palace. In other words, they now know she is here. Suppose another ship comes near; she would then be in a position to communicate to our enemies the gist of our plans. Naturally, she must be killed at once."

A mind-shattering dismay burned through Kathleen. The logic of the chief of police's argument could not be gainsaid. She saw the gathering realization of it in the minds of the men. By trying so desperately to escape the unwelcome attentions of Jem Lorry, she had walked blindly into a trap that could only end in death.

KATHLEEN'S GAZE continued in awful fascination upon John Petty's triumphant face. The man was aglow with a genuine, deep-rooted pleasure that he could not hide. There was no doubt that he had never expected such a victory; and the thrill of it was all the greater because of the immense surprise of it.

Almost reluctantly, she tore her eyes from him and concentrated on the other men. The vague thoughts that had already come from them came now in more concentrated form from each in turn; and there was no doubt what they thought. Death!

The idea gave no particular pleasure to the younger men who, unlike Jem Lorry, had no personal interest in her. But their conviction was a hard, unalterable thing. Death!

It seemed to Kathleen that the final verdict was written in the face of Jem Lorry. The man's whole manner showed his frank dismay. It was a dark, stunning thing that made him suddenly, harshly, exclaim:

"You damned little fool!"

With that, he started to chew viciously on his lower lip, and sank back in his chair, staring moodily at the floor.

She was dazed now; and there seemed little spinning wheels in the back of her head that buzzed and buzzed painfully. She stared for a long, dizzy moment at Kier Gray before she even saw him. With a rising sense of horror she watched the startled frown that creased his forehead, the unconcealed, thunder-struck expression in his eyes. That gave her an instant of courage. He didn't want her dead, or he wouldn't be so startled.

The courage, and the hope that came with it, vanished like a star behind a black, enveloping cloud. His very dismay showed that he had no answer, no solution to the problem that had dropped into the room like a bombshell—slowly his expression changed to impassivity, then a laconic light glowed in his eyes. But she felt no hope until he said:

"Death would perhaps be the necessary solution if it were true that she was in communication with a slan aboard that ship. Fortunately for her, she was telling a lie. There were no slans on the plane. The ship was robot-propelled."

A man barked: "I thought robot-propelled ships could be captured by

a sort of radio interference with their mechanism."

"So they can!" said Kier Gray, still laconically, "You may remember how the slan ship darted straight upward when it disappeared. The slan controllers shot it off like that when they suddenly realized we were sending up tampering rays."

The leader smiled grimly: "We fought the ship down into the swampland a hundred miles south of here. It was pretty badly wrecked, from all reports, and they haven't got it out yet, but it will be taken in due course to the great Cugden machine works where, no doubt, its mechanism will be analyzed." He added: "The reason it took so long was that the robot mechanism was on a slightly different principle, requiring a new combination of radio waves to dominate it."

"All that is unimportant," John Petty snapped impatiently. "What counts is that this slan has been here in the room, has heard our plan to annihilate her people, and may therefore be dangerous to us, in that she will do her best to inform other slans of what we contemplate. She must be killed."

Kier Gray stood up slowly; and the face he bent toward John Petty was grim and dangerous; his voice, when he spoke held a metallic note of exasperation: "I have told you, sir, that I am making a sociological study of this slan, and I will thank you to refrain from further attempts to execute her. You have said some hundred slans are caught and executed every month; and the slans claim that some eleven million others still exist. I hope"—his voice was edged with sarcasm—"I hope I shall be permitted the privilege of keeping one slan alive for scientific purposes; one slan whom, appar-

ently, you hate worse than all the others put together—”

John Petty cut in sharply: “That’s all very well, Kier. What I’d like to know is, why did Kathleen Layton lie about being in communication with the slans?”

Kathleen drew a deep breath; the chill of those few minutes of deadly danger was oozing out of her, but there was still a choked-up sensation of emotion. She said shakily: “Because I knew Jem Lorry was going to try to make me his mistress, and I wanted you to know that I objected.”

She felt the tremor of thoughts that swept out from the men, and saw their facial expressions: Understanding, then impatience.

“For heaven’s sake, Jem,” one exclaimed. “Can’t you keep your love affairs out of Council meetings?”

Another snapped: “With all due respect for Kier Gray, there is something intolerable about a slan objecting to anything that a human being with authority may plan for her. I am curious to see myself what the issue would be from such a mating. Your objections are overruled; and now, Jem, have your guard take her up to your apartment. And I hope that ends this discussion!”

For the first time in her seventeen years, it struck Kathleen that there was a limit to the nervous tension that a slan could endure. There was a tautness inside her, as if somewhere something vital was at the breaking point. She was conscious of no thought of her own. She just sat there, painfully gripping the plastic smoothness of the arms of her chair. Abruptly, she grew aware of a thought inside her brain, a sharp, lashing thought from Kier Gray:

“You little fool! How did you

get yourself into this mess?”

She looked at him then, miserably, seeing for the first time that he was leaning back in his chair, eyes half closed, lips drawn tight. He said finally:

“All this would be very well if such matings needed testing. They don’t. Case histories of more than a hundred slan-human attempts to reproduce children are available in the file library under the heading, ‘Abnormal Marriages.’

“The reasons for the sterility are difficult to define because men and slans do not appear to differ from each other to any marked degree. The amazingly tough musculature of the slan is due, not to a new type of muscle, but to a speeding up of the electro-explosions that actuate the muscles. There is also an increase in the number of nerves to every part of the body, making it tremendously more sensitive.

“The two hearts are not really two hearts, but a combination, each section of which can operate independent of the other. Nor are the two together very much larger than the one original. They’re simply finer pumps.

“Again, the tendrils that send and receive thoughts are growths from formerly little known formations at the top of the brain, which, obviously, must have been the source of all the vague mental telepathy known to earlier human beings and is still practiced by people everywhere.

“So you see that what Samuel Lann did with his mutation machine to his wife, who bore him the first three slan babies—one boy and two girls—six hundred and thirty years ago, has not added anything new to the human body, but change or mutate what already existed.”

It seemed to Kathleen that he

was talking to gain time. In that one brief mental flash from him, there had been overtones of a complete understanding of the situation. He must know that no amount of reasonable argument could dissuade the passions of a man like Jem Lorry; she heard his voice go on:

"I am giving you this information because apparently none of you has ever bothered to investigate the true situation as compared to popular beliefs. Take for instance the so-called superior intelligence of the slan, referred to in the letter received from them today. There is an old illustration on that point

which has been buried by the years; an experiment in which Samuel Lamm, that extraordinary man, brought up a monkey baby, a human baby and a slan baby under rigidly scientific conditions. The monkey was the most precocious, learning within a few months what the slan and the human required considerably longer to assimilate. Then the human and slan learned to talk; and the monkey was hopelessly outdistanced. The slan and the human continued at a fairly even pace until, at the age of four, the slan's powers of mental telepathy began painfully to operate. At this point,



Jommy Cross stared. It was a girl—a slan girl! The first he'd ever seen, and he knew that he could never use his weapon against her.

the slan baby forged into the lead.

"However, Dr. Lann later discovered that by intensification of the human baby's education, it was possible for the latter to catch up to, and remain reasonably level with, the slan, particularly in quickness of mind. The slan's great advantage was the ability to read minds, which gave him an unsurpassable insight into psychology and readier access to the education which the human child could learn only through the medium of ears and eyes—"

JOHN PETTY interrupted in a voice that was thick and harsh: "What you're saying is only what I've known all along, and is the main reason why we can't begin to consider peace negotiations with these . . . these damned artificial beings. In order for a human being to equal a slan, he must strain for years to acquire what comes with the greatest of ease to the slan. In other words, all except the minutest fraction of humanity is incapable of ever being anything more than a slave in comparison to a slan. Gentlemen, there can be no peace but rather an intensification of extermination methods. We can't even risk one of the Machiavellian plans already discussed, because the danger of something going wrong is too great."

"By heaven," said a councilor, "he's right!"

Several voices firmly echoed the conviction; and there was suddenly no doubt which way the verdict would go. Kathleen saw Kier Gray glance keenly from face to face. He said:

"If that is to be our decision, then I should consider it a grave mistake for any one of us at the present time to take this slan as mistress. It might give a wrong impression."

The silence that followed was the

silence of agreement; and Kathleen's gaze leaped to Jem Lorry's face. He met her eyes coolly, rising languidly to his feet as she stood up and made for the door. As she passed him he fell into step at her side.

As he opened the door for her he spoke in a low voice: "It won't be for long, my lady. So don't build up false hopes." And he smiled confidently.

But it was not of his threat that Kathleen was thinking as she walked slowly along the corridor. She was remembering the thunderstruck expression that had come into Kier Gray's face at the moment John Petty had asked for her death.

And it didn't fit. It didn't fit at all with his suave words of a minute later, when he had informed the others that the slan ship was robot-propelled and had been brought down in the marshes. If that was so, then why had he been startled? And if it wasn't so—then Kier Gray had taken the terrific risk of lying for her; and was probably even now worrying about it.

VIII.

JOMMY CROSS stared urgently yet thoughtfully down at the pale, wrecked spectacle that was Granny. There was no rage in him at her betrayal of him, rather a melancholy sense of the inevitability of what had happened. The result was disaster, his future abruptly a vast blank, unplanned, homeless; yet the whole desperate business was simply the product of the rigid forces of Granny's disintegrating character combining with the world-wide slan-human tensions to produce what seemed suddenly a foregone conclusion.

But now the problem was: what to do with the old fool?

She sat almost blithely in a chair, an extravagantly rich and colorful dressing gown swaddled jauntily around her ungainly form. She giggled up at him:

"Granny knows something, yes, Granny knows—" Her words trailed into nonsense, then: "—money, oh, good lord, yes. Granny's got plenty of money for her old age, see!"

With the trusting innocence of a well-stewed old soak, she slid a bulging black bag from inside her dressing gown, then with ostrichlike common sense, jerked it back into hiding.

Jommy Cross was conscious of shock. It was the first time he had actually seen her money, although he had always known her various hiding places. But to have the stuff out here now, with a raid actually in progress—such stupidity deserved the farthest limits of retribution.

But still he stood there, undecided, becoming tenser as the first faint pressure of men's thoughts from outside the shack made an almost impalpable weight against his brain. Dozens of men, edging closer, the snub noses of their sub-machine guns protruding ahead of them.

He frowned blackly. By all rights, he should leave the betrayer to face the rage of the baffled hunters, to face the law which said that every human being, without exception, who was convicted of harboring a slant, must be hanged by the neck until dead.

Through his mind ran the nightmareish picture of Granny on the way to the gallows, Granny shrieking for mercy, Granny fighting to prevent the rope from being placed around her neck, kicking, scratching, slobbering at her captors—*ugh!*"

He reached down and grabbed her

clammy, naked shoulders where the dressing gown was loosely drawn. He shook her with a cold, deadly violence till her teeth rattled, till she sobbed with a dry, horrible pain; and a modicum of sanity came into her eyes. He grated harshly:

"It's death for you if you stay here. Don't you know the law?"

"Huh!" She sat up, briefly startled, then abruptly slipped off again into the cesspools of her mind.

Hurry, hurry, he thought, and forced his brain into that nightmare of squalor to see if his words had brought any basic balance. Just as he was about to give up he found a startled, dismayed, alert little section of sanity, almost buried in the dissolving, incoherent mass that was her thoughts.

"S'all right," she mumbled, "Granny's got plenty of money. Rich people don't get hung. Stand to reason."

JOMMY stepped back from her, indecisive. The weight of the men's minds was a heavy, dragging thing on his brain. They were nearer now, drawing an ever tighter circle. Their numbers appalled him. Even the great weapon in his pocket might be helpless if a hail of bullets swept the resistless walls of the shack. And only one bullet was needed to destroy all his father's dreams—

"By God," he said aloud furiously, "I'm a fool! What will I do with you, even if I get you out? All highways out of the city will be blocked. There's only one real hope, and that'll be almost hopelessly hard even without a drunken old woman to hinder me. I don't fancy climbing a thirty-story building with you on my back—"

Logic said to hell with her. He half turned away; and then, once more, thought of Granny being

strung up came in all its horror. Damn it! Whatever her faults, her very existence had made it possible for him to continue alive. That was a debt which must be paid.

With a single snatching movement he tore the black bag from its hiding place under Granny's dressing gown. She grunted drunkenly, and then awareness seeped into her as he held the bag tantalizingly before her eyes.

"Look," he taunted, "all your money, your whole future. You'll starve; they'll have you scrubbing floors in the poorhouse. They'll whip you."

In fifteen seconds she was sober—a hot, burning soberness that grasped essentials with all the swift, cunning clarity of the hardened criminal.

"Granny'll hang!" she gasped.

"Now we're getting somewhere," Jommy Cross snapped. "Here, take your money." He smiled grimly as she grabbed it from him. "We've got a tunnel to go through. It leads from my bedroom to a private garage at the corner of 470th Street. I've got a key to the car. We'll drive down near the Air Center and steal one of—"

He stopped, conscious of the unutterable flimsiness of that final part of his plan. It seemed completely incredible that the tendriless slans would be so hopelessly organized that he would actually be able to get one of those marvelous spaceships which nightly launched into the sky.

True, he had escaped from them once with absurd ease, but that seemed strangely unreal and unbelievable.

With a gasp, Jommy set the old woman down on the flat roof of the spaceship building. He sank down beside her heavily, his six slim feet of body collapsed onto the roof. For

the first time in his life he was conscious of sheer muscular weariness, contracted from exertion at the full of vibrant health.

"Good heavens," he breathed, "who'd have thought an old woman would weigh so much?"

The old woman was snarling in retrospect terror from that frightful climb. His brain caught the first warning of the burst of fury vituperations that was rising to her lips. His weary muscles galvanized instantly: One swift hand clamped over her mouth.

"Shut up," he hissed, "or I'll drop you over the edge like a sack of potatoes. You're the cause of this horrible situation, and you'd better mind your manners."

His words acted like a dash of cold water. He had to admire the way she recuperated from the desperate terror that had racked her. The old devil certainly had staying powers. She pulled his hand from her mouth and asked sullenly:

"What now?"

"We've got to find a way into the building in as short a time as possible and—"

Time! He glanced at his wrist watch; and, dismayed, leaped to his feet. Twelve minutes to ten!

Twelve minutes before the rocket-ship took off for Mars! Twelve minutes to take control of that ship!

He snatched Granny up, flung her lightly over his shoulder, and raced off toward the center of the roof. Not only was there no time to search for doors, but such doors would obviously be wired and there was even less time to study and nullify the alarm system. There was only one way. Somewhere here must be the runway up which the ships were projected when they launched toward the remote regions of interplanetary space, and—

Abruptly he felt a difference beneath his feet, a vague rise, a gentle bulbousness. He stopped short, teetering on his toes, unbalanced by the violent ending of his racing flight. Carefully he felt his way back to the beginning of the bulbous section. That would be the edge of the runway.

The atomic gun he literally tore from his pocket. Its intolerable disintegrating fire flamed downward.

He peered through the four-foot-in-diameter hole into a great, shining tunnel that sloped into depths at an angle that must have been a tight sixty-five degrees. A hundred, two hundred, three hundred yards of glistening metal tunnel wall; and at the very bottom—

THE SHIP that lay there gradually took on outline as Jommy's eyes grew accustomed to the dim light. There was a torpedo-pointed nose, with dimly visible forward blast tubes distorting the smooth, streamlined effect. A queer, deadly thing, silent and moveless, yet somehow strangely, abnormally menacing.

It was as if he was staring down the barrel of a vast gun, at the shell that was about to be fired. The comparison struck him so sharply that for a long, terrible moment his mind refused to hold the thought of what he must do.

Doubt came in waves as he stood there, a mad stream of discordant thought. Could he dare slide down that glass-smooth slipway when any second a rocketship in all the fury and power of irresistible motion could come smashing up toward the sky?

His body felt tense and cold. With a distinct effort, he lifted his gaze from that paralyzing depth of tunnel and fixed his eyes, at first unsee-

ing, then with gathering fascination, on the distant, looming splendor of the palace. His thought paused abruptly, slowly his body lost tension; for long seconds he just stood there drinking in the glory of the immense, the exquisite jewel that was the palace by night.

It was plainly visible from this height between and beyond two great skyscrapers; and it glowed divinely. There was no mind-staggering, eye-dazzling glare to it. It glowed with a soft, living, wonderful flame that was never the same color for more than a single instant. Glorious, lambent fire that flickered and flashed a thousand combinations; and each combination was subtly, sometimes startlingly, different. Not once was there an exact repetition!

On and on it sparkled, and *lived!* Once, for a long, splendid moment, wild chance turned the tower, that translucent five-hundred-foot fairy tower, a glowing, turquoise blue. And for that amazing instant the visible part of the palace below was nearly all deep, deep red. For one moment—and then the combination shattered into a million bursting fragments of color: blue, red, green yellow. No color, no possible shade of color, was missing from that silent, flaming explosion.

A thousand nights he had fed his soul on its flowing, gorgeous beauty; and now he felt again the sheer, wonderful power. Strength poured from it into him; his courage came back like the unbreakable, indestructible force it was. His teeth clenched; grimly he stared down into the depths, so sharply angled, so smooth in the promise of madly swift passage to the distant, steel-hard bottom.

The very unalloyed danger of it was like a symbol of his future. Blank future, more unpredictable

now than it had ever been. It simply couldn't be that the tendrillless slans could not be aware that he was here on this roof. There must be superb alarm systems—there *must* be!

"What do you keep staring down that hole for?" Granny whined. "Where's the door we want? Time is—"

Thought of time nearly knocked him down. His watch said four minutes to ten, and that seemed to shock even his bones. Eight minutes actually gone, *four* minutes to conquer a fortress.

He caught Granny's thought then, her abrupt awareness of his intention. Just in time his hand slapped at her mouth; and her shriek of dismay stifled against his palm. The next second they were falling, committed irrevocably.

THEY STRUCK the tunnel surface almost gently, as if they had suddenly entered a world of slow motion. The slipway felt, not hard, but yielding beneath his body; and there was only the vaguest sense of motion.

But his eyes and mind were not fooled for an instant. The blunt nose of the spaceship so many hundreds of yards away, in one short moment plunged up at them. The illusion of the ship roaring toward them in full blast was so real that he had to hold the emotional part of his brain in leash, so great was the impulse to panic.

"Quick!" he hissed at Granny. "Use the flat of your hands—*slow down!*"

The old woman needed no urging. Of all the instincts in her misused body, that of survival was immeasurably the strongest. She couldn't have screamed now to save her soul,

but her lips blubbered with fear even as she fought for life. Her beadlike eyes glistened with a horrible, moist terror—but she *fought!* She clung at the gleaming metal, bony hands spread out flat and hard, her legs squeezed against the metal surface; and pitiful though the result was—it helped.

Abruptly, the nose of the ship loomed above Jommy Cross, higher than he had thought; with a desperate strength, he reached up, up at the first thick ring of rocket chambers. His fingers touched the corded, seared metal, skidded—and instantly lost their holds.

He fell back, and only then did he realize that he had risen to the full, stretched-out height of his body. He fell hard, almost stunningly; but instantly, with the desperate, special strength of slan muscles, was up again. His fingers caught one of the big tubes of the second ring of fire chambers with such unbreakable hold that the uncontrollable part of the journey ended at that very moment.

Sick from the strain of too much effort, he let go; and it was as he half sat there, shaking the dizziness out of his head, that he grew aware of the patch of light farther under the immense body of the machine.

The ship was curving so sharply now toward the tunnel floor on which it rested that he had to bend double as he made his way toward it painfully. He was thinking: An open door, here, now, a few short seconds before the great ship is due to leave?

It was a door! A two-foot-in-diameter opening in a foot-thick metal hull, with the hinged door leaning inward. He pushed up into the opening unhesitating, his terrible gun alert for the slightest movement. There was nothing, no one.

In that one swift first glance he saw that this was the control room. There were some chairs, an intricate-looking instrument board, and some great curved, glowing plates on either side of it—and there was an open door leading to the second section of the ship.

It took but a moment to leap inside and to pull the panicky old woman after him; and then, lightly, he jumped for the connecting door.

At the threshold he paused cautiously and peered in. This second room was partly furnished with chairs, the same deep, comfortable chairs as in the control room—but more than half the space was filled with chained-down packing cases.

There were two doors; one led to what was obviously a third section of the long ship, partly open, with more packing cases visible beyond, and, vaguely, a door leading into a fourth compartment. But it was the second door in the second compartment that made Jommy Cross freeze moveless where he was.

It was on the side beyond the chairs and led outside. A blaze of light poured from the great room there into the ship, and there were figures of men. He opened his mind wide. Instantly a thought wash from many brains came to him, so many of them that the combined leakage from behind their defective shields brought dozens of half thoughts, curiously, menacingly, alert thoughts, as if out there scores of tendrillless slans were waiting—for what?

He cut the thought off, whirled toward the instrument board that dominated the whole front part of the control room. The board itself was about a yard wide, two yards long, a metal-mounted bank of glowing tubes and shining mechanisms. There were more than a dozen con-

trol levers of various kinds, all within reach of the finely built chair facing them.

On either side of the instrument board were the great, curved, glossy, semimetallic plates he had already noticed. The concave surface of each towering section glowed with a subdued light of its own.

Utterly strange mechanism! Impossible to solve this alien control system in the few moments at his disposal. Tight-lipped, he sprang forward into the control chair. With swift, deliberately crude purpose he activated every switch and lever in sight.

A door clanged metallically. There was an abrupt, wonderful sense of extraordinary lightness; swift, almost body-crushing forward movement, and then a faint, throbbing bass roar.

Instantly the purpose of the great curved metallike plates became apparent. On the one to the right appeared a picture of the sky ahead. Jommy could see lights and land far below, but the ship was mounting too steeply for the Earth to be more than a distortion at the bottom of the plate.

It was the left visiplat that showed the glory, an incredibly lovely picture of a city of lights, so vast that it staggered the imagination, falling away behind the ship. Far to one side he caught the night splendor of the palace.

And then the city was gone into distance behind them. Carefully he shut off the mechanisms he had actuated, watching for the effect of each in turn. In two minutes the complicated board was solved and the simple machinery under control. The purpose of four of the switches was not clear, but that could wait.

He leveled off, for it was no part of his intention to go out into airless space. That demanded intimate knowledge of every screw and plate in the machine; and his first purpose must be to establish a new, safe base of operations. Then, with his ship to take him where he willed to go—

His brain soared. There was in him suddenly an extravagant sense of sheer power. A thousand things remained to be done, but at last he was out of his cage—old enough and strong enough, mentally and physically, to live a secure, defensive existence.

There were years to be passed, long years that separated him from maturity. All his father's science must be learned, and used! Above all, his first real plan for finding the true slans must be carefully thought out, and the first exploratory moves made. Finally—

The thought ended as he grew abruptly, queerly aware of Granny. The old woman's thought had been a gentle beat against his brain all these minutes. He was aware of her going into the next room; and deep in his mind was a developing picture of what she was seeing. And now—just like that—the picture went dead slow, as if she had suddenly closed her eyes and—

With a gasp, Jommy Cross snatched his gun. He whirled, simultaneously leaping desperately to one side. There was a flash of fire from the doorway that seared across the place where his head had been.

The flame touched the instrument board, then winked out. The tall, magnificently beautiful, full-grown tendrillless slan woman standing in the doorway whipped the muzzle of her little silver gun toward him—then her whole body went rigid as she saw his weapon pointing at her.

They stood like that for a long, frozen moment. The woman's eyes became glittering pools.

"You damned snake!"

In spite of anger, almost because of it, her voice was golden in its vibrant beauty; and abruptly Jommy Cross felt beaten. The sight of her and the sound of her brought sudden poignant memory of his glorious mother, and he knew with a startled sense of helplessness that he could no more blast this marvelous creature out of existence than he could have destroyed his own mother. In spite of his mighty gun threatening her as her weapon threatened him, he was actually utterly at her mercy.

And the way that she had fired at his back showed the hot determination that burned behind those fine gray eyes. Murder! The mad, utterly incomprehensible murder desire of the tendrillless slan against the true slan!

IN SPITE of dismay, Jommy studied her with growing fascination. Slimly, strongly, lithely built, she stood there poised, alert, leaning forward a little breathlessly, one foot slightly forward like a runner tensed for the race. Her right hand holding the silver weapon, was a slender, finely shaped thing, beautifully tanned and supple-looking; her left hand was half hidden behind her, as if she had been walking along briskly, arms swinging freely; and then had frozen in midstride, one arm up and one swung back.

Her dress was a simple tunic, drawn in snugly at her waist, and her head—

What a proudly tilted head it was, hair gleaming dark brown, bobbed and curled; and her face inset in that crown of glorious brown was the epitome of sensitive loveliness: lips not

too full, nose lean and shapely, cheeks delicately molded, yet it was in the subtly shaping of her cheeks that gave her face the power, the sheer intellectual forcefulness.

Her skin was soft and clear, the purest of unblemished complexion; and the gray of her eyes was darkly luminous.

No, he couldn't shoot; he couldn't blast this exquisitely beautiful creature out of existence. And yet—

Yet he must make her think that he could. He stood there, watching the surface of her mind, the little half thoughts that flicked across it. There was in her shield the same quality of incomplete coverage that he had already noticed in the tendriless slans, due probably to their inability to read minds and therefore to realize what complete coverage actually meant.

For the moment he could not allow himself to follow the little memory vibrations that pulsed from her. All that counted was that he was standing here facing this tremendously dangerous woman, his weapon and her weapon leveled, every nerve and muscle in their two bodies pitched to the ultimate key of alertness. Something must be done.

Before Jommy could speak, the woman said:

"This is very foolish. We should sit down, put our weapons on the floor in front of us and talk this thing over. That would relieve the intolerable strain, but our positions would remain materially the same."

JOMMY CROSS felt startled. The very suggestion showed a weakness in the face of danger that was not indicated anywhere in that highly courageous head and face. The fact that she had made it added instantly to the psychological strength of his

position, but he was conscious of suspicion, a distinct conviction that her offer must be examined for special dangers. He said slowly:

"The advantage would be yours. You're a grown-up slan, your muscles are better co-ordinated, you could reach your gun faster than I could reach mine."

She nodded matter-of-factly. "That's true. But, actually, you have the advantage in your ability to watch at least part of my mind."

"To the contrary"—he spoke the lie smoothly. "When your mind shield is up the coverage is so complete that I could not possibly divine your purpose or intention before it was too late."

The very uttering of the words brought him sharp awareness of how incomplete her coverage really was. In spite of his having kept his mind concentrated on danger and out of the trickling stream of her thought, enough had come through to give him a brief but coherent history of the woman.

She was a regular pilot on the Martian way, but this was to be her last trip for many months. The reason being that she had recently married an engineer stationed on Mars, and now she was going to have a baby—so was being assigned to duties that put less strain on her system than the constant pressure of acceleration to which she was subjected in space travel.

Jommy Cross began to feel easier; a newlywed expecting a child was not likely to take desperate chances. He said:

"Very well, let us put our guns down simultaneously and sit down."

When the guns were on the floor, Jommy Cross glanced across at the slan woman, puzzled by the faintly amused smile that twisted her lips.

The smile became broader, more distinctly ironic.

"And now that you have disarmed yourself," she said softly, "you will put up your hands—and prepare to die!"

In unutterable dismay, Jommy Cross stared at the tiny gun that glittered in her left hand. She must have held the toy-sized weapon concealed there all those tense moments,

waiting with a mocking certainty, the opportunity of using it. Her golden-rich voice, beautiful as music, went on:

"So you swallowed all that about my being a poor little bride, with a baby coming and an anxious husband waiting! A full-grown snake wouldn't have been so credulous. As it is, the young snake I'm looking at, will die for his incredible stupidity."

TO BE CONTINUED.

URANIUM ISN'T RARE!

IN view of current interest in uranium as a possible source of atomic power, the following statistics from the Mining Year Book, published by the United States bureau of mines, are not as dry and uninteresting as they might once have seemed. The 1937 Year Book, reviewing 1936, reported that Canada's radium mining activities were producing uranium salts in large quantities. Since fifty-two tons of uranium salts are produced for each gram of radium extracted, the three grams of radium produced in 1936 meant more than one hundred and fifty tons of uranium salts. It was expected that the production might be increased threefold.

About one fourth of the United States' imports of uranium salts came from Canada, the remainder from the Belgian Congo, totaling, in 1936, somewhat more than two hundred thousand pounds.

In 1938, the United States produced from carnotite ores found largely in Colorado, some fifty-two thousand pounds of uranium, extracted from four thousand two hundred and ninety tons of carnotite ore. The price of ninety-six-percent pure uranium oxide in one-hundred-pound lots was between two dollars and sixty-five cents to two dollars and seventy cents a pound.

Drs. Kingdon and Pollock of the General Electric research laboratories have reported that about one part in one hundred and forty of the natural uranium isotope mixture is the desired U-235, and that quantities of about one to ten pounds would be needed to make the self-sustaining chain atomic power reaction take place.



WHITE MUTINY

By Malcolm Jameson

You don't have to start a fight and shoot your officers to mutiny—and the officer's don't have to beat men to drive 'em to mutiny! A rule book skipper in a prize-winning ship is dynamite enough for that!

Illustrated by Schneeman

For the first time in his life, Commander Bullard found himself dreading something—dreading it in-

tensely. And, oddly enough, that something was no more than the routine Saturday inspection. In ten

minutes he would buckle on his sword, that quaint ceremonial relic of antiquity, put on his awkward fore-and-aft hat, and accompany the new captain—Chinnery—through the mazes of the good spaceship *Pollux*.

He sighed helplessly, glanced up at Lieutenant Commander Fraser, thence let his eyes rove to the bookshelf where a fathom's length of canvas bound stood. He stared savagely at them. He had never realized before there were so many of them. Heretofore he had done his duty as he saw it and left chapter and verse to the sky lawyers.

But those fat books contained the awful clauses that regulated the conduct of the Space Guard. There they were—eight thick volumes—of the Regulations Proper. Ranged next were three volumes more of the Ordinance Instructions, and five of the Engineering Instructions. Then came the set relating to Astragation, and the fourteen learned tomes on Interplanetary Law; then the ones on Tactics and Strategy, then—

Bullard shuddered. It was overwhelming. To violate, even unwittingly, any provision contained in that compact library was technically "neglect of duty." And the new skipper was a hound for regulations.

"From here out," he had told Bullard the week before, on the occasion of his confiscation and destruction of all the crew's tailor-made liberty uniforms, "the regulations are in effect. All of them, not just the ones that happen to please you." And Bullard remembered the sullen faces of what had been a happy ship's company as they tossed their trim outfits into the incinerator door. A tapeline in Chinnery's own hands had revealed the clothing much too tight in the waist, and as much as three inches too full in the shoulders. It was, he

said, a clear violation of Article 8878, sections B and D.

So they were destroyed. It did not seem to matter to Chinnery that no self-respecting skyman would allow himself to be seen, even in the lowest dive, clad in the shoddy issue uniform, nor did it matter to him that each of those uniforms stood their owners two or three months' pay. They were non-reg, and that was that. What if the planet girls had a way of judging sailors by their clothes? What if the men sulked and grumbled at their work?

"A couple of days on bread and water will take that out of them," said Chinnery tartly when Bullard had protested. "The question is—are we going to run the ship the way the department wants it, or are we going to pamper the men?"

And Bullard thought back to the glowing report of their last admiral's inspection—that which had brought them all citations and promotions; and to the plaque in control that stated the *Pollux* to be the best all-around ship in the service. To a young man who had been taught that success lay in getting things done, that trophy seemed to be conclusive. Results, it seemed to him, were what counted, not the manner of the doing.

THERE was a rap at the door. It was the captain's orderly. Bullard took the folded paper he bought, read it, frowned, and tossed it onto the desk.

"Tell the captain I'll attend to it," he said to the orderly wearily. It was the umpty-umph message of the sort he had received in the past ten days.

"The captain said you were to answer forthwith in writing," said the orderly stiffly. His manner was punctiliously correct, yet there was

the hint of insolence in the way he said it. Orderlies of man-baiting captains soon acquire the manner.

Bullard shot him a hard look, then reached for Volume II of the Regulations. The paper was upside down to Carlson, but he could read it.

From: Commanding Officer

To: Executive Officer.

Subject: Duties.

Reference: Art. 2688, SS Regs.

1. It has been brought to my attention that reference is not being complied with.

2. You are directed to explain in writing at once the reasons for this dereliction in duty on your part.

CHINNERY.

Bullard found Article 2688, read it and gaped. It merely said:

The executive officer shall wind the chronometer.

"Damnation," he muttered, and pushed the button for his yeoman. He dictated three terse sentences. The *Pollux's* chronometer behaved perfectly, it was wound daily by the assistant navigator, as was the practice in the fleet, the executive officer did not understand the commanding officer's allusion to dereliction in duty.

Bullard gnawed his lip while the yeoman rapped out the letter, then signed it and handed it without a word to the waiting orderly.

Within two minutes the orderly was back.

"The captain says," said the orderly, with even more of an undertone of insolence, "that he is not interested in the so-called customs of the service. He says that the regulations require the executive to wind the chronometer, and that there is nothing about delegating the duty to some subordinate. And that hereafter he wants straightforward answers to his memos, not evasive alibis."

Bullard glared at the man, the color mounting to his face. The orderly returned the look with a cool stare.

"He said you were to acknowledge the—"

"Get out of here!" roared Bullard, rising and thumping his desk.

"He's riding you, that's what, the dumb fathead!" exclaimed Fraser as the orderly disappeared down the passage. "He's still sore over the way you showed him up at that admiral's inspection. He's envious, he's yellow—"

"Easy!" warned Bullard. "After all, he's our superior officer."

"Superior, my eye!" snorted Fraser. "He's got more rank, yes. But it burns me up to even look at the slob. And every time I see that smart-Aleck orderly I want to swing on him. That goes for that slippery ship's writer, too. Think of you having to wind the chronometer personally! Why, how—"

"How?" laughed Bullard harshly. "If you think that's something, look at this. He sent it in just before you came."

He tossed Fraser the earlier memo.

"Phew!" whistled the gunnery officer, popping his eyes.

"Yes," said Bullard bitterly. "Article 2751 says that the exec shall satisfy himself that the quarterly inventories are correct, but you see that his nibs construes that to mean an item-by-item personal check—and that don't mean sampling, either."

"What about all those firebricks in D-66? I used to do those by the cubic yard, but they are carried on the books by number—"

"I have to count 'em—the whole damn forty-two thousand some-odd of 'em."

"How will we ever get anything done?" asked Fraser blankly. He,

like every other officer in the ship, had received his own quota of Captain Chinnery's curt queries as to this regulation and that. He had long since abandoned informal gunnery drills. All his gunner's mates were up to their necks, compiling lists of spare parts, motor serial numbers, and immersed in such other paper work.

"Thar she blows," remarked Bullard dully as the gong began to tap for quarters. He reached for his sword and cocked hat. "Well, let's go and get the bad news."

BAD NEWS it was. Smug, plump little Chinnery stayed a long time in each compartment, blandly pointing out technical flaws. The only thing in the ship that seemed to please him were the ill-fitting, badly-dyed issue uniforms of the crew—made by the female convicts to kill time on bleak Juno. The disgruntled, sour looks of the men seemed not to disturb him at all. His ambition was to have the perfect ship—on paper—and his coup had been duly entered in the log. The reviewer in the department would read that and know of his zeal, whereas subtleties—like morale—were not so readily conveyed in cold type.

In sub-CC the inspecting party made its usual pause. The captain's eye lit on the old-style annunciator panel hung on the bulkhead above the intership communication board. He reached up and struck the glass-ite cover sharply with the heel of his hand. A black card bearing the number "24-B" dropped into view.

"What does that mean?" he barked at the unhappy operator, a recruit just come aboard. "What do you do when one of those drops?"

"I . . . I don't know, sir. N-nobody ever told me—"

"What!" squealed Chinnery.

"Here you are, intrusted with the watch, and don't know what to do when a magazine is on fire? Bullard! What is the meaning of this?" He swung viciously on Bullard, puckering his fat face into what was meant to be a stern expression.

"That board—" began Bullard patiently. But Chinnery cut him off.

"Never mind that. I know what the board is. Why has not this man been instructed in his duties?"

"Because—" Bullard tried a second time, but the captain was not listening.

"Never mind the alibi. Yeoman! Take a note . . . for the commander's record . . . about this. Let's see, that makes Specification No. 14 under the charge of 'neglect of duty,' doesn't it?"

"Seventeen, sir," answered the yeoman, riffling through the pages of his notebook.

"Hm-m-m," muttered Chinnery.

"But—" objected Bullard, his wrath rising.

"But me no buts, young man. I am beginning to see that your vaunted efficiency was mostly luck. Imagine! Having a phone operator on watch who does not know what to do in case of a magazine fire!"

He turned to the now thoroughly frightened lad and, in what was meant to be a soothing voice, said:

"That, my boy, is an indicator of high magazine temperatures. If a number should ever drop, flood that magazine immediately—then notify me. The controls are to your right—there."

Bullard, purple with fury, restrained himself. Then he caught Fraser's solemn wink and decided to let it go. Fraser knew as well as he did that the board was no longer connected with the thermocouples in the powder storerooms. The dropping of a number could only mean that

the board had been jarred, a thing that had occurred before, with embarrassing consequences. It was for that reason that this alarm system had been condemned and replaced by a better one in Central. That was why there was a job order on file for its complete removal the very next time they were back to the home yard on Luna.

Similar outbursts on the part of the captain took place in other spots, but it was not until they were inside the port torpedo rooms that his legalistic mind showed itself in its fullest flower. He laid his hand on a curious bulge in the inboard bulkhead.

"What is behind this?" he demanded.

"The original torpedo hoists," replied Fraser, "but we use the magnetic ones altogether now. These are blanked off with plating to keep dirt from accumulating in them."

"Ah," said Chinnery, "I seem to remember." He sent his yeoman scurrying back to the cabin for his file of quarterly reports. After he had returned, Chinnery turned his scowl on Fraser.

"More negligence," he said. "No routine tests, no monthly operating by hand, no quarterly reports for more than three years. No inventories or requisitions for spare parts. Don't the regulations mean *anything* to you?"

Fraser looked at his captain in blank amazement.

"Tut, tut," said Chinnery testily, "don't stand there like a gaping fool. The point is that the hoists are still installed, whether you use them or not. And since they are installed, they are subject to the usual maintenance routine and reports."

"But, captain," interposed Bullard, "the only reason they are still here is because, being obsolete, the

department figured it was cheaper to abandon them in place and blank them in than to tear them out. Moreover, we can't run them monthly—the leads to the motors have been removed."

"Then run new ones," snapped the captain, "and replace the motors, if necessary."

"Aye, aye, sir," growled Bullard.

This was the last straw. If Chinnery kept this sort of think up, the ship would be a raving madhouse before the month was out—absolutely ruined as a fighting ship. There is nothing that takes the spirit out of men and officers more than useless, foolish work—particularly when done at the expense of something truly worth while.

BULLARD was soon to learn, however, that his troubles had just begun. In his capacity as executive officer, it fell to him to pass Chinnery's silly orders on to his juniors, who in their turn passed them on to the men, grumbling and venting themselves of caustic side remarks as they did. As for the men, they merely sulked, doggedly doing what they were told. Smoldering resentment was obvious everywhere, and it finally came to a head the day Chinnery slapped four men in the brig and put Lieutenant Carlson under hack for ten days. Their exact offense was not clearly understood, but the captain characterized it as "officiousness." They had done something on their own, not waiting for his direct order.

"But, commander," pleaded Fraser, "we can't go on this way. We had the finest ship in the whole damn service, but what have we got now? A madhouse! She's going to hell right under our noses. The men are on the verge of mutiny . . . both Benton and Tobleman had been dis-

rated, a rank injustice . . . and I hear—”

“Yes, I know,” replied Bullard morosely. He sat a moment in a brown study. He knew that a round robin was being circulated, that committees of petty officers had been formed, and that there were rocks ahead.

“Get those men up here,” said Bullard suddenly, “and Carrick, too, the pharmacist.”

When they came, Bullard looked them over steadily as they lined up before his desk. He knew them well, and they him. They were the mainstay of the ship—the real leaders of the crew—the men upon whom the officers depended to get things done. Men like those could make or break a captain. Bullard read their faces and thought back gratefully to a certain gruff old bos'n who had tactfully deflated him when he was a fresh-caught snotty. Some of that off-the-record discipline from beneath upward had been hard to take, but he knew now that he was a better officer for it.

“Men,” he said, looking straight at them, “we have a tough assignment. We have a new captain. He is . . . well, *different* from Captain Dongan. He is more . . . er . . . regulation-minded, if you know what I mean.”

“Yes, sir,” chorused the men, “we know.”

“The refuge of an incompetent,” blurted out Fraser indignantly. “He knows damn well that as long as he sticks to the book they can't hang him, no matter what happens to the ship. But just let somebody exercise a little initiative, a little common sense, and right away his neck is in a tight. It *might* turn out wrong. He's yellow, I tell you. Bah!”

“An outburst like that may relieve the emotions, Fraser,” said Bullard

calmly, “but it does not alter the situation. Captain Chinnery is still the skipper, and as such he is much more than a man. He is a symbol . . . the symbol of the supreme authority. Moreover, every order he has issued has been strictly legal. Any refusal on our part to carry them out merely ruins us and hurts him not at all. We have no choice but to comply.”

“And see the ship go merrily to hell!” Fraser was outraged.

“Perhaps.”

It was then that Fraser and the three silent enlisted men first noted the half smile playing on Bullard's lips and the fleeting twinkle in his eye.

“Supposing,” remarked Bullard dryly, fixing his eyes on the rows of books, “it does. There will be an investigation, naturally. Blame will be fixed. They always start at the top. I propose to let them stop there. I, for one, do not mean to accept the buck.”

“Meaning?”

“Meaning that the only possible course open to us is co-operation.”

“Co-operation?” Fraser's laugh was hard and dry. Benton and his comrades remained silent.

“Exactly. Captain Chinnery complains of misplaced initiative. Well, let's cut out initiative. He wan's a 'reg' ship. Let's bone the book—turn sky lawyers. Let's do what we're told—and *not one damn thing more!*”

Bullard let his glance drift back to the three stolid men and the flushed officer before him. He noted Benton and Tobelman as they wiped the grins from their faces, and saw Fraser's hot indignation fade as comprehension dawned.

“Not bad . . . not bad,” said the latter slowly. “Fight fire with fire, eh?”

"We'll pass the word, sir," came from Benton, and the other two men grinned frankly then, "co-operation it will be."

"Good," said Commander Bullard, and promptly immersed himself in Volume 2 of Regulations. None but a god, omnipotent and with all eternity to do it in, could expect to do all the things required of an executive officer, but he could try, paragraph by paragraph, just as they came.

He looked at 2707.

From time to time, the executive officer shall satisfy himself, by personal inspection, that boat boxes are in order—

"Ah," breathed Bullard, "I'll beat him to that one." And he walked out onto the broad fin where the boats were cradled. One hundred and nineteen items in each boat box—and there were eight boats! It would take two days' work, that simple duty alone!

II.

IT WAS about two weeks after that that the rumors began to fly about the revival of banditry on Neptune. Only spaceships could cope with them, for over that jagged and precipitous terrain and in that airless sky the usual planetary gendarmerie could not operate effectively. The scuttlebutt was more and more persistent that one of the larger ships of the Jovian Patrol was about to be detached and sent there to wipe the villains out.

Bullard made a wry face when he heard of it, for the most likely ship was, of course, the *Pollux*. Ironically enough, Admiral Abercrombie's last report of her unequivocally pronounced her to be the ship best fitted for emergency duty. Yet Bullard knew, as every man jack aboard—unless Chinnery himself be excepted—that the *Pollux* of a scant four

months before was a thing of the past, a legend. Morale? It was to laugh! Or weep.

Only three days before, the starboard condenser had sprung a leak, and when it was reported to the captain he went to have a look.

"Well, pull it down and roll in that tube," he snapped.

Benton's men turned to, pulled it down, and rolled the tube. Then they replaced the shell, laboriously made all the connections and put it back in service. An hour later two more tubes went.

"Hell's bells!" squealed Chinnery when they told him. "How can that be? You were in that condenser only yesterday. Couldn't you see those other two tubes were about to go?"

"You told us to roll the leaky one, sir," said Benton, his face the ultimate in dead pan. He might have added that it was not the tubes that were at fault, but a warped header. But he was not asked that.

"Such stupidity!" muttered Captain Chinnery. "Very well, yank it down again and do it all over."

"The one we did yesterday?" asked Benton, registering faint surprise.

"No, fool, the two that just blew out!"

"Yes, sir."

Bullard looked on impassively. Chinnery's tart words of a few weeks past still burned. "When I want anything done, I'll order it—this ship is not so complicated that one man can't do the thinking for it."

Yet, as he recalled that, knowing that that very morning the condenser had been pulled down for the third time, he wondered just how the *Pollux* could get to Neptune, if ordered, and what she could do if she got there. Bullard shrugged, and dismissed the matter from his mind. That was Chinnery's worry. Then

he looked up to see the goat-getting orderly standing by his desk with the inevitable memorandum in his hand.

Listlessly Bullard took it and read:

In view of our probable departure shortly for one of the outer planets, you will take such action as may be necessary to insure that no contraband is brought on board. Section 10,009, SS Regs.)

Bullard straightened up in his chair and frowned. He knew without looking what the reference was—it was the *one* article in the book that even the most arrant martinet found it expedient to ignore. That is, where Neptune and Pluto were concerned. For Martian *joola-joola*, the forbidden beverage, was the only known specific against the mysterious and invisible radiations emanated by those cold and rocky dim planets. Out there it did not intoxicate—it was a vital stimulant. Yet since the control board were Puritanical Earthlings, the space guard had never been able to have the article modified. Hence the unwritten law of the service that its breach must be winked at.

The young exec knew that the returning liberty party would be well heeled with the stuff—cleverly enough concealed to save the face of the O. D., who, at least, had to go through the motions of upholding the regulations. He glanced at the clock. It was well after five, 10 time, and shortly boats would start coming back. He got up uneasily and walked out toward the exit port. He had learned something about Chinnery's methods and he feared dirty work of some sort.

"What is that gadget?" Bullard asked of Ensign Pitto, the officer of the deck, pointing to a contraption being erected in the gangway.

"A field fluorescope, sir. Captain's

orders. They are setting up the X-ray tube behind that sheet of canvas across the passage."

Bullard scowled at the layout, then hurried to his office. Lately he had learned to suppress anger, but at the moment it was hard. For he saw instantly through the captain's malicious plan. Apparently Chinnery, when it suited his purposes, knew how to evade the regulations, too. To be sure he was right, Bullard snatched down the volume entitled "Pertaining to Enlisted Personnel." Yes, it was there. The men had *some* rights.

14,075: Neither the person nor the effects of any enlisted man may be searched except upon good and sufficient grounds. Except in cases of suspected theft, and where a man has a known bad record, a man's own statement that he possesses no contraband shall be deemed sufficient—

"So," he murmured grimly, "a search that is not a search. A slinking, slimy way to smear the records of hundreds of men—and to hang me on the rebound." He slammed the book shut. "Well—he'll do neither."

TWENTY MINUTES later, Bullard jumped out of one of the gyrocopters that were acting as tenders for the ship. The landing stage was still empty, but soon it would be full of returning skymen, their arms full of bundles—innocent purchases—and somewhere else upon them the forbidden *joola-joola*. And out at the ship, Captain Chinnery waited craftily with his trap all set.

"Hold the next boat for the ship until I get back," Bullard said hastily to Lieutenant Carlson, who was handling the beach guard. With that he dashed off to the nearest liquor dive.

On his way he passed a number of the *Pollux's* men, heading for the boat landing. They saluted sheep-

ishly, still painfully self-conscious for having to wear the unsightly issue uniforms that made them pariahs on shore.

By the time he reached the liquor joint, though, it was empty. Or almost. In one corner, almost concealed by a post, sat the captain's yeoman—Ship's Writer Norvick. As the door slammed behind Bullard, he saw the yeoman fold up a notebook and slide it into a pocket. Ranged on the bar stood a row of flat curved-glass bottles, most of them empty. The bartender was filling the others from a huge demijohn of the delicate violet *joola-joola*.

"Aha," thought Bullard, "check and double check, eh? Chinnery's chief spy is getting the dope at the source!"

He turned abruptly and strode from the place. He had seen enough. The belly flasks lined up on the bar told him how the stuff was being smuggled. The presence of the skipper's snooping yeoman, coupled with the waiting X-ray machine at the gangway of the *Pollux* told him how the captain had planned to trip him up—and most of the crew with him.

He bounded toward the landing stage, inwardly raging. But his anger did not cloud his thought. At every step he turned over some new plan for defeating the captain's scheme. He was actuated, as he had been when he had proposed non-co-operative co-operation to forestall overt mutiny, by the highest motives. He wanted to save the crew—and the junior officers—from their small-minded incompetent captain. Constantly goaded as they were by picayune quibbling and nagging, he was fearful of an outright rupture. And in that event everybody would lose.

It was a situation he found galling, for, like the crew, he was capable

of the fiercest loyalty—if properly led. It was unfortunate that out of such a generally splendid service the crack crew of the *Pollux* should draw a weak sister for a captain, a man who hid his lack of ability behind the technicalities of the printed word. But it had. The thing to do was make the best of it.

BULLARD'S heart fell when he reached the landing stage. Carlson had finished his superficial inspection and already loaded the men into the boat, which stood waiting to shove off. That was bad, for if it could be proved that the men had carried the liquor into one of the ship's tenders it was the same as having taken it on board the *Pollux* herself. Bullard's plan for warning the men while still beyond the jurisdiction of the space guard was unworkable. And as he saw the yeoman Norvick had come along behind him, he knew that calling the liberty party back ashore so they could get rid of the contraband would be worse than doing nothing. Like a flash, he changed his plans.

"Out of the boat, all you men, and fall in on the dock. Single rank."

Several of the waiting men blinked in surprise at the order, but they got out of the boat and fell in.

"I have orders," said Bullard slowly, "to see that no contraband goes aboard. But before I question you on that score, I will make a brief uniform inspection."

He turned around to where a patrolman stood behind him twirling an oak nightstick.

"Lend me that a moment," said Bullard, and took the stick.

He paused before the first man in line and looked him up and down. The skin-tight issue trousers afforded no hiding place for anything. Yes, it must be all in belly flasks. Thoughtfully he extended the club

and gently tapped the rigid skyman on his blouse, just above the middle. There was a faint clink.

Pam! With a quick and unexpected stroke, Bullard brought the stick down harder. Then he stepped on to the next man. Behind him he thought he heard the *tinkle-tinkle* of glass fragments raining on the pavement, but he did not look back. Again the tentative tap, again the sharp, sudden blow, again the muffled crash—and a slowly widening damp spot on the barbarous issue uniform. Bullard did not give it a glance, but stepped forward. Somewhere in the background someone snickered, but the young exec's face was a study in nonexpression.

Fourteen times down that line he detected the telltale clink, and fourteen times he swatted. Then he stood back, looking the men in the face, not at the small, widening puddles of violet something at their feet.

"Have any of you men any contraband substance in your possession?"

"No, sir!"

The yell was in unison, as if previously rehearsed. Bullard's face almost cracked into a wide grin, but he managed to get the better of it.

"Embark!" he said.

The men got back into the boat, Norvick among them. Bullard was about to follow when he saw a fresh group of men coming down the dock, Benton and Carrick among them. Bullard walked to meet them.

"When you get aboard, Carrick," said Bullard in the most matter-of-fact way, "you had better check up on the operation of your X-ray-fluoroscope outfit. Captain Chinnery is using it at the gangway."

"The sunnuva—" began Carrick.

"Pipe down!" growled Benton to Carrick. Then to the commander, "Thank you, sir; we'll be coming out in the next boat."

"Splendid," said Bullard, and there was just the slightest little jerk of his right eyelid. Benton wheeled and spread out his arms to the group of skyemen assembling for the boat.

"Back, men. I want to talk to you."

"Shove off," said Bullard to the coxswain, settling himself among the slightly damp and odoriferous men he had just inspected. He shot one look at the ship's writer sitting opposite him with a crooked little smile on his face, as if he was sucking the marrow out of some private joke, then looked out at the fleeting Ionian landscape. He shrugged. There was no contraband in *this* boat. Nor, in so far as anybody could prove, had ever been.

"You're hair-splitting, Bullard, and that is all there is to it!"

Chinnery was fairly screaming with rage. "You should have arrested those men, confiscated the bottles for evidence, and brought them to me to—"

"My orders," said Bullard, struggling for calm expression, "said to take such action as may be necessary to prevent contraband being brought aboard. To the best of my knowledge, none was. Those orders are in my safe, awaiting the court of inquiry the *Pollux* is certain to have before—"

"The court-martial *you* are sure to have!" yelled the captain. "For I have an independent witness who saw those flasks of *joola-joola*—"

"Saw flasks filled with a pale-violet liquid," corrected Bullard coolly. "Unhappily, they were flimsy flasks, and the stuff is lost. There is no way to prove what was in them. So far as I know, it was that perfume they make from the Ganymedean *plimiris* bloom."

A boat bell clanged.

"Never mind," said Chinnery, triumph supplanting his petulant anger, "step with me to the gangway. The moment I heard of your pusillanimous behavior I sent a message to the beach guard that there was to be no more belly-patting inspections."

Bullard followed along with considerably mixed feelings. He had the utmost reliance on Benton's quickness of perception and on his versatility. What fruit had the veiled warning he had thrown out brought?

"Here are three of them," said Ensign Pitto, motioning toward the three skymen lined up against the bulkhead. "The rest were clean."

"Aha!" gloated Chinnery, shooting an I-told-you-so look at the discomfited Bullard.

The three men were the three outstanding petty officers of the ship—Benton, Tobelman, and Carrick. Chinnery stooped and squinted at the fluoroscope. Bullard could not help seeing, too. Each of the men had a flat, rectangular package under his jacket athwart his navel. The shape was unmistakable—*joola-joola* bottles! Made of lead glass, they showed up like a sore thumb.

"Search them—strip them!" yelled the captain, sure of his victory.

"Sir, we protest." It was Benton who spoke. "We pledge our word we have no contraband. You have no right—"

"Carry out my orders!" screamed the captain, turning in fury on the bos'n's mate of the watch.

In a moment the jackets were ripped away and the flask-shaped objects snatched out of the tight belts of the three protesting men.

"W-w-what the—" Captain Chinnery turned one of them over and over in his hands, absolutely nonplused. The slab was slightly curved and of a sort of plaster. On the face

of it was a crude bas-relief of a heifer and a scribbled inscription reading, "Souvenir of the Ionian Barium Mines, made of one of our products—gamma-ray-resisting barium plaster."

For a moment Captain Chinnery stood stupidly staring at the thing he was twisting in his hands. Then he dashed it to the deck and strode off down the passage, combing his hair with agitated fingers and muttering, "Damn, damn, damn!" Bullard looked after the departing figure and began to laugh. In an instant the whole corridor was reverberating with the howls of twenty laughing men as the next boatload of men poured through the port and down toward their lockers. Ensign Pitto, mystified and baffled by the entire proceedings, looked wonderingly on, not bothering to use the now discredited fluoroscope again.

Benton picked up his plaster *objet-d'art* and stuck it back under his belt.

"Somebody owes me a quart," he said to a man passing.

"You'll get it," said the man. "Two of 'em."

III.

THE precipitous walls of Nereus Crater ringed them like a huge Coliseum. The face of every man in the control room of the *Pollux* was set in hard, grim lines. They were anxious, and many of them wondered whether they had been so smart, after all. For they were hurtling straight downward toward the ragged cone in the center at hideous velocity, and everyone of them knew the ship about them was a semiwreck. Half her engine room was torn apart—for routine tests—and the same applied to her battery. She could hardly be worked. It was problematical whether she could be fought. And

in this crater were said to be more than a thousand of the toughest rascals who ever slit a throat.

Yet as each man turned over in his mind his own contribution to the chaos, he could not help recall some saying of the captain. Throughout the cramped room through the mind of one or another of them ran the memory of such curt and devastating sayings as these—all quotations from Captain Chinnery:

"When I want information, I'll ask for it."

"I'm long on ideas, young man. All I expect of you is execution."

"Never mind why—I tell you to do it."

"Of course it handicaps gunfire—but the regulations call for it."

"Cancel the drill—you have three quarterly reports to get out."

"You exceed your authority! Wait for orders hereafter!"

And on and on. You were damned if you did, damned if you didn't. When a man cannot be pleased, nobody tries.

Captain Chinnery set the counterblasts to raging, and the fall of the ship was checked with a shudder. Fraser was searching the horizon for the bandit lair. Then of a sudden the roar of the exhaust sputtered and stopped. Chinnery angrily barked into the engine-room communicator.

"Who stopped those motors?"

"Fuel exhausted, sir."

Chinnery paled. No one spoke, but all knew the inevitable answer. And the cause. They would crash, for the hydrogen tubes could not be limbered up in time. And the reason for it was that Chinnery had refused to O. K. the last uranium requisition on the ground the ship had already exceeded her quarterly allowance!

Chinnery threw in the antigravity units, but they were weak and it was too late. The *Pollux* struck, at some-

where about ninety miles an hour, bounced high in the airless sky, then struck again, nose down. The lights went out, then came on. Men picked themselves up, nursing bruises, and looked at one another and the disordered compartments about them.

"Fire in all magazines!" came the startling announcement over the loud speakers. "Magazines flooded."

Bullard groaned. His non-co-operative co-operation had gone farther than he meant it to.

Pasted on the annunciator board in sub-CC were the captain's orders—to flood whenever any of those unconnected monitors showed! The jar of falling had brought them all down, of course, and the operator following the rule of blind obedience had done as he was told. The ship's guns were useless.

Chinnery looked sick, but he still had a grip on himself.

"Get up torpedoes," he directed. "Seeing us like this, they may attack at any moment."

"Can't," said Fraser without making any bones of it. "No hoists working."

"What!" bleated Chinnery.

"Right. You wanted those original ones operated—for the record. Well, we did. But to do it we had to rob the real hoists of their motors. It'll take another day to get them back again."

A bell began a clamorous clanging.

"A number of men headed this way across the crater floor," sang out the lookout. "There are tanks with them, and a caterpillar gun of some kind."

"Do something, Bullard," said Chinnery in a pleading voice, turning white-faced to his young exec. "You're a resourceful fellow."

"I am at your command, captain," said Bullard stiffly. "What is it you wish me to do?"

"They are setting that gun," the lookout informed them. "It's due west of us—nearly astern, as we lie. The men on foot are deploying at the foot of the slope."

"Fit out the landing force," managed Chinnery, finding his voice after the third gulp.

"Sorry," said Bullard, "but the small-arms magazine is flooded. Our ray guns are in there, too. There are no weapons available, unless it's the cutlery in the galley. Your order, you know—nothing ever to be left out of magazines."

The ship shuddered. There was a quick succession of staccato reports as a metallic hail beat against her armored sides. The brigands' gun was getting the range.

"The party on foot has a heat gimlet," reported the lookout. "They are working their way around to the north."

"Commence firing!" squeaked Chinnery. He was near to fainting.

"What with?" asked Fraser, having no wish to spare him.

Suddenly Chinnery got a grip on himself and straightened up. Wildly he looked around at the silent, accusing, unhelpful faces. Then he addressed Bullard.

"You win, Bullard. From the very first I recognized it would be you or me. But organized mutiny is too much. I yield—for the good of the ship. Take over. Do it your way." His voice trailed away. Then he drooped across the chart rack and vomited. "Black mutiny," he muttered, over and over again. "Black mutiny and insubordination."

Bullard's lip curled in scorn.

"What order of yours was ever refused? What threat was ever made you? And now, after you've wrecked us, you want to quit. Because you don't know what to do. You're yellow!"

Bullard glared at the cringing figure.

"But," he went on, not regarding the now persistent hail of pellets against the hull, "under your precious library of rules, you *can't* quit. Not while you are alive and well. The captain cannot duck his responsibility—not ever!"

"I'm a sick man," wailed Chinnery, sliding to the deck.

Bullard jerked his head toward the surgeon, Lieutenant Herilon.

"He's sick, all right," said Herilon after an examination of about one second. "Diagnosis: blue funk. Prognosis: terrible. In other words, he's unfit for duty."

"Very well, then," said Bullard. "I'll take over. But, doc, be sure that gets in the log."

The doc grinned. The ship had gotten regulation-minded, all right.

BULLARD went into action like a prodded bobcat.

"Benton! Warm up those old stern tubes and get ready to shoot measured blasts.

"Harris! Break out those two heavy jacks and take 'em outside. Set one on each side of the ship and slue her around until our stern bears on that bandit gun.

"Tobelman! Wangle half a dozen of your torps out of their brackets, stick 'em on dollies and manhandle 'em the best way you can to the rocket room.

"Carlson, you compute the ballistic. I'm firing torpedoes that way. You know the Neptune gravity, and there's a vacuum outside. Benton'll give you the pressure tables."

"The tubes are bigger than the torps," said Carlson.

"I know. Build up your torps with wire-rope grommets until they fit!"

Bullard paused for breath. Then

he saw Norvick, slightly green about the gills, huddled in a corner.

"You—captain's yeoman! Grab your notebook and get busy." Bullard's voice was harsh and his eye was hard. "I want you to put down every breach of the regulations that happens from now on. Begin with the one—whatever its number is—that says you can't divert engineering material to the use of the ordinance department. And mind you, if you miss a single one, you're up for a court!"

"Yes, sir," whimpered the amazed ship's writer, but he dragged out his bulky notebook.

The lookout was reporting again.

"Those men are about halfway up the hill now. They have some other machine with them—can't make it out."

"Fraser!" shouted Bullard. "How long will it take you to convert that big exhaust blower in the topside fin to a centrifugal machine gun? Do you know what kind of an animal that is?"

"Yes, sir. I do. About five shakes of a lamb's tail!"

"Get at it. Only do it in four."

"Aye, aye, sir. But ammunition?"

"There are three or four tons of assorted ball bearings in storeroom D-60. I'll see that you get 'em."

In a couple of minutes Bullard ceased bellowing orders. He wiped his eyes and shook his head. He was beginning to feel queer, sickly sensations. Of a sudden a dread came over him that at any moment he would cave in. He took a deep breath, but it did no good. Then he noticed his hands were trembling.

"The radiations are getting bad, sir," reported the doctor. "Several men have caved in already. I'm administering *suprene*, but it does not seem to be very effective."

Bullard knew then what had gone wrong with him.

"Don't waste time with that stuff," he said impatiently. "Serve out a slug of *joola-joola* all around."

"There's none on board," said Herilon. "I tried—"

"The hell there isn't! There's gallons of it. Just ask Carrick, or Tobelman, or—"

Herilon had gone, on the jump.

The ship shook. That time it was from her own recoil. Carlson had shot his first torpedo from the stern rocket tubes. There was a moment's wait for the spot, then a second one went.

"That group's through," reported Carlson gleefully a moment later. "Boy! What a mess those torps do make!"

"Help Fraser with the other crowd."

Ten minutes later, fortified by a double shot of *joola-joola*, Bullard watched the terrible execution on the downslope to starboard. First there was the singing whine as the high-speed motor worked up to velocity, then the rattle as the hopperful of ball bearings fell against the swift-revolving vanes. Then, under the wide-flung hail of that super-colossal blunderbuss, the oncoming pirates crumpled. Their mystery machine stood a moment later alone and untended in the midst of their piled-up corpses.

"That seems to be all of them," said Bullard. "Tell Benton to stand by to pull out of this hole with the old rockets. We'll get more uranium as soon as we get to base."

ADMIRAL MIKE DONGAN lifted his eyebrows at the mass of paper Bullard laid before him. Old Captain Mike, after his promotion, had been sent to the outer zone as force commander. So it was to him, in Tethys

Advanced Base, that Bullard reported.

"But—" puzzled the old man. Bullard had never gone in heavily for paper work when he knew him on the *Pollux*.

"That first stack," explained Bullard, "are the accumulated charges against me up to the moment I took temporary command—"

"Bosh," said Admiral Mike Dongan, glancing over the topmost sheet. He dumped the lot in the wastebasket.

"The other stack lists the things I did wrong to get the old *Pollux* out of the hole. I never knew until—"

"Really?" said Captain Mike, more attentive. He slid open a drawer of his desk and carefully laid the damning documents inside. "These are more to the point. I want to forward these to the control board." He shut the drawer, then locked it.

Bullard did not know exactly what reaction those papers were going to bring, but certainly he had not anticipated *that*. It was disconcerting.

"You see," said Admiral Mike, studying the curling smoke from his cigar, "I have been authorized to prepare another volume of the Regulations—"

Bullard winced.

"—to be entitled 'Instructions for Procedure in Extraordinary Emergencies'"—the admiral kept tugging at another drawer—"umph . . . and this . . . umph . . . is just the sort of thing we want for it."

By then the old man had the drawer open, and out of it he fished a gleaming crystal beaker half filled with the aromatic forbidden juice of Mars. He filled two glasses with the violet liqueur.

"Of course, before Captain Chinery was put on the retired list this morning, he did submit quite a lengthy list of your . . . er . . . *derelictions*, I believe he called them —"

"Yes?" said Bullard, on tenderhooks.

"Here's to 'em," said the admiral, hoisting his glass, and admiring the delicate color. He took a sip.

"But fourteen charges and God knows how many specifications—"

"Nobody gives a damn," said the admiral with great decision. "You got the bandits, didn't you—all of 'em? You brought the *Pollux* in, didn't you? What the hell! Drink hearty, boy—you've got my old job. You're skipper of the *Pollux* now!"

THE END.





FAREWELL TO THE MASTER

By Harry Bates

The robot was harmless, in fact couldn't be moved in any way whatever—till a newsman stuck his nose in where it didn't belong!

Illustrated by F. Kramer

FROM his perch high on the ladder above the museum floor, Cliff Sutherland studied carefully each line and

shadow of the great robot, then turned and looked thoughtfully down at the rush of visitors come

from all over the Solar System to see Gnut and the traveler for themselves and to hear once again their amazing, tragic story.

He himself had come to feel an almost proprietary interest in the exhibit, and with some reason. He had been the only free-lance picture reporter on the Capitol grounds when the visitors from the Unknown had arrived, and had obtained the first professional shots of the ship. He had witnessed at close hand every event of the next mad few days. He had thereafter photographed many times the eight-foot robot, the ship, and the beautiful slain ambassador, Klaatu, and his imposing tomb out in the center of the Tidal Basin, and, such was the continuing news value of the event to the billions of persons throughout habitable space, he was there now once more to get still other shots and, if possible, a new "angle."

This time he was after a picture which showed Gnut as weird and menacing. The shots he had taken the day before had not given quite the effect he wanted, and he hoped to get it today; but the light was not yet right and he had to wait for the afternoon to wane a little.

The last of the crowd admitted in the present group hurried in, exclaiming at the great pure green curves of the mysterious time-space traveler, then completely forgetting the ship at sight of the awesome figure and great head of the giant Gnut. Hinged robots of crude manlike appearance were familiar enough, but never had Earthling eyes lain on one like this. For Gnut had almost exactly the shape of a man—a giant, but a man—with greenish metal for man's covering flesh, and greenish metal for man's bulging muscles. Except for a loin cloth, he was nude. He stood like the powerful god of the machine of some undreamed-of

scientific civilization, on his face a look of sullen, brooding thought. Those who looked at him did not make jests or idle remarks, and those nearest him usually did not speak at all. His strange, internally illuminated red eyes were so set that every observer felt they were fixed on himself alone, and he engendered a feeling that he might at any moment step forward in anger and perform unimaginable deeds.

A slight rustling sound came from speakers hidden in the ceiling above, and at once the noises of the crowd lessened. The recorded lecture was about to be given. Cliff sighed. He knew the thing by heart; had even been present when the recording was made, and met the speaker, a young chap named Stillwell.

"Ladies and gentlemen," began a clear and well-modulated voice—but Cliff was no longer attending. The shadows in the hollows of Gnut's face and figure were deeper; it was almost time for his shot. He picked up and examined the proofs of the pictures he had taken the day before and compared them critically with the subject.

As he looked a wrinkle came to his brow. He had not noticed it before, but now, suddenly, he had the feeling that since yesterday something about Gnut was changed. The pose before him was the identical one in the photographs, every detail on comparison seemed the same, but nevertheless the feeling persisted. He took up his viewing glass and more carefully compared subject and photographs, line by line. And then he saw that there *was* a difference.

With sudden excitement, Cliff snapped two pictures at different exposures. He knew he should wait a little and take others, but he was so sure he had stumbled on an important mystery that he had to get go-

ing, and quickly folding his accessory equipment he descended the ladder and made his way out. Twenty minutes later, consumed with curiosity, he was developing the new shots in his hotel bedroom.

WHAT Cliff saw when he compared the negatives taken yesterday and today caused his scalp to tingle. Here was a slant indeed! And apparently no one but he knew! Still, what he had discovered, though it would have made the front page of every paper in the Solar System, was after all only a lead. The story, what really had happened, he knew no better than anyone else. It must be his job to find out.

And that meant he would have to secrete himself in the building and stay there all night. That very night; there was still time for him to get back before closing. He would take a small, very fast infrared camera that could see in the dark, and he would get the real picture and the story.

He snatched up the little camera, grabbed an aircab and hurried back to the museum. The place was filled with another section of the ever-present queue, and the lecture was just ending. He thanked Heaven that his arrangement with the museum permitted him to go in and out at will.

He had already decided what to do. First he made his way to the "floating" guard and asked a single question, and anticipation broadened on his face as he heard the expected answer. The second thing was to find a spot where he would be safe from the eyes of the men who would close the floor for the night. There was only one possible place, the laboratory set up behind the ship. Boldly he showed his press credentials to the second guard, stationed at the partitioned passageway leading to it,

stating that he had come to interview the scientists; and in a moment was at the laboratory door.

He had been there a number of times and knew the room well. It was a large area roughly partitioned off for the work of the scientists engaged in breaking their way into the ship, and full of a confusion of massive and heavy objects—electric and hot-air ovens, carboys of chemicals, asbestos sheeting, compressors, basins, ladles, a microscope, and a great deal of smaller equipment common to a metallurgical laboratory. Three white-smocked men were deeply engrossed in an experiment at the far end. Cliff, waiting a good moment, slipped inside and hid himself under a table half buried with supplies. He felt reasonably safe from detection there. Very soon now the scientists would be going home for the night.

From beyond the ship he could hear another section of the waiting queue filing in—the last, he hoped, of the day. He settled himself as comfortably as he could. In a moment the lecture would begin. He had to smile when he thought of one thing the recording would say.

Then there it was again—the clear, trained voice of the chap Stillwell. The foot scrapings and whispers of the crowd died away, and Cliff could hear every word in spite of the great bulk of the ship lying interposed.

"LADIES and gentlemen," began the familiar words, "the Smithsonian Institution welcomes you to its new Interplanetary Wing and to the marvelous exhibits at this moment before you."

A slight pause. "All of you must know by now something of what happened here three months ago, if indeed you did not see it for yourself in the telescreen," the voice went on.

"The few facts are briefly told. A little after 5:00 p. m. on September 16th, visitors to Washington thronged the grounds outside this building in their usual numbers and no doubt with their usual thoughts. The day was warm and fair. A stream of people was leaving the main entrance of the museum, just outside in the direction you are facing. This wing, of course, was not here at that time. Everyone was homeward bound, tired no doubt from hours on their feet, seeing the exhibits of the museum and visiting the many buildings on the grounds nearby. And then it happened.

"On the area just to your right, just as it is now, appeared the time-space traveler. It appeared in the blink of an eye. It did not come down from the sky; dozens of witnesses swear to that; it just appeared. One moment it was not here, the next it was. It appeared on the very spot it now rests on.

"The people nearest the ship were stricken with panic and ran back with cries and screams. Excitement spread out over Washington in a tidal wave. Radio, television, and newspapermen rushed here at once. Police formed a wide cordon around the ship, and army units appeared and trained guns and ray projectors on it. The direst calamity was feared.

"For it was recognized from the very beginning that this was no spaceship from anywhere in the Solar System. Every child knew that only two spaceships had ever been built on Earth, and none at all on any of the other planets and satellites; and of those two, one had been destroyed when it was pulled into the Sun, and the other had just been reported safely arrived on Mars. Then, the ones made here had a shell of a strong aluminum alloy, while

this one, as you see, is of an unknown greenish metal.

"The ship appeared and just sat here. No one emerged, and there was no sign that it contained life of any kind. That, as much as any single thing, caused excitement to skyrocket. Who, or what, was inside? Were the visitors hostile or friendly? Where did the ship come from? How did it arrive so suddenly right on this spot without dropping from the sky?

"For two days the ship rested here, just as you now see it, without motion or sign that it contained life. Long before the end of that time the scientists had explained that it was not so much a spaceship as a space-time traveler, because only such a ship could arrive as this one did—materialize. They pointed out that such a traveler, while theoretically understandable to us Earthmen, was far beyond attempt at our present state of knowledge, and that this one, activated by relativity principles, might well have come from the far corner of the Universe, from a distance which light itself would require millions of years to cross.

"When this opinion was disseminated, public tension grew until it was almost intolerable. Where had the traveler come from? Who were its occupants? Why had they come to Earth? Above all, why did they not show themselves? Were they perhaps preparing some terrible weapon of destruction?

"And where was the ship's entrance port? Men who dared go look reported that none could be found. No slightest break or crack marred the perfect smoothness of the ship's curving ovoid surface. And a delegation of high-ranking officials who visited the ship could not, by knocking, elicit from its occu-

pants any sign that they had been heard.

"At last, after exactly two days, in full view of tens of thousands of persons assembled and standing well back, and under the muzzles of scores of the army's most powerful guns and ray projectors, an opening appeared in the wall of the ship, and a ramp slid down, and out stepped a man, godlike in appearance and human in form, closely followed by a giant robot. And when they touched the ground the ramp slid back and the entrance closed as before.

"It was immediately apparent to all the assembled thousands that the stranger was friendly. The first thing he did was to raise his right arm high in the universal gesture of peace; but it was not that which impressed those nearest so much as the expression on his face, which radiated kindness, wisdom, the purest nobility. In his delicately tinted robe he looked like a benign god.

"At once, waiting for this appearance, a large committee of high-ranking government officials and army officers advanced to greet the visitor. With graciousness and dignity the man pointed to himself, then to his robot companion, and said in perfect English with a peculiar accent, 'I am Klaatu,' or a name that sounded like that, 'and this is Gnut.' The names were not well understood at the time, but the sight-and-sound film of the television men caught them and they became known to everyone subsequently.

"And then occurred the thing which shall always be to the shame of the human race. From a treetop a hundred yards away came a wink of violet light and Klaatu fell. The assembled multitude stood for a moment stunned, not comprehending what had happened. Gnut, a

little behind his master and to one side, slowly turned his body a little toward him, moved his head twice, and stood still, in exactly the position you now see him.

"Then followed pandemonium. The police pulled the slayer of Klaatu out of the tree. They found him mentally unbalanced; he kept crying that the devil had come to kill every one on Earth. He was taken away, and Klaatu, although obviously dead, was rushed to the nearest hospital to see if anything could be done to revive him. Confused and frightened crowds milled about the Capitol grounds the rest of the afternoon and much of that night. The ship remained as silent and motionless as before. And Gnut, too, never moved from the position he had come to rest in.

"Gnut never moved again. He remained exactly as you see him all that night and for the ensuing days. When the mausoleum in the Tidal Basin was built, Klaatu's burial services took place where you are standing now, attended by the highest functionaries of all the great countries of the world. It was not only the most appropriate but the safest thing to do, for if there should be other living creatures in the traveler, as seemed possible at that time, they had to be impressed by the sincere sorrow of us Earthmen at what had happened. If Gnut was still alive, or perhaps I had better say functionable, there was no sign. He stood as you see him during the entire ceremony. He stood so while his master was floated out to the mausoleum and given to the centuries with the tragically short sight-and-sound record of his historic visit. And he stood so afterward, day after day, night after night, in fair weather and in rain, never moving or showing by any slightest sign that he was aware

of what had gone on.

"After the interment, this wing was built out from the museum to cover the traveler and Gnut. Nothing else could very well have been done, it was learned, for both Gnut and the ship were far too heavy to be moved safely by any means at hand.

"YOU HAVE HEARD about the efforts of our metallurgists since then to break into the ship, and of their complete failure. Behind the ship now, as you can see from either end, a partitioned workroom has been set up where the attempt still goes on. So far its wonderful greenish metal has proved inviolable. Not only are they unable to get in, but they cannot even find the exact place from which Klaatu and Gnut emerged. The chalk marks you see are the best approximation.

"Many people have feared that Gnut was only temporarily deranged, and that on return to function might be dangerous, so the scientists have completely destroyed all chance of that. The greenish metal of which he is made seemed to be the same as that of the ship and could no more be attacked, they found, nor could they find any way to penetrate to his internals; but they had other means. They sent electrical currents of tremendous voltages and amperages through him. They applied terrific heat to all parts of his metal shell. They immersed him for days in gases and acids and strongly corroding solutions, and they have bombarded him with every known kind of ray. You need have no fear of him now. He cannot possibly have retained the ability to function in any way.

"But—a word of caution. The officials of the government know that visitors will not show any disrespect in this building. It may be that the

unknown and unthinkably powerful civilization from which Klaatu and Gnut came may send other emissaries to see what happened to them. Whether or not they do, not one of us must be found amiss in our attitude. None of us could very well anticipate what happened, and we all are immeasurably sorry, but we are still in a sense responsible, and must do what we can to avoid possible retaliations.

"You will be allowed to remain five minutes longer, and then, when the gong sounds, you will please leave promptly. The robot attendants along the wall will answer any questions you may have.

"Look well, for before you stand stark symbols of the achievement, mystery, and frailty of the human race."

The recorded voice ceased speaking. Cliff, carefully moving his cramped limbs, broke out in a wide smile. If they knew what he knew!

For his photographs told a slightly different story from that of the lecturer. In yesterday's a line of the figured floor showed clearly at the outer edge of the robot's near foot; in today's, *that line was covered*. Gnut had moved!

Or been moved, though this was very unlikely. Where was the derrick and other evidence of such activity? It could hardly have been done in one night, and all signs so quickly concealed. And why should it be done at all?

Still, to make sure, he had asked the guard. He could almost remember verbatim his answer:

"No, Gnut has neither moved nor been moved since the death of his master. A special point was made of keeping him in the position he assumed at Klaatu's death. The floor was built in under him, and the scientists who completed his derangement

erected their apparatus around him, just as he stands. You need have no fears."

Cliff smiled again. He did not have any fears.

Not yet.

II.

A MOMENT later the big gong above the entrance doors rang the closing hour, and immediately following it a voice from the speakers called out, "Five o'clock, ladies and gentlemen. Closing time, ladies and gentlemen."

The three scientists, as if surprised it was so late, hurriedly washed their hands, changed to their street clothes and disappeared down the partitioned corridor, oblivious of the young picture man hidden under the table. The slide and scrape of the feet on the exhibition floor rapidly dwindled, until at last there were only the steps of the two guards walking from one point to another, making sure everything was all right for the night. For just a moment one of them glanced in the doorway of the laboratory, then he joined the other at the entrance. Then the great metal doors clanged to, and there was silence.

Cliff waited several minutes, then carefully poked his way out from under the table. As he straightened up, a faint tinkling crash sounded at the floor by his feet. Carefully stooping, he found the shattered remains of a thin glass pipette. He had knocked it off the table.

That caused him to realize something he had not thought of before: A Gnut who had moved might be a Gnut who could see and hear—and really be dangerous. He would have to be very careful.

He looked about him. The room was bounded at the ends by two fiber partitions which at the inner ends

followed close under the curving bottom of the ship. The inner side of the room was the ship itself, and the outer was the southern wall of the wing. There were four large high windows. The only entrance was by way of the passage.

Without moving, from his knowledge of the building, he made his plan. The wing was connected with the western end of the museum by a doorway, never used, and extended westward toward the Washington Monument. The ship lay nearest the southern wall, and Gnut stood out in front of it, not far from the northeast corner and at the opposite end of the room from the entrance of the building and the passageway leading to the laboratory. By retracing his steps he would come out on the floor at the point farthest removed from the robot. This was just what he wanted, for on the other side of the entrance, on a low platform, stood a paneled table containing the lecture apparatus, and this table was the only object in the room which afforded a place for him to lie concealed while watching what might go on. The only other objects on the floor were the six manlike robot attendants in fixed stations along the northern wall, placed there to answer visitors' questions. He would have to gain the table.

He turned and began cautiously tiptoeing out of the laboratory and down the passageway. It was already dark there, for what light still entered the exhibition hall was shut off by the great bulk of the ship. He reached the end of the room without making a sound. Very carefully he edged forward and peered around the bottom of the ship at Gnut.

He had a momentary shock. The robot's eyes were right on him!—or so it seemed. Was that only the effect of the set of his eyes, he won-

dered, or was he already discovered? The position of Gnut's head did not seem to have changed, at any rate. Probably everything was all right, but he wished he did not have to cross that end of the room with the feeling that the robot's eyes were following him.

He drew back and sat down and waited. It would have to be totally dark before he essayed the trip to the table.

He waited a full hour, until the faint beams from the lamps on the grounds outside began to make the room seem to grow lighter; then he got up and peeped around the ship once more. The robot's eyes seemed to pierce right at him as before, only now, due no doubt to the darkness, the strange internal illumination seemed much brighter. This was a chilling thing. Did Gnut know he was there? What were the thoughts of the robot? What *could* be the thoughts of a man-made machine, even so wonderful a one as Gnut?

It was time for the cross, so Cliff slung his camera around on his back, went down on his hands and knees, and carefully moved to the edge of the entrance wall. There he fitted himself as closely as he could into the angle made by it with the floor and started inching ahead. Never pausing, not risking a glance at Gnut's unnerving red eyes, moving an inch at a time, he snaked along. He took ten minutes to cross the space of a hundred feet, and he was wet with perspiration when his fingers at last touched the one-foot rise of the platform on which the table stood. Still slowly, silently as a shadow, he made his way over the edge and melted behind the protection of the table. At last he was there.

He relaxed for a moment, then, anxious to know whether he had been seen, carefully turned and

looked around the side of the table.

Gnut's eyes were now full on him! Or so it seemed. Against the general darkness, the robot loomed a mysterious and still darker shadow that, for all his being a hundred and fifty feet away, seemed to dominate the room. Cliff could not tell whether the position of his body was changed or not.

But if Gnut were looking at him, he at least did nothing else. Not by the slightest motion that Cliff could discern did he appear to move. His position was the one he had maintained these last three months, in the darkness, in the rain, and this last week in the museum.

CLIFF made up his mind not to give away to fear. He became conscious of his own body. The cautious trip had taken something out of him—his knees and elbows burned and his trousers were no doubt ruined. But these were little things if what he hoped for came to pass. If Gnut so much as moved, and he could catch him with his infrared camera, he would have a story that would buy him fifty suits of clothes. And if on top of that he could learn the purpose of Gnut's moving—provided there was a purpose—that would be a story that would set the world on its ears.

He settled down to a period of waiting; there was no telling when Gnut would move, if indeed he would move that night. Cliff's eyes had long been adjusted to the dark and he could make out the larger objects well enough. From time to time he peered out at the robot—peered long and hard, till his outlines wavered and he seemed to move, and he had to blink and rest his eyes to be sure it was only his imagination.

Again the minute hand of his watch crept around the dial. The

inactivity made Cliff careless, and for longer and longer periods he kept his head back out of sight behind the table. And so it was that when Gnut did move he was scared almost out of his wits. Dull and a little bored, he suddenly found the robot out on the floor, halfway in his direction!

But that was not the most frightening thing. It was that when he did see Gnut he did not catch him moving! He was stopped as still as a cat in the middle of stalking a mouse. His eyes were now much brighter, and there was no remaining doubt about their direction: he was looking right at Cliff!

Scarcely breathing, half hypnotized, Cliff looked back. His thoughts tumbled. What was the robot's intention? Why had he stopped so still? Was he being stalked? How could he move with such silence?

In the heavy darkness Gnut's eyes moved nearer. Slowly but in perfect rhythm the almost imperceptible sound of his footsteps beat on Cliff's ears. Cliff, usually resourceful enough, was this time caught flat-footed. Frozen with fear, utterly incapable of fleeing, he lay where he was while the metal monster with the fiery eyes came on.

For a moment Cliff all but fainted, and when he recovered, there was Gnut towering over him, legs almost within reach. He was bending slightly, burning his terrible eyes right into his own!

Too late to try to think of running now. Trembling like any cornered mouse, Cliff waited for the blow that would crush him. For an eternity, it seemed, Gnut scrutinized him without moving. For each second of that eternity Cliff expected annihilation, sudden, quick, complete. And then suddenly and unexpectedly it was over. Gnut's body straightened

and he stepped back. He turned. And then, with the almost jerkless rhythm which only he among robots possessed, he started back toward the place from which he came.

Cliff could hardly believe he had been spared. Gnut could have crushed him like a worm—and he had only turned around and gone back. Why? It could not be supposed that a robot was capable of human considerations.

Gnut went straight to the other end of the traveler. At a certain place he stopped and made a curious succession of sounds. At once Cliff saw an opening, blacker than the gloom of the building, appear in the ship's side, and it was followed by a slight sliding sound as a ramp slid out and met the floor. Gnut walked up the ramp and, stooping a little, disappeared inside the ship.

Then, for the first time, Cliff remembered the picture he had come to get. Gnut had moved, but he had not caught him! But at least now, whatever opportunities there might be later, he could get the shot of the ramp connecting with the opened door; so he twisted his camera into position, set it for the proper exposure, and took a shot.

A long time passed and Gnut did not come out. What could he be doing inside? Cliff wondered. Some of his courage returned to him and he toyed with the idea of creeping forward and peeping through the port, but he found he had not the courage for that. Gnut had spared him, at least for the time, but there was no telling how far his tolerance would go.

AN HOUR passed, then another. Gnut was doing something inside the ship, but what, Cliff could not imagine. If the robot had been a human being, he knew he would have



Sutherland froze; that giant metal figure was not helpless! It had moved!

sneaked a look, but as it was, he was too much of an unknown quantity. Even the simplest of Earth's robots under certain circumstances were inexplicable things; what, then, of this one, come from an unknown and even unthinkable civilization, by far the most wonderful construction ever

seen—what superhuman powers might he not possess? All that the scientists of Earth could do had not served to derange him. Acid, heat, rays, terrific crushing blows—he had withstood them all; even his finish had been unmarred. He might be able to see perfectly in the dark.

And right where he was, he might be able to hear or in some way sense the least change in Cliff's position.

More time passed, and then, some time after two o'clock in the morning, a simple homely thing happened, but a thing so unexpected that for a moment it quite destroyed Cliff's equilibrium. Suddenly, through the dark and silent building, there was a faint whir of wings, soon followed by the piercing, sweet voice of a bird. A mocking bird. Somewhere in the gloom above his head. Clear and full throated were its notes; a dozen little songs it sang, one after the other without pause between—short insistent calls, twirings, coaxings, cooings—the spring love song of perhaps the finest singer in the world. Then, as suddenly as it began, the voice was silent.

If an invading army had poured out of the traveler, Cliff would have been less surprised. The month was December; even in Florida the mocking birds had not yet begun their song. How had one gotten into that tight, gloomy museum? How and why was it singing there?

He waited, full of curiosity. Then suddenly he was aware of Gnut, standing just outside the port of the ship. He stood quite still, his glowing eyes turned squarely in Cliff's direction. For a moment the hush in the museum seemed to deepen; then it was broken by a soft thud on the floor near where Cliff was lying.

He wondered. The light in Gnut's eyes changed, and he started his almost jerkless walk in Cliff's direction. When only a little away, the robot stopped, bent over, and picked something from the floor. For some time he stood without motion and looked at a little object he held in his hand. Cliff knew, though he could not see, that it was the mock-

ing bird. Its body, for he was sure that it had lost its song forever. Gnut then turned, and without a glance at Cliff, walked back to the ship and again went inside.

HOURS PASSED while Cliff waited for some sequel to this surprising happening. Perhaps it was because of his curiosity that his fear of the robot began to lessen. Surely if the mechanism was unfriendly, if he intended him any harm, he would have finished him before, when he had such a perfect opportunity. Cliff began to nerve himself for a quick look inside the port. And a picture; he must remember the picture. He kept forgetting the very reason he was there.

It was in the deeper darkness of the false dawn when he got sufficient courage and made the start. He took off his shoes, and in his stocking feet, his shoes tied together and slung over his shoulder, he moved stiffly but rapidly to a position behind the nearest of the six robot attendants stationed along the wall, then paused for some sign which might indicate that Gnut knew he had moved. Hearing none, he slipped along behind the next robot attendant and paused again. Bolder now, he made in one spurt all the distance to the farthest one, the sixth, fixed just opposite the port of the ship. There he met with a disappointment. No light that he could detect was visible within; there was only darkness and the all-permeating silence. Still, he had better get the picture. He raised his camera, focused it on the dark opening, and gave the film a comparatively long exposure. Then he stood there, at a loss what to do next.

As he paused, a peculiar series of muffled noises reached his ears, apparently from within the ship. Ani-

mal noises—first scrapings and pantings, punctuated by several sharp clicks, then deep, rough snarls, interrupted by more scrapings and pantings, as if a struggle of some kind were going on. Then suddenly, before Cliff could even decide to run back to the table, a low, wide, dark shape bounded out of the port and immediately turned and grew to the height of a man. A terrible fear swept over Cliff, even before he knew what the shape was.

In the next second Gnut appeared in the port and stepped unhesitatingly down the ramp toward the shape. As he advanced it backed slowly away for a few feet; but then it stood its ground, and thick arms rose from its sides and began a loud drumming on its chest, while from its throat came a deep roar of defiance. Only one creature in the world beat its chest and made a sound like that. The shape was a gorilla!

And a huge one!

Gnut kept advancing, and when close, charged forward and grappled with the beast. Cliff would not have guessed that Gnut could move so fast. In the darkness he could not see the details of what happened; all he knew was that the two great shapes, the titanic metal Gnut and the squat but terrifically strong gorilla, merged for a moment with silence on the robot's part and terrible, deep, indescribable roars on the other's; then the two separated, and it was as if the gorilla had been flung back and away.

The animal at once rose to its full height and roared deafeningly. Gnut advanced. They closed again, and the separation of before was repeated. The robot continued inexorably, and now the gorilla began to fall back down the building. Suddenly the beast darted at a manlike shape against the wall, and with one

rapid side movement dashed the fifth robot attendant to the floor and decapitated it.

Tense with fear, Cliff crouched behind his own robot attendant. He thanked Heaven that Gnut was between him and the gorilla and was continuing his advance. The gorilla backed farther, darted suddenly at the next robot in the row, and with strength almost unbelievable picked it from its roots and hurled it at Gnut. With a sharp metallic clang, robot hit robot, and the one of Earth bounced off to one side and rolled to a stop.

CLIFF CURSED himself for it afterward, but again he completely forgot the picture. The gorilla kept falling back down the building, demolishing with terrific bursts of rage every robot attendant that he passed and throwing the pieces at the implacable Gnut. Soon they arrived opposite the table, and Cliff now thanked his stars he had come away. Then followed a brief silence. Cliff could not make out what was going on, but he imagined that the gorilla had at last reached the corner of the wing and was trapped.

If he was, it was only for a moment. The silence was suddenly shattered by a terrific roar, and the thick, squat shape of the animal came bounding toward Cliff. He came all the way back and turned just between Cliff and the port of the ship. Cliff prayed frantically for Gnut to come back quickly, for there was now only the last remaining robot attendant between him and the madly dangerous brute. Out of the dimness Gnut did appear. The gorilla rose to its full height and again beat its chest and roared its challenge.

And then occurred a curious thing. It fell to all fours and slowly rolled

over on its side, as if weak or hurt. Then panting, making frightening noises, it forced itself again to its feet and faced the oncoming Gnut. As it waited, its eye was caught by the last robot attendant and perhaps Cliff, shrunk close behind it. With a surge of terrible destructive rage, the gorilla waddled sideward toward Cliff, but this time, even through his panic, he saw that the animal moved with difficulty, again apparently sick or severely wounded. He jumped back just in time; the gorilla pulled out the last robot attendant and hurled it violently at Gnut, missing him narrowly.

That was its last effort. The weakness caught it again; it dropped heavily on one side, rocked back and forth a few times, and fell to twitching. Then it lay still and did not move again.

The first faint pale light of the dawn was seeping into the room. From the corner where he had taken refuge, Cliff watched closely the great robot. It seemed to him that he behaved very queerly. He stood over the dead gorilla, looking down at him with what in a human would be called sadness. Cliff saw this clearly; Gnut's heavy greenish features bore a thoughtful, grieving expression new to his experience. For some moments he stood so, then, as might a father with his sick child, he leaned over, lifted the great animal in his metal arms and carried it tenderly within the ship.

Cliff flew back to the table, suddenly fearful of yet other dangerous and inexplicable happenings. It struck him that he might be safer in the laboratory, and with trembling knees he made his way there and hid in one of the big ovens. He prayed for full daylight. His thoughts were chaos. Rapidly, one after another, his mind churned up

the amazing events of the night, but all was mystery; it seemed there could be no rational explanation for them. That mocking bird. The gorilla. Gnut's sad expression and his tenderness. What could account for a fantastic melange like that!

Gradually full daylight did come. A long time passed. At last he began to believe he might yet get out of that place of mystery and danger alive. At 8:30 there were noises at the entrance, and the good sound of human voices came to his ears. He stepped out of the oven and tip-toed to the passageway.

The noises stopped suddenly and there was a frightened exclamation and then the sound of running feet, and then silence. Stealthily Cliff sneaked down the narrow way and peeped fearfully around the ship.

There Gnut was in his accustomed place, in the identical pose he had taken at the death of his master, brooding sullenly and alone over a space traveler once again closed tight and a room that was a shambles. The entrance doors stood open and, heart in his mouth, Cliff ran out.

A few minutes later, safe in his hotel room, completely done in, he sat down for a second and almost at once fell asleep. Later, still in his clothes and still asleep, he staggered over to the bed. He did not wake up till midafternoon.

III.

CLIFF AWOKE slowly, at first not realizing that the images tumbling in his head were real memories and not a fantastic dream. It was recollection of the pictures which brought him to his feet. Hastily he set about developing the film in his camera.

Then in his hands was proof that the events of the night were real. Both shots turned out well. The first

showed clearly the ramp leading up to the port as he had dimly discerned it from his position behind the table. The second, of the open port as snapped from in front, was a disappointment, for a blank wall just back of the opening cut off all view of the interior. That would account for the fact that no light had escaped from the ship while Gnut was inside. Assuming Gnut required light for whatever he did.

Cliff looked at the negatives and was ashamed of himself. What a rotten picture man he was to come back with two ridiculous shots like these! He had had a score of opportunities to get real ones—shots of Gnut in action—Gnut's fight with the gorilla—even Gnut holding the mocking bird—spine-chilling stuff!—and all he had brought back was two stills of a doorway. Oh, sure, they were valuable, but he was a Grade A ass.

And to top this brilliant performance, he had fallen asleep!

Well, he'd better get out on the street and find out what was doing.

Quickly he showered, shaved, and changed his clothes, and soon was entering a nearby restaurant patronized by other picture and newsmen. Sitting alone at the lunch bar, he spotted a friend and competitor.

"Well, what do *you* think?" asked his friend when he took the stool at his side.

"I don't think anything until I've had breakfast," Cliff answered.

"Then haven't you heard?"

"Heard what?" fended Cliff, who knew very well what was coming.

"You're a fine picture man," was the other's remark. "When something really big happens, you are asleep in bed." But then he told him what had been discovered that morning in the museum; and of the world-wide excitement at the news.

Cliff did three things at once, successfully—gobbled a substantial breakfast, kept thanking his stars that nothing new had transpired, and showed continuous surprise. Still chewing, he got up and hurried over to the building.

OUTSIDE, balked at the door, was a large crowd of the curious, but Cliff had no trouble gaining admittance when he showed his press credentials. Gnut and the ship stood just as he had left them, but the floor had been cleaned up and the pieces of the demolished robot attendants were lined up in one place along the wall. Several other competitor friends of his were there.

"I was away; missed the whole thing," he said to one of them—Gus. "What's supposed to be the explanation for what happened?"

"Ask something easy," was the answer. "Nobody knows. It's thought maybe something came out of the ship, maybe another robot like Gnut. Say—where have you been?"

"Asleep."

"Better catch up. Several billion bipeds are scared stiff. Revenge for the death of Klaatu. Earth about to be invaded."

"But that's—"

"Oh, I know it's all crazy, but that's the story they're being fed; it sells news. But there's a new angle just turned up, very surprising. Come here."

He led Cliff to the table where stood a knot of people looking with great interest at several objects guarded by a technician. Gus pointed to a long slide on which were mounted a number of short dark-brown hairs.

"Those hairs came off a large male gorilla," Gus said with a certain hard-boiled casualness. "Most of them were found among the sweep-

ings of the floor this morning. The rest were found on the robot attendants."

Cliff tried to look astounded. Gus pointed to a test tube partly filled with a light amber fluid.

"And that's blood, diluted—gorilla blood. It was found 'on Gnut's arms."

"Good Heaven!" Cliff managed to exclaim. "And there's no explanation?"

"Not even a theory. It's your big chance, wonder boy."

Cliff broke away from Gus, unable to maintain his act any longer. He couldn't decide what to do about his story. The press services would bid heavily for it—with all his pictures—but that would take further action out of his hands. In the back of his mind he wanted to stay in the wing again that night, but—well, he simply was afraid! He'd had a pretty stiff dose, and he wanted very much to remain alive.

He walked over and looked a long time at Gnut. No one would ever have guessed that he had moved, or that there had rested on his greenish metal face a look of sadness. Those weird eyes! Cliff wondered if they were really looking at him, as they seemed, recognizing him as the bold intruder of last night. Of what unknown stuff were they made—those materials placed in his eye sockets by one branch of the race of man which all the science of his own could not even serve to disfunction! What was Gnut thinking? What could be the thoughts of a robot—a mechanism of metal poured out of man's clay crucibles? Was he angry at him? Cliff thought not. Gnut had had him at his mercy—and had walked away.

Dared he stay again?

Cliff thought perhaps he did.

He walked about the room, think-

ing it over. He felt sure Gnut would move again. A Mikton ray gun would protect him from another gorilla—or fifty of them. He did not yet have the real story. He had come back with two miserable architectural stills!

He might have known from the first that he would stay. At dusk that night, armed with his camera and a small Mikton gun, he lay once more under the table of supplies in the laboratory and heard the metal doors of the wing clang to for the night.

This time he would get the story—and the pictures.

If only no guard was posted inside!

IV.

CLIFF LISTENED hard for a long time for any sound which might tell him that a guard had been left, but the silence within the wing remained unbroken. He was thankful for that—but not quite completely. The gathering darkness and the realization that he was now irrevocably committed made the thought of a companion not altogether unpleasant.

About an hour after it reached maximum darkness he took off his shoes, tied them together and slung them around his neck, down his back, and stole quietly down the passageway to where it opened into the exhibition area. All seemed as it had been the preceding night. Gnut loomed an ominous, indistinct shadow at the far end of the room, his glowing red eyes again seemingly right on the spot from which Cliff peeped out. As on the previous night, but even more carefully, Cliff went down on his stomach in the angle of the wall and slowly snaked across to the low platform on which stood the table. Once in its shelter,

he fixed his shoes so that they straddled one shoulder, and brought his camera and gun holster around, ready on his breast. This time, he told himself, he would get pictures.

He settled down to wait, keeping Gnut in full sight every minute. His vision reached maximum adjustment to the darkness. Eventually he began to feel lonely and a little afraid. Gnut's red-glowing eyes were getting on his nerves; he had to keep assuring himself that the robot would not harm him. He had little doubt but that he himself was being watched.

Hours slowly passed. From time to time he heard slight noises at the entrance, on the outside—a guard, perhaps, or maybe curious visitors.

At about nine o'clock he saw Gnut move. First his head alone; it turned so that the eyes burned stronger in the direction where Cliff lay. For a moment that was all; then the dark metal form stirred slightly and began moving forward—straight toward himself. Cliff had thought he would not be afraid—much—but now his heart stood still. What would happen this time?

With amazing silence, Gnut drew nearer, until he towered an ominous shadow over the spot where Cliff lay. For a long time his red eyes burned down on the prone man. Cliff trembled all over; this was worse than the first time. Without having planned it, he found himself speaking to the creature.

"You would not hurt me," he pleaded. "I was only curious to see what's going on. It's my job. Can you understand me? I would not harm or bother you. I . . . I couldn't if I wanted to! Please!"

The robot never moved, and Cliff could not guess whether his words had been understood or even heard. When he felt he could not bear the suspense any longer, Gnut reached

out and took something from a drawer of the table, or perhaps he put something back in; then he stepped back, turned, and retraced his steps. Cliff was safe! Again the robot had spared him!

BEGINNING then, Cliff lost much of his fear. He felt sure now that this Gnut would do him no harm. Twice he had had him in his power, and each time he had only looked and quietly moved away. Cliff could not imagine what Gnut had done in the drawer of the table. He watched with the greatest curiosity to see what would happen next.

As on the night before, the robot went straight to the end of the ship and made the peculiar sequence of sounds that opened the port, and when the ramp slid out he went inside. After that Cliff was alone in the darkness for a very long time, probably two hours. Not a sound came from the ship.

Cliff knew he should sneak up to the port and peep inside, but he could not quite bring himself to do it. With his gun he could handle another gorilla, but if Gnut caught him it might be the end. Momentarily he expected something fantastic to happen—he knew not what; maybe the mocking bird's sweet song again, maybe a gorilla, maybe—anything. What did at last happen once more caught him with complete surprise.

He heard a sudden slight muffled sound, then words—human words—every one familiar.

"Gentlemen," was the first, and then there was a very slight pause. "The Smithsonian Institution welcomes you to its new Interplanetary Wing and to the marvelous exhibits at this moment before you."

It was the recorded voice of Stillwell! But it was not coming through the speakers overhead, but much

muted, from within the ship.

After a slight pause it went on:

"All of you must . . . must—"

Here it stammered and came to a stop. Cliff's hair bristled. That stammering was not in the lecture!

For just a moment there was silence; then came a scream, a hoarse man's scream, muffled, from somewhere within the heart of the ship; and it was followed by muted gasps and cries, as of a man in great fright or distress.

Every nerve tight, Cliff watched the port. He heard a thudding noise within the ship, then out the door flew the shadow of what was surely a human being. Gasping and half stumbling, he ran straight down the room in Cliff's direction. When twenty feet away, the great shadow of Gnut followed him out of the port.

Cliff watched, breathless. The man—it was Stillwell, he saw now—came straight for the table behind which Cliff himself lay, as if to get behind it, but when only a few feet away, his knees buckled and he fell to the floor. Suddenly Gnut was standing over him, but Stillwell did not seem to be aware of it. He appeared very ill, but kept making spasmodic futile efforts to creep on to the protection of the table.

Gnut did not move, so Cliff was emboldened to speak.

"What's the matter, Stillwell?" he asked. "Can I help? Don't be afraid. I'm Cliff Sutherland; you know, the picture man."

WITHOUT showing the least surprise at finding Cliff there, and clutching at his presence like a drowning man would a straw, Stillwell gasped out:

"Help me! Gnut . . . Gnut—"
He seemed unable to go on.

"Gnut what?" asked Cliff. Very conscious of the fire-eyed robot

looming above, and afraid even to move out to the man, Cliff added reassuringly: "Gnut won't hurt you. I'm sure he won't. He doesn't hurt me. What's the matter? What can I do?"

With a sudden accession of energy, Stillwell rose on his elbows.

"Where am I?" he asked.

"In the Interplanetary Wing," Cliff answered. "Don't you know?"

Only Stillwell's hard breathing was heard for a moment. Then hoarsely, weakly, he asked:

"How did I get here?"

"I don't know," said Cliff.

"I was making a lecture recording," Stillwell said, "when suddenly I found myself here . . . or I mean in there—"

He broke off and showed a return of his terror.

"Then what?" asked Cliff gently.

"I was in that box—and there, above me, was Gnut, the robot. Gnut! But they made Gnut harmless! He's never moved!"

"Steady, now," said Cliff. "I don't think Gnut will hurt you."

Stillwell fell back on the floor.

"I'm very weak," he gasped. "Something— Will you get a doctor?"

He was utterly unaware that towering above him, eyes boring down at him through the darkness, was the robot he feared so greatly.

As Cliff hesitated, at a loss what to do, the man's breath began coming in short gasps, as regular as the ticking of a clock. Cliff dared to moved out to him, but no act on his part could have helped the man now. His gasps weakened and became spasmodic, then suddenly he was completely silent and still. Cliff felt for his heart, then looked up to the eyes in the shadow above.

"He is dead," he whispered.

The robot seemed to understand,

or at least to hear. He bent forward and regarded the still figure.

"What is it, Gnut?" Cliff asked the robot suddenly. "What are you doing? Can I help you in any way? Somehow I don't believe you are unfriendly, and I don't believe you killed this man. But what happened? Can you understand me? Can you speak? What is it you're trying to do?"

Gnut made no sound or motion, but only looked at the still figure at his feet. In the robot's face, now so close, Cliff saw the look of sad contemplation.

Gnut stood so several minutes; then he bent lower, took the limp form carefully—even gently, Cliff thought—in his mighty arms, and carried him to the place along the wall where lay the dismembered pieces of the robot attendants. Carefully he laid him by their side. Then he went back into the ship.

Without fear now, Cliff stole along the wall of the room. He had gotten almost as far as the shattered figures on the floor when he suddenly stopped motionless. Gnut was emerging again.

He was bearing a shape that looked like another body, a larger one. He held it in one arm and placed it carefully by the body of Stillwell. In the hand of his other arm he held something that Cliff could not make out, and this he placed at the side of the body he had just put down. Then he went to the ship and returned once more with a shape which he laid gently by the others; and when this last trip was over he looked down at them all for a moment, then turned slowly back to the ship and stood motionless, as if in deep thought, by the ramp.

CLIFF RESTRAINED his curiosity as long as he could, then slipped for-

ward and bent over the objects Gnut had placed there. First in the row was the body of Stillwell, as he expected, and next was the great shapeless furry mass of a dead gorilla—the one of last night. By the gorilla lay the object the robot had carried in his free hand—the little body of the mocking bird. These last two had remained in the ship all night, and Gnut, for all his surprising gentleness in handling them, was only cleaning house. But there was a fourth body whose history he did not know. He moved closer and bent very low to look.

What he saw made him catch his breath. Impossible!—he thought; there was some confusion in his directions; he brought his face back, close to the first body. Then his blood ran cold. The first body was that of Stillwell, but the last in the row was Stillwell, too; there were two bodies of Stillwell, both exactly alike, both dead.

Cliff backed away with a cry, and then panic took him and he ran down the room away from Gnut and yelled and beat wildly on the door. There was a noise on the outside.

"Let me out!" he yelled in terror. "Let me out! Let me out! Oh, hurry!"

A crack opened between the two doors and he forced his way through like a wild animal and ran far out on the lawn. A belated couple on a nearby path stared at him with amazement, and this brought some sense to his head and he slowed down and came to a stop. Back at the building, everything looked as usual, and in spite of his terror, Gnut was not chasing him.

He was still in his stockinged feet. Breathing heavily, he sat down on the wet grass and put on his shoes; then he stood and looked at the building, trying to pull himself to-



Cliff held onto the tree and prayed—and the giant robot plucked it out by the roots!

gether. What an incredible melange! The dead Stillwell, the dead gorilla, and the dead mocking bird—all dying before his eyes. And then that last frightening thing, the second dead Stillwell whom he had *not* seen die. And Gnut's strange gentleness, and the sad expression he had twice seen on his face.

As he looked, the grounds about the building came to life. Several people collected at the door of the wing, above sounded the siren of a police copter, then in the distance another, and from all sides people came running, a few at first, then more and more. The police planes landed on the lawn just outside the door of the wing, and he thought he could see the officers peeping inside. Then suddenly the lights of the wing flooded on. In control of himself now, Cliff went back.

He entered. He had left Gnut standing in thought at the side of the ramp, but now he was again in his old familiar pose in the usual place, as if he had never moved. The ship's

door was closed, and the ramp gone. But the bodies, the four strangely assorted bodies, were still lying by the demolished robot attendants where he had left them in the dark.

He was startled by a cry behind his back. A uniformed museum guard was pointing at him.

"This is the man!" the guard shouted. "When I opened the door this man forced his way out and ran like the devil!"

The police officers converged on Cliff.

"Who are you? What is all this?" one of them asked him roughly.

"I'm Cliff Sutherland, picture reporter," Cliff answered calmly. "And I was the one who was inside here and ran away, as the guard says."

"What were you doing?" the officer asked, eyeing him. "And where did these bodies come from?"

"Gentlemen, I'd tell you gladly—only business first," Cliff answered. "There's been some fantastic goings on in this room, and I saw them and have the story, but"—he smiled—"I must decline to answer without advice of counsel until I've sold my story to one of the news syndicates. You know how it is. If you'll allow me the use of the radio in your plane—just for a moment, gentlemen—you'll have the whole story right afterward—say in half an hour, when the television men broadcast it. Meanwhile, believe me, there's nothing for you to do, and there'll be no loss by the delay."

The officer who had asked the questions blinked, and one of the others, quicker to react and certainly not a gentleman, stepped toward Cliff with clenched fists. Cliff disarmed him by handing him his press credentials. He glanced at them rapidly and put them in his pocket.

By now half a hundred people were there, and among them were two

members of a syndicate crew whom he knew, arrived by copter. The police growled, but they let him whisper in their ear and then go out under escort to the crew's plane. There, by radio, in five minutes, Cliff made a deal which would bring him more money than he had ever before earned in a year. After that he turned over all his pictures and negatives to the crew and gave them the story, and they lost not one second in spinning back to their office with the flash.

More and more people arrived, and the police cleared the building. Ten minutes later a big crew of radio and television men forced their way in, sent there by the syndicate with which he had dealt. And then a few minutes later, under the glaring lights set up by the operators and standing close by the ship and not far from Gnut—he refused to stand underneath him—Cliff gave his story to the cameras and microphones, which in a fraction of a second shot it to every corner of the Solar System.

Immediately afterward the police took him to jail. On general principles and because they were pretty blooming mad.

V.

CLIFF STAYED in jail all that night—until eight o'clock the next morning, when the syndicate finally succeeded in digging up a lawyer and got him out. And then, when at last he was leaving, a Federal man caught him by the wrist.

"You're wanted for further questioning over at the Continental Bureau of Investigation," the agent told him. Cliff went along willingly.

Fully thirty-five high-ranking Federal officials and "big names" were waiting for him in an imposing conference room—one of the presi-

dent's secretaries, the undersecretary of state, the underminister of defense, scientists, a colonel, executives, department heads, and ranking "C" men. Old gray-mustached Sanders, chief of the CBI, was presiding.

They made him tell his story all over again, and then, in parts, all over once more—not because they did not believe him, but because they kept hoping to elicit some fact which would cast significant light on the mystery of Gnut's behavior and the happenings of the last three nights. Patiently Cliff racked his brains for every detail.

Chief Sanders asked most of the questions. After more than an hour, when Cliff thought they had finished, Sanders asked him several more, all involving his personal opinions of what had transpired.

"Do you think Gnut was deranged in any way by the acids, rays, heat, and so forth applied to him by the scientists?"

"I saw no evidence of it."

"Do you think he can see?"

"I'm sure he can see, or else has other powers which are equivalent."

"Do you think he can hear?"

"Yes, sir. That time when I whispered to him that Stillwell was dead, he bent lower, as if to see for himself. I would not be surprised if he also understood what I said."

"At no time did he speak, except those sounds he made to open the ship?"

"Not one word, in English or any other language. Not one sound with his mouth."

"In your opinion, has his strength been impaired in any way by our treatment?" asked one of the scientists.

"I have told you how easily he handled the gorilla. He attacked the animal and threw it back, after which it retreated all the way down

the building, afraid of him."

"How would you explain the fact that our autopsies disclosed no mortal wound, no cause of death, in any of the bodies—gorilla, mocking bird, or the two identical Stillwells?"—this from a medical officer.

"I can't."

"You think Gnut is dangerous?"—from Sanders.

"Potentially very dangerous."

"Yet you say you have the feeling he is not hostile."

"To me, I meant. I do have that feeling, and I'm afraid I can't give any good reason for it, except the way he spared me twice when he had me in his power. I think maybe the gentle way he handled the bodies had something to do with it, and maybe the sad, thoughtful look I twice caught on his face."

"Would you risk staying in the building alone another night?"

"Not for anything." There were smiles.

"Did you get any pictures of what happened last night?"

"No, sir." Cliff, with an effort, held on to his composure, but he was swept by a wave of shame. A man hitherto silent rescued him by saying:

"A while ago you used the word 'purposive' in connection with Gnut's actions. Can you explain that a little?"

"Yes, that was one of the things that struck me: Gnut never seems to waste a motion. He can move with surprising speed when he wants to; I saw that when he attacked the gorilla; but most other times he walks around as if methodically completing some simple task. And that reminds me of a peculiar thing: at times he gets into one position, any position, maybe half bent over, and stays there for minutes at a time.

It's as if his scale of time values was eccentric, compared to ours; some things he does surprisingly fast, and others surprisingly slow. This might account for his long periods of immobility."

"That's very interesting," said one of the scientists. "How would you account for the fact that he recently moves only at night?"

"I think he's doing something he wants no one to see, and the night is the only time he is alone."

"But he went ahead even after finding you there."

"I know. But I have no other explanation, unless he considered me harmless or unable to stop him—which was certainly the case."

"Before you arrived, we were considering incasing him in a large block of glasstex. Do you think he would permit it?"

"I don't know. Probably he would; he stood for the acids and rays and heat. But it had better be done in the daytime; night seems to be the time he moves."

"But he moved in the daytime when he emerged from the traveler with Klaatu."

"I know."

That seemed to be all they could think of to ask him. Sanders slapped his hand on the table.

"Well, I guess that's all Mr. Sutherland," he said. "Thank you for your help, and let me congratulate you for a very foolish, stubborn, brave young man—young businessman." He smiled very faintly. "You are free to go now, but it may be that I'll have to call you back later. We'll see."

"May I remain while you decide about that glasstex?" Cliff asked. "As long as I'm here I'd like to have the tip."

"The decision has already been made—the tip's yours. The pouring

will be started at once."

"Thank you, sir," said Cliff—and callously asked more: "And will you be so kind as to authorize me to be present outside the building tonight? Just outside. I've a feeling something's going to happen."

"You want still another scoop, I see," said Sanders not unkindly, "then you'll let the police wait while you transact your business."

"Not again, sir. If anything happens, they'll get it at once."

The chief hesitated. "I don't know," he said. "I'll tell you what. All the news services will want men there, and we can't have that; but if you can arrange to represent them all yourself, it's a go. Nothing's going to happen, but your reports will help calm the hysterical ones. Let me know."

Cliff thanked him and hurried out and phoned his syndicate the tip—free—then told them Sanders' proposal. Ten minutes later they called him back, said all was arranged, and told him to catch some sleep. They would cover the pouring. With light heart, Cliff hurried over to the museum. The place was surrounded by thousands of the curious, held far back by a strong cordon of police. For once he could not get through; he was recognized, and the police were still sore. But he did not care much; he suddenly felt very tired and needed that nap. He went back to his hotel, left a call, and went to bed.

He had been asleep only a few minutes when his phone rang. Eyes shut, he answered it. It was one of the boys at the syndicate, with peculiar news. Stillwell had just reported, very much alive—the real Stillwell. The two dead ones were some kind of copies; he couldn't imagine how to explain them. He had no brothers.

For a moment Cliff came fully awake, then he went back to bed. Nothing was fantastic any more.

VI.

AT FOUR O'CLOCK, much refreshed and with an infrared viewing magnifier slung over his shoulder, Cliff passed through the cordon and entered the door of the wing. He had been expected and there was no trouble. As his eyes fell on Gnut, an odd feeling went through him, and for some obscure reason he was almost sorry for the giant robot.

Gnut stood exactly as he had always stood, right foot advanced a little, and the same brooding expression on his face; but now there was something more. He was solidly incased in a huge block of transparent glasstex. From the floor on which he stood to the top of his full eight feet, and from there on up for an equal distance, and for about eight feet to the left, right, back, and front, he was immured in a water-clear prison which confined every inch of his surface and would prevent the slightest twitch of even his amazing muscles.

It was absurd, no doubt, to feel sorry for a robot, a man-made mechanism, but Cliff had come to think of him as being really alive, as a human is alive. He showed purpose and will; he performed complicated and resourceful acts; his face had twice clearly shown the emotion of sadness, and several times what appeared to be deep thought; he had been ruthless with the gorilla, and gentle with the mocking bird and the other two bodies, and he had twice refrained from crushing Cliff when there seemed every reason that he might. Cliff did not doubt for a minute that he was still alive, whatever that "alive" might mean.

But outside were waiting the radio and television men; he had work to do. He turned and went to them and all got busy.

An hour later Cliff sat alone about fifteen feet above the ground in a big tree which, located just across the walk from the building, commanded through a window a clear view of the upper part of Gnut's body. Strapped to the limbs about him were three instruments—his infrared viewing magnifier, a radio mike, and an infrared television eye with sound pickup. The first, the viewing magnifier, would allow him to see in the dark with his own eyes, as if by daylight, a magnified image of the robot, and the others would pick up any sights and sounds, including his own remarks, and transmit them to the several broadcast studios which would fling them millions of miles in all directions through space. Never before had a picture man had such an important assignment, probably—certainly not one who forgot to take pictures. But now that was forgotten and Cliff was quite proud, and ready.

Far back in a great circle stood a multitude of the curious—and the fearful. Would the plastic glasstex hold Gnut? If it did not, would he come out thirsting for revenge? Would unimaginable beings come out of the traveler and release him, and perhaps exact revenge? Millions at their receivers were jittery; those in the distance hoped nothing awful would happen, yet they hoped something would, and they were prepared to run.

In carefully selected spots not far from Cliff on all sides were mobile ray batteries manned by army units, and in a hollow in back of him, well to his right, there was stationed a huge tank with a large gun. Every weapon was trained on the door of

the wing. A row of smaller, faster tanks stood ready fifty yards directly north. Their ray projectors were aimed at the door, but not their guns. The grounds about the building contained only one spot—the hollow where the great tank was—where, by close calculation, a shell directed at the doorway would not cause damage and loss of life to some part of the sprawling capital.

Dusk fell; out streamed the last of the army officers, politicians and other privileged ones; the great metal doors of the wing clanged to and were locked for the night. Soon Cliff was alone, except for the watchers at their weapons scattered around him.

Hours passed. The moon came out. From time to time Cliff reported to the studio crew that all was quiet. His unaided eyes could now see nothing of Gnut but the two faint red points of his eyes, but through the magnifier he stood out as clearly as if in daylight from an apparent distance of only ten feet. Except for his eyes, there was no evidence that he was anything but dead and unfunctionable metal.

Another hour passed. Now and again Cliff thumbed the levers of his tiny radio-television watch—only a few seconds at a time because of its limited battery. The air was full of Gnut and his own face and his own name, and once the tiny screen showed the tree in which he was then sitting and even, minutely, himself. Powerful infrared long-distance television pickups were even then focused on him from nearby points of vantage. It gave him a funny feeling.

Then, suddenly, Cliff saw something and quickly bent his eye to the viewing magnifier. Gnut's eyes were moving; at least the intensity of the

light emanating from them varied. It was as if two tiny red flashlights were turned from side to side, their beams at each motion crossing Cliff's eyes.

Thrilling, Cliff signaled the studios, cut in his pickups, and described the phenomenon. Millions resonated to the excitement in his voice. Could Gnut conceivably break out of that terrible prison?

Minutes passed, the eye flashes continued, but Cliff could discern no movement or attempted movement of the robot's body. In brief snatches he described what he saw. Gnut was clearly alive; there could be no doubt he was straining against the transparent prison in which he had at last been locked fast; but unless he could crack it, no motion should show.

Cliff took his eye from the magnifier—and started. His unaided eye, looking at Gnut shrouded in darkness, saw an astounding thing not yet visible through his instrument. A faint red glow was spreading over the robot's body. With trembling fingers he readjusted the lens of the television eye, but even as he did so the glow grew in intensity. It looked as if Gnut's body was being heated to incandescence!

He described it in excited fragments, for it took most of his attention to keep correcting the lens. Gnut passed from a figure of dull red to one brighter and brighter, clearly glowing now even through the magnifier. And then he moved! Unmistakably he moved!

He had within himself somehow the means to raise his own body temperature, and was exploiting the one limitation of the plastic in which he was locked. For glasstex, Cliff now remembered, was a thermoplastic material, one that set by cooling and conversely would soften again with heat. Gnut was melting his way out!

In three-word snatches, Cliff described this. The robot became cherry-red, the sharp edges of the icelike block rounded, and the whole structure began to sag. The process accelerated. The robot's body moved more widely. The plastic lowered to the crown of his head, then to his neck, then his waist, which was as far as Cliff could see. His body was free! And then, still cherry-red, he moved forward out of sight!

Cliff strained eyes and ears, but caught nothing but the distant roar of the watchers beyond the police lines and a few low, sharp commands from the batteries posted around him. They, too, had heard, and perhaps seen by telescreen, and were waiting.

SEVERAL minutes passed. There was a sharp, ringing crack: the great metal doors of the wing flew open, and out stepped the metal giant, glowing no longer. He stood stock-still, and his red eyes pierced from side to side through the darkness.

Voices out in the dark barked orders, and in a twinkling Gnut was bathed in narrow crisscrossing rays of sizzling, colored light. Behind him the metal doors began to melt, but his great green body showed no change at all. Then the world seemed to come to an end; there was a deafening roar, everything before Cliff seemed to explode in smoke and chaos, his tree whipped to one side so that he was nearly thrown out. Pieces of debris rained down. The tank gun had spoken, and Gnut, he was sure, had been hit.

Cliff held on tight and peered into the haze. As it cleared he made out a stirring among the debris at the door, and then dimly but unmistakably he saw the great form of Gnut rise to his feet. He got up slowly,

turned toward the tank, and suddenly darted toward it in a wide arc. The big gun swung in an attempt to cover him, but the robot side-stepped and then was upon it. As the crew scattered, he destroyed its breech with one blow of his fist, and then he turned and looked right at Cliff.

He moved toward him, and in a moment was under the tree. Cliff climbed higher. Gnut put his two arms around the tree and gave a lifting push, and the tree tore out at the roots and fell crashing to its side. Before Cliff could scramble away, the robot had lifted him in his metal hands.

Cliff thought his time had come, but strange things were yet in store for him that night. Gnut did not hurt him. He looked at him from arm's length for a moment, then lifted him to a sitting position on his shoulders, legs straddling his neck. Then, holding one ankle, he turned and without hesitation started down the path which led westward away from the building.

Cliff rode helpless. Out over the lawns he saw the muzzles of the scattered field pieces move as he moved, Gnut—and himself—their one focus. But they did not fire. Gnut, by placing him on his shoulders, had secured himself against that—Cliff hoped.

The robot bore straight toward the Tidal Basin. Most of the field pieces throbbed slowly after. Far back, Cliff saw a dark tide of confusion roll into the cleared area—the police lines had broken. Ahead, the ring thinned rapidly off to the sides; then, from all directions but the front, the tide rolled in until individual shouts and cries could be made out. It came to a stop about fifty yards off, and few people ventured nearer.

Gnut paid them no attention, and he no more noticed his burden than

he might a fly. His neck and shoulders made Cliff a seat hard as steel, but with the difference that their underlying muscles with each movement flexed, just as would those of a human being. To Cliff, this metal musculature became a vivid wonder.

Straight as the flight of a bee, over paths, across lawns and through thin rows of trees Gnut bore the young man, the roar of thousands of people following close. Above droned copters and darting planes, among them police cars with their nerve-shattering sirens. Just ahead lay the still waters of the Tidal Basin, and in its midst the simple marble tomb of the slain ambassador, Klaatu, gleaming black and cold in the light of the dozen searchlights always trained on it at night. Was this a rendezvous with the dead?

Without an instant's hesitation, Gnut strode down the bank and entered the water. It rose to his knees, then waist, until Cliff's feet were under. Straight through the dark waters for the tomb of Klaatu the robot made his inevitable way.

The dark square mass of gleaming marble rose higher as they neared it. Gnut's body began emerging from the water as the bottom shelved upward, until his dripping feet took the first of the rising pyramid of steps. In a moment they were at the top, on the narrow platform in the middle of which rested the simple oblong tomb.

Stark in the blinding searchlights, the giant robot walked once around it, then, bending, he braced himself and gave a mighty push against the top. The marble cracked; the thick cover slipped askew and broke with a loud noise on the far side. Gnut went to his knees and looked within, bringing Cliff well up over the edge.

Inside, in sharp shadow against the converging light beams, lay a

transparent plastic coffin, thick walled and sealed against the centuries, and containing all that was mortal of Klaatu, unspoken visitor from the great Unknown. He lay as if asleep, on his face the look of godlike nobility that had caused some of the ignorant to believe him divine. He wore the robe he had arrived in. There were no faded flowers, no jewelry, no ornaments; they would have seemed profane. At the foot of the coffin lay the small sealed box, also of transparent plastic, which contained all of Earth's records of his visit—a description of the events attending his arrival, pictures of Gnut and the traveler, and the little roll of sight-and-sound film which had caught for all time his few brief motions and words.

CLIFF SAT very still, wishing he could see the face of the robot. Gnut, too, did not move from his position of reverent contemplation—not for a long time. There on the brilliantly lighted pyramid, under the eyes of a fearful, tumultuous multitude, Gnut paid final respect to his beautiful and adored master.

Suddenly, then, it was over. Gnut reached out and took the little box of records, rose to his feet and started down the steps.

Back through the water, straight back to the building, across lawns and paths as before, he made his irresistible way. Before him the chaotic ring of people melted away, behind they followed as close as they dared, trampling each other in their efforts to keep him in sight. There are no television records of his return. Every pickup was damaged on the way to the tomb.

As they drew near the building, Cliff saw that the tank's projectile had made a hole twenty feet wide extending from the roof to the

ground. The door still stood open, and Gnut, hardly varying his almost jerkless rhythm, made his way over the debris and went straight for the port end of the ship. Cliff wondered if he would be set free.

He was. The robot set him down and pointed toward the door; then, turning, he made the sounds that opened the ship. The ramp slid down and he entered.

Then Cliff did the mad, courageous thing which made him famous for a generation. Just as the ramp started sliding back in he skipped over it and himself entered the ship. The port closed.

VII.

IT WAS pitch dark, and the silence was absolute. Cliff did not move. He felt that Gnut was close, just ahead, and it was so.

His hard metal hand took him by the waist, pulled him against his cold side, and carried him somewhere ahead. Hidden lamps suddenly bathed the surroundings with bluish light.

He set Cliff down and stood looking at him. The young man already regretted his rash action, but the robot, except for his always unfathomable eyes, did not seem angry. He pointed to a stool in one corner of the room. Cliff quickly obeyed this time and sat meekly, for a while not even venturing to look around.

He saw he was in a small laboratory of some kind. Complicated metal and plastic apparatus lined the walls and filled several small tables; he could not recognize or guess the function of a single piece. Dominating the center of the room was a long metal table on whose top lay a large box, much like a coffin on the outside, connected by many wires to a complicated apparatus at the far end.

From close above spread a cone of bright light from a many-tubed lamp.

One thing, half covered on a nearby table, did look familiar—and very much out of place. From where he sat it seemed to be a brief case—an ordinary Earthman's brief case. He wondered.

Gnut paid him no attention, but at once, with the narrow edge of a thick tool, sliced the lid off the little box of records. He lifted out the strip of sight-and-sound film and spent fully half an hour adjusting it within the apparatus at the end of the big table. Cliff watched, fascinated, wondering at the skill with which the robot used his tough metal fingers. This done, Gnut worked for a long time over some accessory apparatus on an adjoining table. Then he paused thoughtfully a moment and pushed inward a long rod.

A voice came out of the coffinlike box—the voice of the slain ambassador.

"I am Klaatu," it said, "and this is Gnut."

From the recording!—flashed through Cliff's mind. The first and only words the ambassador had spoken. But, then, in the very next second he saw that it was not so. There was a man in the box! The man stirred and sat up, and Cliff saw the living face of Klaatu!

Klaatu appeared somewhat surprised and spoke quickly in an unknown tongue to Gnut—and Gnut, for the first time in Cliff's experience, spoke himself in answer. The robot's syllables tumbled out as if born of human emotion, and the expression on Klaatu's face changed from surprise to wonder. They talked for several minutes. Klaatu, apparently fatigued, then began to lie down, but stopped midway, for he saw Cliff.

Gnut spoke again, at length. Klaatu beckoned Cliff with his hand, and he went to him.

"Gnut has told me everything," he said in a low, gentle voice, then looked at Cliff for a moment in silence, on his face a faint, tired smile.

Cliff had a hundred questions to ask, but for a moment hardly dared open his mouth.

"But you," he began at last—very respectfully, but with an escaping excitement—"you are not the Klaatu that was in the tomb?"

The man's smile faded and he shook his head.

"No." He turned to the towering Gnut and said something in his own tongue, and at his words the metal features of the robot twisted as if with pain. Then he turned back to Cliff. "I am dying," he announced simply, as if repeating his words for the Earthman. Again to his face came the faint, tired smile.

Cliff's tongue was locked. He just stared, hoping for light. Klaatu seemed to read his mind.

"I see you don't understand," he said. "Although unlike us, Gnut has great powers. When the wing was built and the lectures began, there came to him a striking inspiration. Acting on it at once, in the night, he assembled this apparatus . . . and

now he has made me again, from my voice, as recorded by your people. As you must know, a given body makes a characteristic sound. He constructed an apparatus which reversed the recording process, and from the given sound made the characteristic body."

Cliff gasped. So that was it!

"But you needn't die!" Cliff exclaimed suddenly, eagerly. "Your voice recording was taken when you stepped out of the ship, while you were well! You must let me take you to a hospital! Our doctors are very skillful!"

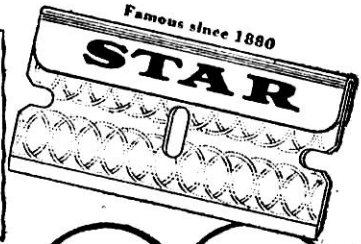
Hardly perceptibly, Klaatu shook his head.

"You still don't understand," he said slowly and more faintly. "Your recording had imperfections. Perhaps very slight ones, but they doom the product. All of Gnut's experiments died in a few minutes, he tells me . . . and so must I."

SUDDENLY, then, Cliff understood the origin of the "experiments." He remembered that on the day the wing was opened a Smithsonian official had lost a brief case containing film strips recording the speech of various world fauna. There, on that table, was a brief case! And the Stillwells must have been made from



TRY THE
STAR
WAY TO
SHAVE!



STAR

WORLD'S
LARGEST SELLING
SINGLE EDGE BLADE

4 for
10¢

12 for
25¢

strips kept in the table drawer!

But his heart was heavy. He did not want this stranger to die. Slowly there dawned on him an important idea. He explained it with growing excitement.

"You say the recording was imperfect, and of course it was. But the cause of that lay in the use of an imperfect recording apparatus. So if Gnut, in his reversal of the process, had used exactly the same pieces of apparatus that your voice was recorded with, the imperfections could be studied, canceled out, and you'd live, and not die!"

As the last words left his lips, Gnut whipped around like a cat and gripped him tight. A truly human excitement was shining in the metal muscles of his face.

"Get me that apparatus!" he ordered—in clear and perfect English! He started pushing Cliff toward the door, but Klaatu raised his hand.

"There is no hurry," Klaatu said gently; "it is too late for me. What is your name, young man?"

Cliff told him.

"Stay with me to the end," he asked. Klaatu closed his eyes and rested; then, smiling just a little, but not opening his eyes, he added: "And don't be sad, for I shall now perhaps live again . . . and it will be due to you. There is no pain—" His voice was rapidly growing weaker. Cliff, for all the questions he had, could only look on, dumb. Again Klaatu seemed to be aware of his thoughts.

"I know," he said feebly, "I know. We have so much to ask each other. About your civilization . . . and Gnut's—"

"And yours," said Cliff.

"And Gnut's," said the gentle voice again. "Perhaps . . . some day . . . perhaps I will be back—"

He lay without moving. He lay so for a long time, and at last Cliff knew that he was dead. Tears came to his eyes; in only these few minutes he had come to love this man. He looked at Gnut. The robot knew, too, that he was dead, but no tears filled his red-lighted eyes; they were fixed on Cliff, and for once the young man knew what was in his mind.

"Gnut," he announced earnestly, as if taking a sacred oath, "I'll get the original apparatus. I'll get it. Every piece of it, the exact same things."

Without a word, Gnut conducted him to the port. He made the sounds that unlocked it. As it opened, a noisy crowd of Earthmen outside trampled each other in a sudden scramble to get out of the building. The wing was lighted. Cliff stepped down the ramp.

THE NEXT two hours always in Cliff's memory had a dreamlike quality. It was as if that mysterious laboratory with the peacefully sleeping dead man was the real and central part of his life, and his scene with the noisy men with whom he talked a gross and barbaric interlude. He stood not far from the ramp. He told only part of his story. He was believed. He waited quietly while all the pressure which the highest officials in the land could exert was directed toward obtaining for him the apparatus the robot had demanded.

When it arrived, he carried it to the floor of the little vestibule behind the port. Gnut was there, as if waiting. In his arms he held the slender body of the second Klaatu. Tenderly he passed him out to Cliff, who took him without a word, as if all this had been arranged. It seemed to be the parting.

Of all the things Cliff had wanted

to say to Klaatu, one remained imperatively present in his mind. Now, as the green metal robot stood framed in the great green ship, he seized his chance.

"Gnut," he said earnestly, holding carefully the limp body in his arms, "you must do one thing for me. Listen carefully. I want you to tell your master—the master yet to come—that what happened to the first Klaatu was an accident, for which all Earth is immeasurably sorry. Will you do that?"

"I have known it," the robot answered gently.

"But will you promise to tell your

master—just those words—as soon as he is arrived?"

"You misunderstand," said Gnut, still gently, and quietly spoke four more words. As Cliff heard them a mist passed over his eyes and his body went numb.

As he recovered and his eyes came back to focus he saw the great ship disappear. It just suddenly was not there any more. He fell back a step or two. In his ears, like great bells, rang Gnut's last words. Never, never was he to disclose them till the day he came to die.

"You misunderstand," the mighty robot had said. "I am the master."

THE END.

IN TIMES TO COME

A FULL magazine rather scatters the editorial departments this issue; hence you'll find the Analytical Laboratory elsewhere this month. Next month—the third part of "Slan" of course is reason enough to look forward, I think. In addition, there's a number of other items. The cover goes to Vic Phillips again—his "Maiden Voyage" introduced 1939, if you remember—on his yarn "Salvage," which is a yarn about salvaging spaceships where they're most apt to need salvaging. Of course the radio, the driving units, the air conditioner and all other functions might break down at once and leave 'em stranded without communication in space. But the chances are, most of 'em are going to need picking up and putting together again on planets, just as ships of the sea most need help when the shore is not only near, but too darned near. Anyway, Phillips feels so.

Something strange seems to be happening to our authors. The serials I'm seeing nowadays keep getting better and better, a sort of determination to outdo outstanding stories seems manifest. I've gotten in a new one to follow "Slan." You'll hear more about it later, of course, but among other unusual things, it's a new author—Anson MacDonald. It's called "Sixth Column"; most of it is about an old gentleman with a long white beard and a real-for-sure luminous halo around his head who goes around performing miracles. You know—stretches out his hand, says "Peace!" and a dying man is cured. And, friends, it does *not* belong in *Unknown*. It has one of the loveliest scientific explanations of the year! Begins in January Astounding.

THE EDITOR.

RUNAWAY CARGO

By Nat Schachner

The cargo was harmless enough—so long as no air hit it! And it was automatically controlled from the Moon to Earth—till the control stations were blown up!

Illustrated by Schneeman

MOON Station 2X hummed with activity. The great lucent dome was alive with lights and the bustle that presaged the departure of a great cargo craft. The pitted surface of Tycho cast eerie shadows, and the fierce Sun filtered through the artificial air within the huge, overarching span. Mighty derricks lifted giant fingers and scooped the precious Tycho dust into the hold of the waiting cargo ship. Orders crackled and men scurried like gnomes delving deep in the bowels of a planet. Every second counted; every extra moment's exposure of the dust to the disintegrating influence of the atmosphere increased the chances of blowing the Moon to kingdom come a hundredfold.

Shep Low tried to keep his eyes on the screen that registered incoming calls from New York, but they insisted on straying nervously to the ovoid ship that thrust its blunt nose, like an upended egg, through the sheathing dome and into the airlessness of the Moon. His short, chunky body was rigid, and his wide, generous mouth was clamped tight. Finally he could stand it no longer. He jumped up from his post, glared openly through the control-room window.

"Damn it, Neal!" he exploded. "Won't they ever get through loading that blasted, triple-blank stuff?

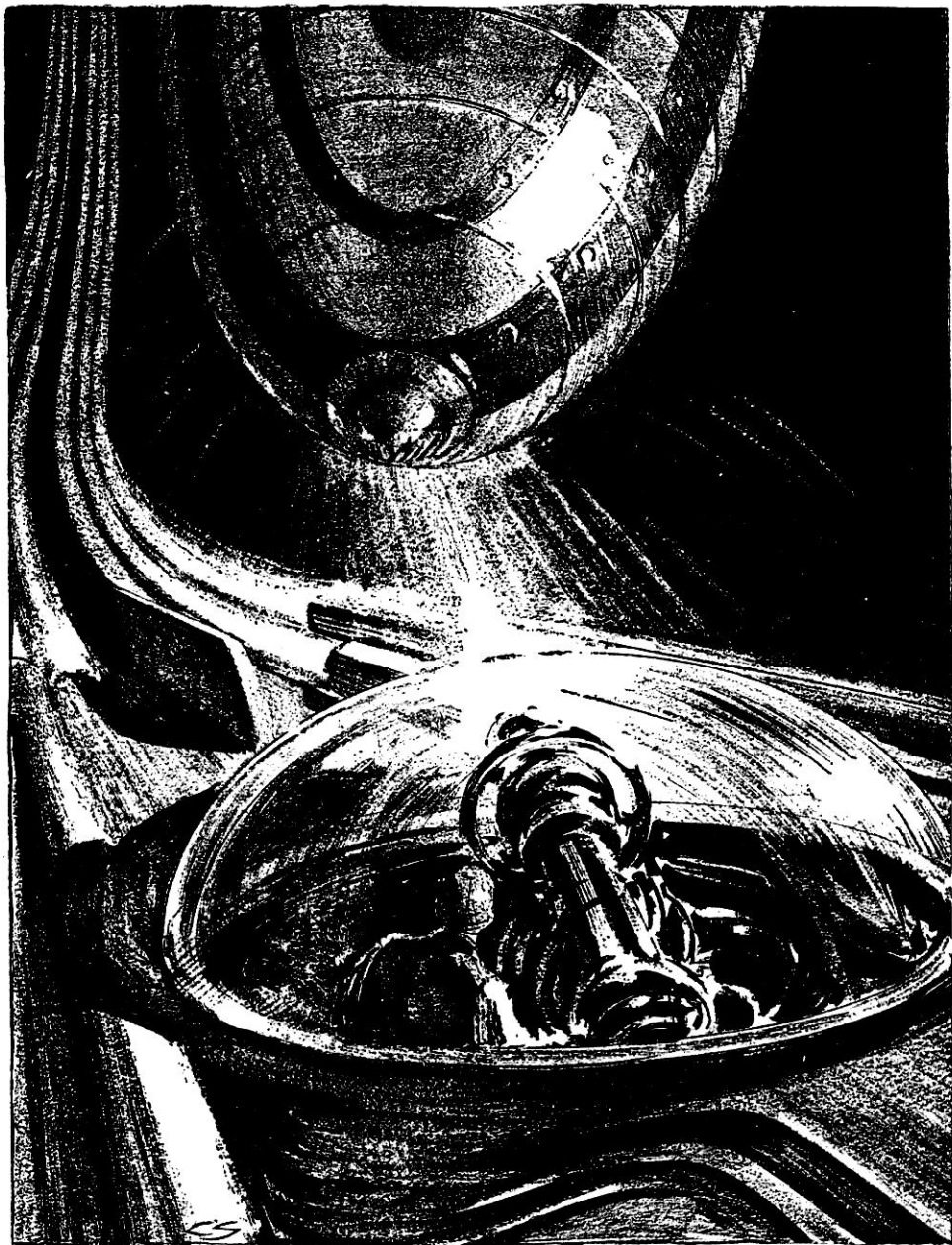
I never saw such a bunch of lazy, slow-moving guys in my life!"

Neal Cass did not immediately answer. Carefully, and with exasperating calm, he kept on checking the readings of the cylindrical beam of force that surged through space between Moon Station 2X and Port New York. Amperage, voltage, magnetic sidesway, countervailing fields, hysteresis. Everything was right and tight to the hairline. Everything was set for the quick, hurtling flight across the void.

Shep whirled on him. "How the blazes can you sit there like a mummified fish?" he said violently. "Those fellows out there are way behind schedule. That Tycho dust's liable to go popping on us any second."

"Keep your shirt on," Neal advised. "It disintegrates pretty fast; but not that fast. The rate follows a definite curve, and we know exactly how long it takes to reach the limiting point. Once it slides into the vacuum hold of the ship it's safe enough. As for the loading crew being behind schedule"—he looked at the moving time signal—"they're exactly five minutes ahead of it, my jittery friend."

Shep groaned and wiped his forehead with an old-fashioned handkerchief. "I'd have sworn it was noon



"That beam can't turn the mass of that ship!"

"No—but it may lead it!"

of next month. I can take almost anything, but just sitting on my hands, waiting for some highly unstable dust to blast us out of the

Galaxy, is more than should be expected of a reasonable man."

"Meaning *you?*"

"Yes, me!" Shep retorted inele-

gantly. "I wish to Hannah that first Moon expedition never discovered the dust in the old slag vents of Tycho."

"I'm with you there, Shep. But it *was* discovered, and by some miracle of chance a sample was brought back to Earth without exploding. Packed in vacuum shells, it makes the most terrible weapon civilized man has ever had. Doesn't even have to be detonated. As the shell strikes, contact releases a spring. The shell opens, the dust flies in all directions. The oxygen in the air does the rest." Neal's face grew grim. "I've heard of the tests. One shell wiped out an area five miles square and dug a hole a hundred feet deep."

"Yeah, I've heard, too." Shep glanced apprehensively out at the feverish workers. "I *still* say they should have left the dust here in Tycho where it belongs."

Neal nodded. "That was the original intention when our chemists laid the results before the North American Union. But the other unions got wind of it. They sent over their own expeditions. We claimed Tycho by right of discovery; they searched the other craters and set up their own Moon stations. Unfortunately they found the dust, too. So in self-defense, we've got to keep on mining and shipping."

Shep wiped his face again. "That's the hell of it! Everyone afraid to stop because of the others. Now if I had my way—"

THE WARNING signal flashed red and buzzed sharply. Neal turned the screen switch. The round, serious face of Bruce Hopper blinked owlshly at him from the silver surface. He was the New York operator.

"Hello, Neal!" he greeted. "Ev-

erything's set at this end. Landing beam's tight and ready. When does the *Thunderbolt* blast off?"

Neal glanced up at the time signal. "In about five minutes, Bruce. The loading's a bit ahead of schedule. I'll transmit the starting units as soon as she lifts."

"Good enough!" Bruce approved. Then his round, businesslike face took on a worried look. He glanced furtively around the deserted control chamber as though he were afraid of eavesdroppers. He lowered his voice. "You can't hurry the stuff over fast enough to suit Their Nibs."

"What's up?"

"Plenty! That is, nothing definite; nothing you could put a handle to. But Their Nibs are nervous. Been holding a lot of secret meetings. In fact, the great William Pruyn just contacted me to find out when that load of Tycho dust was coming through. Himself in person, too; not a stereo."

Neal whistled. "Their Nibs"—irreverently so-called by the control men—was the august Council of Experts who governed the North American Union; and Pruyn was its president. "That sounds bad," he agreed. "But hell, we've already delivered two cargoes. That dust's pretty deep down the vents. Takes at least a month to load up a ship. Besides, what are Their Nibs nervous about? The World Treaty's got another six months to run."

Bruce laughed mirthlessly. "You fellows have been on the Moon too long. Earth's become a vast whispering gallery of rumors. The way things are now, no union's going to pay much attention to a treaty. And the first two shipments are already past history. The detonating plants are clamoring for more."

"We've sent as much as any other

Moon station," Neal protested. "And now that we've installed the new Shipman process we'll double the output."

"That's the trouble. The other unions got wind of it. That's why they're liable to strike before we get the edge on them." He stopped suddenly, flung his head around toward the rear of his chamber. "Signing off, Neal. Someone's coming. Send me the elements when the *Thunderbolt* blasts."

Then the screen wiped clean into a featureless blank.

"Holy cats!" breathed Shep, his dark face screwed up into little knots. "So *that's* the way it is! Maybe we'd better tell Gautry to put some guards around the station. No telling what might happen."

Neal grinned. "The only thing that'll happen will be a swell case of lunar madness for you if you don't take hold of yourself. They say the lesser gravity has a lot to do with it. Makes lesions in the brain cells, and the victim sees wimpuses and thinks he's a floating moon-beam."

"Shut up!" Shep yelled indignantly. "I'm serious."

"So am I. What do you want to guard against? Any flight from Earth would be seen by us in ample time."

"I'm not talking about Earth. How about the half dozen Moon stations? There's Gassendi, worked by the East Europe Union; Proclus with a heavy staff of Central Asians; Eratosthenes and so on. Any one of them could launch a swift attack against us without our having a chance."

Neal frowned and looked thoughtful. "There's something in that," he admitted. "Perhaps you're right. At any rate it wouldn't hurt. I'll talk it over with Gautry after the

Thunderbolt clears." Everett Gautry was supervising chief of the station. "Ah! She's ready now. They've battened down the hatches; they're waving everyone out of range."

THE HUGE orange light beam swung frantically outside. The annunciators blared warning. "Back, everyone! The ship's blasting off."

The men scurried for their lives, dropping into specially prepared shelter chambers, bounding with fantastic jumps for the rock-hewn central quarters. Ev Gautry, feet straddled, powerful frame leaning slightly forward, flashed a hand signal across the pumicelike ground toward the control chamber.

Neal stared tensely at the time signal, ready for readings.

There was a sudden blast of sound. The deep cavity underneath the ship was filled with belching flame. A lurid blaze flicked over the station. The *Thunderbolt* whooshed out through the skin-tight vent, streaked upward so fast the human eye could barely follow its flight. Already it was a tiny speck of shimmering metal against a cold, black sky, heading at a slight angle to the half Earth that glowed palely green overhead.

"Boy! She travels fast!" Shep said admiringly. Then he took a deep breath of relief. "Can't say I'm sorry she left. It's Earth's headache now. I'll sleep easy for another month now."

Neal flung figures into the calculator, watched the shining mechanism spin and gyrate. Within seconds the plotted elements of the ship's course spewed out on flexible steel tape. He glanced at them with expert eye. "Everything's right and tight. The beam's holding it like a vise. A neat job, if I do pat my-

self on the back."

"You ought to," said Shep. "It's your idea—I mean the crewless cargo ship and the force beam to guide it. Come to think of it, why isn't it applied to other types as well?"

"Not enough flexibility of motion," explained Neal. "Can't swerve off the beam in case of necessity. The occasion might arise in one out of a billion cases—not enough to bother about with cargoes, but with passengers on board it's another matter. Besides, passengers need attention. Got to wipe their noses, furnish an audience for their 'ohs' and 'ahs' when they hit space for the first time, and answer a lot of fool questions."

"You've left out the real reason you got busy and worked out the beam, Neal. They couldn't get a crew for a dust boat since the first one went out like a nova halfway to Earth."

"Can't say as I blame them. The slightest amount of residual air in the hold—a leak from crew quarters—and the dust explodes. But I'd better send Bruce the flight elements. She's due to come sliding down the beam at Port New York in three hours and thirty-five minutes."

He tripped the visor into action; set it on the New York length.

The screen remained blank.

"That's funny! Bruce must've stepped out a moment. But the automatic reflex should have buzzed back."

He waited a minute; tried it again.

Still the screen showed no signs of life.

Neal said "Damn!" Little puckers appeared in his forehead.

"Maybe his screen's blown," suggested Shep.

"He's got an auxiliary, on an independent circuit. And he knows I was due to transmit."

Shep's dark face began to look white. "Gosh, Neal! Suppose they've started."

Neal swung on him fast. "Who's started?" There was an edge to his voice.

Shep gulped. "One of the other units."

"You're crazy!" Neal made it harsh, explosive, to hide his own unease.

"Maybe, but it makes sense. This is a swell time to start what back in the Second World War they called a 'blitzkrieg.' In another month we go into double production, thanks to the Shipman process. Then it would be too late. Now they've got the jump on us. Their own cargo comes through, and ours gets by-passed in space. The opportunity would never come up again."

Neal got up. His tall, lean body, flat-muscled, lithe like that of a dancer, overtopped Shep by a head. "If it isn't the Moon madness that's got you, you don't know the half of it."

He stopped abruptly, tried New York feverishly again and again.

The screen did not even flicker.

Then he set the length for Washington, where the Council of Experts sat. His mouth was a hard, tight gash, and his eyes burned like neon bulbs.

So intent was he on the controls, so intent was Shep Low on Neal, that neither one heard the stealthy opening of the exit slide behind them. Five men moved soundlessly into the room, their feet padded with noiseless arbo sheaths.

NEAL half turned from the still-blank screen. "Look, Shep!" he started. "While I'm raising Wash-

ington, you go get Gautry and tell him—" Then he saw the men, and he jerked upward with a cry of warning, his right hand streaking to the belt where his thermo unit hung.

Fast as he was, the men were faster. Two sprang for him, short dural clubs upraised. Two others sprang for the startled assistant. The fifth flung for the screen control, sent his club crashing over the tangle of cables and thin-walled tubes. The face of the Washington operator was humming into life when a blast of shorted wires and tubes sent crisping flares over the entire outfit.

Neal tugged desperately at his thermo unit and started a second shout for help. Then two clubs slammed simultaneously down on his skull. Moon and stars and galaxies whirled dizzily around. As he went toppling he heard as from a great distance the smothered outcry of Shep Low; then everything slid away from him.

The five men paid no further attention to the slumped victims. They worked efficiently and fast. No words were uttered. Their alien eyes and olive-stained faces were impassive. Their lank, black hair was plastered greasily over sloping foreheads. Silently on their arbo sheaths they padded around the chamber, methodically smashing every instrument, every panel, every auxiliary set that might take over in an emergency. The dural clubs, specially alloyed, made small, squishing sounds as they thudded into the apparatus.

The whole thing took but a few seconds. The leader's pale eyes flicked over the holocaust; then he lifted his hand and twisted his wrist in a peculiar gesture. It was a salute!

As silent as they had come, the

five men slid out of the place they had wrecked. Like shadows, they hugged the tumbled rocks to one of the emergency locks. Still without a word, they slipped inside, where a small, dull-gray scooter waited. They tumbled in, slid the port into place, and went out of the automatic lock like a gray ghost. Quietly the electro-powered scooter vanished toward the east, its gray sheath merging with the pumice-gray surface of the Moon.

Behind them lay the unwitting Moon station, cut off from all outside communication or warning for at least a day of intensive repairs. The leader's olive-tinted face permitted itself a flitting grin. A day? All that was required was a mere three hours and a half of silence!

EVERETT GAUTRY splashed the sweat off his broad-beamed forehead with a weary gesture. The lean, pumice-smudged man leaning against the wall of central quarters looked down at his gnarled hands and spat thoughtfully. He was Joe Banks, the mining foreman.

"Another load gone, Mr. Gautry," he said, "and I wish to Saturn it'd be the last. My men are getting pretty leery 'bout that there dust. Ever' time they shove a dipper into that old vent they jump like it's already exploded."

"She's a hell hole, all right," Gautry agreed, "but we got our orders. 'Get it out,' they tell me, and I get it out according. Ain't much chance o' trouble down there in the vents, though. Been lying there for millions of years, vacuum-sealed, so to speak."

Joe Banks spat again. "Lucky there ain't any atmosphere on the Moon, or else—"

"The scientists back home worried around with that for a while.

Claim the discovery of the Tycho dust solved what was puzzling them ever since they turned an eye on the Moon."

"How do you mean?"

"About the Moon's surface looking like an old-fashioned battle-field," Gautry explained, "and the total absence of air an' water. They figure long ago there must've been both. But the dust was gradually forming underground, under pressure, from some chemicals that we been fortunate back on Earth in not having. Some pockets close to the surface got exposed. A moonquake, mebbe; a big meteor; or mebbe just plain erosion. The contact with oxygen set off the dust. The whole surface of the Moon went off in one grand smack. Everything went— atmosphere, seas, soil, mebbe a whole race o' people. Where the pockets were there was extra-deep explosions—that's your craters now, like Tycho here."

Joe shivered, looked apprehensively down the deep vent almost at their feet. It ran for miles into the bowels of the dead Moon, and was capped with vacuum locks to keep the artificial air within the dome from seeping down into the workings. "I suppose the stuff we're mining lay too deep for the big blow tuh get at it."

"That's the way they figure it," nodded Gautry. He yawned, flexed his powerful arms. "Might's well go in an' chin with Cass an' Low for a while. We all deserve a rest."

"Me, too," agreed Joe. "'Sides, I wanna hear what's goin' on back on Earth." He grinned shamefacedly. "There oughta be a message for me."

Gautry chuckled and poked him in the ribs. "Nancy, eh?"

"Yeah! I tol' her the company don't like so many personal mes-

sages, but she says either she talks tuh me ever' other day or she's a-comin' out here tuh see what's what. Claims she got a sneakin' suspicion there's some yaller-haired gals up here on th' Moon."

The boss grinned. "I wish tuh Mike there was, Joe. Me, I'm a single man, and this here life gets kinda hard. You're lucky, fella. But come on."

They threaded their way over the porous surface toward the control chamber.

"'S funny!" Gautry remarked. "Everything's quiet's the Moon itself in there. Usually those two babies come boilin' out when the cargo ship blasts off. Like tuh raise hell when there's a chance."

Joe Banks nodded. "'Specially Neal Cass. Bet he could fight his weight in meteors. Good guy, though."

"They don't come any better." Gautry stepped in through the open slide door. Banks was right on his tail.

"Hello, you two space eaters!" greeted Gautry; then went suddenly quiet. Banks made a little choking sound.

THE control room was a shambles of twisted wires and smoldering tubes. It looked as though some Moon giant had torn through it in a murderous rage. And on the floor, limp, unstimulating, lay the two control men!

Ev Gautry was a big man, but he moved now with the celerity of a cat. He shoved clear across the chamber in a single move, ripped open the emergency medical kit, tumbled out supplies—water, bandages, hypos already filled with powerful stimulants.

"See if they're alive, Joe," he said

hoarsely. He did not recognize his own voice.

Banks knelt swiftly. There was a huge lump in his throat that almost suffocated him. He put his ear to Neal's chest; then he did the same with Shep Low.

"They're alive!" he yelped joyfully. "Gawd, Mr. Gautry, they must be made o' dural! Lookit them there lumps on their skulls."

But the boss shoved him aside and began to swab and paint the wounds. He injected the hypos expertly into the big arteries of the arm. There was an almost instantaneous reaction. Color flowed into their faces, breathing grew stertorous, then subsided into regularity. Neal opened his eyes first.

"Wh-what—" he gasped.

"Take it easy, old chap," Gautry advised. "Look, Shep's comin' around."

But Neal's bleary eyes took in the wreckage of his pet instruments, and he jerked off the restraining hand and came wabbling to his feet.

"Those men," he gasped. "Did you get them?"

"Whoa!" said Gautry. "What men?"

"The five who attacked us and wrecked the works."

Joe Banks shook his head. "Never seen hide nor hair o' anyone."

Shep painfully struggled up. His face was pale and the blood streamed still from the cut on his forehead. "They got away clean," he groaned.

Gautry's eyes narrowed. "What's this all about?"

Neal explained swiftly. "They looked like one of the tribes of the Northeast Asiatic Union," he ended.

"You know the type—dark-olive faces; curious, slitted eyes, and damp black hair plastered down."

Gautry swore. "Their station's the other side o' the Moon. Damn their filthy hides! I'll break out every gun and scooter we have and blast them to hell and gone off the Moon!"

"But why should they 'a' done it?" asked Joe.

Neal started to shake his head, then suddenly galvanized into life. Alarm flooded his bruised face. "Migosh!" he exploded. "Shep was right."

Shep held his head. "I wish to hell I wasn't," he moaned.

The boss felt a quivering premonition. "Stop talking riddles, you two!" he snapped.

But Neal disregarded him. Frantically his eyes sought the time signal. It was broken.

"Quick!" he shouted. "What time is it?"

Joe stared down at his wrist. "Eleven—fifty-six."

"We were out then about fifteen minutes." Neal's voice was flat, emotionless. "In three hours and twenty minutes the *Thunderbolt* will crash headlong into Port New York."

"You're crazy!" yelled Gautry. "That slap on the head knocked you dizzy. Just because *our* plant is wrecked don't mean New York can't hold her on the beam and set 'er down easy."

"He's not crazy!" Shep shouted almost hysterically. "He's talking God's truth. Just before they jumped us we were trying to raise Bruce Hopper at New York. He's out; and his station's out, same as us. It was a deliberate set-up, I tell you. Both ends of the beam were smashed."

SHEP'S voice stopped abruptly, and for a long moment only the deep breathing of the four men could be

heard. In each man's mind flashed the same panoramic vision. Of a great cargo boat hurtling crewless through space. Of a control beam that was haywire. Of frantic ground crews at Port New York trying desperately to rig up emergency controls and knowing that it could not possibly be done in time. Of twenty million people cramming all roads, all available crafts in panic terror to evacuate a hundred miles square and knowing that millions of them would not make it. Of hope against hope that somehow the ship would swerve and go careening safely out into space. Of blasphemy and imprecations and prayers all intermingled as every telescope trained on the approaching disaster. Of the moment of contact!

Here, every one of the four in that smashed control room felt his heart held in a vise and all blood squeezed from his veins. They knew what would happen. They knew exactly the terrific energies imprisoned in the Tycho dust that required only contact with air for a short space of time to explode.

Cautious experimentation had blasted miles of desert sky-high with a single shell load. Here there was a thousand tons! The imagination reeled and rocked. Half the eastern coast would detonate out of existence. No similar holocaust had taken place in all Earth's history since the time when the glaciers marched inexorably down from the pole.

"We've got to stop it!" Neal's voice was hard, brittle as he broke the terrible silence.

"But how?" Gautry spread his hands helplessly. For the first time in his hard-bitten career he did not know what to do.

"There isn't a chance," wailed Shep. "The Northeast Union knew

what was what. Damn their olive hides! They must have thousands of fighting detonators crammed to the brim with their own Moon dust waiting for the *Thunderbolt* to crash." He shook his fist up at the pale-green disk of the Earth. "They'll come in slamming and blasting to mop up our union, to bring the terrified remnants under the tyranny. Damn 'em!"

Joe Banks swayed. The gray pumice smudges made black streaks on the sudden pallor beneath. "Nancy!" he whispered. "Nancy! She's in New York!"

"Shut up, all of you!" snapped Neal. "Let me think."

They fell silent. Only their feverish eyes followed his jerky, abrupt pacings around the control chamber. He seemed like a caged lion. His eyes blazed, his brow was a corrugated board, and his mouth was tight with furious thought.

"If anyone can think of a way, it's Neal," Shep said huskily.

Gautry shook his head despairingly. "Correct. But there ain't any way."

Neal came to a swift halt. "It's a million-to-one shot, but it's the only chance."

Joe Banks looked up like a man reprieved from death. "Wh-what is?"

"No time for details, Joe," said Neal. His voice crackled. "Every second counts. Get the *Flying Meteor* fueled at once. She's the fastest boat we've got. And put the following equipment on board. Hurry, Gautry, if you've ever hurried in your life."

Gautry was the boss of Moon Station 2X, but like all good men he knew when to take orders as well as when to issue them. This was an occasion for *taking* orders. He didn't have the slightest idea what

Neal Cass had in mind; but he knew Neal, and that was enough for him.

"Right, Neal. You'll have 'er r'aring to go in five minutes flat. C'mon, Joe, we got lots to do, an' pronto."

MOON Station 2X within five seconds was a seething, ordered inferno of shouted orders and toiling, sweating men. The little speedster was trundled into its lock, rocket fuel jetting into its tanks from flexible hoses even as it moved. Grim mechanics swarmed over its surface, spied through its innards, tightening, tuning, making sure every rocket valve, every jet was functioning like a precision watch. Equipment poured into it in endless stream.

In four minutes and ten seconds Gauty shouted: "She's ready to blast, Neal. I don't know what you're up to, but we're all praying."

Neal lay in his cushioned rebound straps at the controls. Shep, darkly haggard, lay in his own supports. The ports slid noiselessly into place.

"Hold tight, Shep! I'm giving her maximum acceleration."

Neal shifted the lever all the way over. There was a rushing, roaring sound; a huge jerk out into space that thrust them back against the straps like bouncing marionettes. A crushing weight slammed against their limbs. A wall of blackness overcame them.

It was only seconds, but it seemed like eternities. Then they fought out of their daze. The crushing load lifted.

Shep said: "Whah . . . hah! That's the fastest take-off I've ever been in."

Neal's eyes focused on his sights. "Had to, Shep. Every split second counts. We've got to catch up with

the *Thunderbolt* before she gets too close to Earth."

"Hm-m-m! The *Thunderbolt's* bowling along pretty fast. About thirty miles a second."

"Thirty-two and a half, to be exact. And she's got a head start on us of a whole hour."

Shep groaned. "Sounds pretty hopeless. We're geared to about forty, and you know what they say about stern chases."

Neal's jaw hardened. "I'm not going to run the usual way."

"What do you mean?"

"I mean, building up acceleration to maximum speed for which the ship is planned, and then letting her coast. I'm going to keep on accelerating."

Shep sat up quickly, "Wh-what?" he gasped.

"Only chance to catch up," Neal explained. "If I can push her up to sixty and keep accelerating her against the Moon's gravity to keep her at that, we may overhaul the *Thunderbolt* in about an hour and three quarters. Don't forget, the *Thunderbolt's* practically hit the Earth's sphere of gravity by now. Instead of fighting the Moon pull, as we are now, she's accelerating without rockets."

Shep cleared his head with a vigorous shake. "We'll start every strut and every seam," he protested. "You know these speedsters can't stand constant acceleration like that."

"She'll have to," Neal declared grimly. "Otherwise we might as well write 'finis' to home and country and two hundred million swell human beings."

Shep digested that. "O. K.!" he said finally. "Give her the gun. We don't matter in this worth a cent. Only—"

"Only what?"

"If I only knew what you had up your sleeve to stop the *Thunderbolt*, Neal."

Neal turned around to his assistant. "I've only a glimmering yet," he said. "I'm trying to work it out while we're traveling. That's why I had Gautry shove in every type of apparatus I could think of."

The Moon was already only a huge silver disk beneath them, and shrinking visibly with the passing minutes. Neal held the *Flying Meteor* grimly at constant acceleration. Their limbs were heavy and their blood pumped sluggishly. Their bodies seemed to weigh tons. The gravity pull within the ship was of the order of two Earth gravities.

Behind them blazed the steady trail of rocket flame, spreading fan-wise into space. The stout metal struts shook and vibrated and complained at the punishment they were taking.

But Neal kept his eye glued to the scanner for sight of the runaway *Thunderbolt*. They flung past the sphere of Moon attraction and Earth swung slowly underneath, and the Moon described a tedious arc to the zenith, but still the *Thunderbolt* was too far ahead for sight.

"Look," Shep said hopefully. "I just thought of it. If both control stations were wrecked, wouldn't the force beam that holds the *Thunderbolt* to her destination disappear with it? That would mean that the slightest deviation would send the runaway smacking into some other part of Earth." A small grin illuminated his wan face. "Maybe she might act like a museum boomerang and let the Northeast Union have it *kerplunk*."

"Sorry, Shep, it won't happen. She'll crash at Port New York just the same. You forget a very simple

principle. Though the power's cut off, there remains a tremendous magnetic lag. A thing by the name of hysteresis, in case you've forgotten. On the power we were using, the beam can last for days. The only thing that happened with the destruction of the controls is that there's no way of cushioning its fall with directive nose rockets."

"Damn!" muttered Shep, and fell silent again.

But a moment later he broke out once more. "Maybe you expect to do it, Neal; but couldn't we send a shell crashing into her when we overhaul her, and explode her in space?"

Neal looked at his assistant queerly. "You know what that would mean, don't you?"

Shep reddened with embarrassment. "Yes," he admitted. Then, almost beligerently: "After all, it's two lives against the whole union. I know I shouldn't have talked. I'd have felt a whole lot better if you had stayed back on the Moon."

"You old son!" Neal told him affectionately. "I knew I could count on you. Sure, I was thinking of that. But it's too late now. By the time we overtake the *Thunderbolt* she'll be so close to Earth that the explosion of the dust would sear the face of the union as though the Sun had plopped right down on it."

"Oh-h-h!" Again Shep subsided into glum silence.

THEY ROARED ON, jets blasting, combining gravity fall with maximum acceleration. The pressure on them grew almost unbearable. The lifting of an arm was a torture. Neal grew cold with fear. Even if the *Flying Meteor* didn't shake herself apart, they'd catch up with the cargo boat too late. Already Earth

was a vast panorama beneath and spreading out with frightening rapidity.

"There she is!" yelled Shep suddenly. Neal tried to turn his head fast toward the scanner and almost wrenched it off.

There she was, certainly.

A distant, ovoid body, glittering with reflected Sun, falling fast toward the looming Earth.

"Can we make it?" husked Shep.

Neal forced his lead-heavy fingers to the calculators. Slowly the integrations moved. He fetched a deep, painful breath. "She's 4,500 miles ahead of us and about 60,000 miles from Earth. At her present rate of speed she's due to smack in about half an hour." His fingers held the acceleration lever over to the extreme right. "We'll catch up in eight minutes."

"And then?"

Neal shook his head wearily. "I don't know," he confessed with tragic despair. "My brains logy with the double gravity. I haven't been able to think of a single thing yet."

Shep groaned. "Look!" he exclaimed. "There are battle liners rising out of Port New York. A dozen of them! By the ten moons of Neptune, I think they're going to blast the *Thunderbolt*."

Neal's face grew gray. "Quick, Shep, get them on the visor! Tell them for God's sake not to try it. They'll rip the whole face of the Earth to pieces."

Shep's hand moved like a slow-motion stereo to the switch, stopped halfway. Excitement blazed suddenly in his eyes. "Neal! Neal!" he almost screamed. "We've been fools! They're right and we're wrong. We forgot completely."

"What?"

"That the dust won't explode unless there's oxygen. There's no air in space, and the *Thunderbolt* is a practical vacuum. When they smash her up, all that'll happen is that the dust spatters out into space, harmless."

"Yeah! And then drift down to Earth, contact with Earth's stratosphere—and then what?"

Shep collapsed. The luster died in his eyes. "I might have known you'd have thought of it already. Hereafter I'll keep my brilliant ideas to myself."

THE GRIM, gray warships were coming up fast as Shep spat out his warning over the screen. "But, damn it, man!" exploded Squadron Commander Dakin of the flagship, *Abraham Lincoln*. "We can't just stand back and watch everything



go up in smoke."

"Nothing else to do, sir," Shep reported heavily. "Unless Neal here can—"

Neal was pacing feverishly up and down the narrow limits of the chamber, picking up pieces of apparatus, studying them with fiercely narrowed eyes, setting them down again with an impatient groan.

"There *must* be a way!" he kept on repeating. "There must—"

He stopped short, stared at a small, shining tube of magneton, mounted on a swinging pivot and looking for all the world like an old-fashioned machine gun. The difference was that its slender arm and solid base were wound with fine strands of spider-thin wire that made a sheath of open mesh about two inches equidistant around the magneton and capable of whirling revolution at the turn of a switch.

Shep turned anxiously, and Dakin was fixed on the screen. "Got anything?" asked Shep.

Neal furrowed his scalp with a swift movement of his hand. "Something's beginning to glimmer. Let me think." He was talking half incoherently to himself. "The beam of force . . . pure magnetism . . . tremendous lag . . . hysteresis . . . but it's cut off from both bases . . . floating in space, so to speak."

"What about it?" demanded Dakin from his uprushing flagship.

Neal looked vacantly at the pale, drawn features of the space fighter. His brain was moving furiously.

"Means it shouldn't take much power to move it. If the beam moves, the *Thunderbolt* goes with it."

Shep whooped. "You mean you can do it?"

"I can try. But not what you think. I couldn't possibly shunt it out into space."

"Oh!" groaned Dakin. "You mean you might be able to shunt it onto some other land." His voice hardened. "Sorry, Cass. As commander of the space fleet of the North American Union, I'll have to forbid that. The Council of Experts will never permit the sacrifice of millions of innocent lives to save our own."

"Wasn't thinking of that," snapped Neal. "Shut up a moment; I'm groping around."

Dakin shut up. Neal Cass had a certain reputation.

"Let's see now. The floating force beam's at right angles to the magnetic lines of force of the Earth. The lines run north and south through the magnetic poles. A regular meshwork. The dangling end of the beam is in contact. Suppose . . . suppose—"

Shep kept his eyes glued straight ahead on the falling *Thunderbolt*. They were overhauling it fast, but Earth was barely 40,000 miles below. Soon it would be too late to do *anything*.

Neal's eyes cleared. He pounded balled fist into open palm. "I've got it!" he shouted.

"Thank God!" breathed Shep. "I knew you would."

A hopeful yet half-skeptical flicker played over Dakin's tight-drawn countenance. "Then hurry, man! You've barely got twenty minutes to do your stuff."

Neal was already at the magneton tube, his hands like blurred lightning. He hooked up tubes in series, he attached wires, he plugged the whole thing into the power circuit of their generators, and spun the magneton on its pivots until it pointed at right angles to their line of flight and tangential to the outspread Earth beneath.

As he worked he spoke rapidly.

"It's a gigantic gamble. I haven't time to work the thing out mathematically on the integrator. But this magneton instrument is a refinement on the usual thing. When the power goes on it develops a negative magnetic beam. A sort of hole in space. Along its cylindrical stream of action it clears out of its path every type of electro-magnetic wave, every light wave, even the gravitational warp itself."

He spun sharply. "What are you dawdling for, Shep? Get going! Blast on every rocket. Pull in front of the *Thunderbolt*, turn the nose of the *Flying Meteor* directly down along the force beam. Hurry!"

Shep gulped, obeyed. He wasn't resentful, though Neal should have known he wasn't a mind reader. Neal's nerves were on the ragged edge, that was all.

"Hold on to your hat!" he yelled back. "Here we go."

THE SHIP was no longer a flying meteor; it was a blazing, portentous comet. All space behind was a flame of dazzling spray. The *Thunderbolt* seemed to reverse its gait, to rush back upon them at an alarming speed.

They fled past, swerved, barely missing the frantically maneuvering battle liners. Into the stream of the force beam they swung, held. Not more than fifty miles behind, along the same magnetic flow, shot the *Thunderbolt*.

Shep drew a deep breath. In fifteen minutes more they'd hit the stratosphere. "Here you are, Neal," he said. "Now what are you going to do?"

Neal worked on furiously, talking fast. "At the ten-thousand-mile level above Earth, start swinging obliquely, Shep. At one thousand fall into a closed-orbit parallel to the

equator, and directly along the line of the sixtieth parallel of latitude. Do you understand?"

Shep looked blank. "I can follow orders," he grumbled, "but that doesn't mean I understand what you're driving at."

Neal readjusted the angle of sight of the magneton cylinder, threw the first of the step-up power switches. The tubes began to glow, and the hurtling craft was filled with the humming of innumerable bees.

"It's simple enough—if it works!" he declared. "I'm starting to cut a negative cylinder of force through space. As the ship swings into an orbit around the Earth, the anti-magnetic stream will follow and form a closed path. It will shear straight through the longitudinal magnetic lines of Earth, so that all around it, completely enveloping the sheath, there will be, practically, a solid wall of incasing magnetic waves.

"We're now on the Earth-Moon force beam. The dangling end, which stops at ten thousand miles above Port New York, will contact our negative, or antimagnetic hole. Instead of continuing to buck the strong resistance of the Earth's magnetic lines, it will slip easily into the magnetic vacuum."

"And follow us into a closed orbit around Earth," Shep broke in excitedly. "Which means that the *Thunderbolt* will follow, too, like a flying chip in the wake of a cyclone."

"Exactly."

"By the shining rings of Saturn!" crowed Shep. "I knew you'd get it. But why must I place her along the sixtieth parallel?"

Neal grinned, said quickly: "Start angling, Shep. We're hitting the ten-thousand-mile level."

Shep's stubby fingers raced over

the controls. Neal caught hold of a strap, clung grimly against the side sway. Earth reeled beneath them. The magneton glowed with a curious luster. The tubes whined with bluish fires.

Neal's eyes were riveted on the rear screen, where the *Thunderbolt* made a shining, hurtling ovoid.

It had not swerved from its original path!

Shep froze at the controls, his face a tragic mask.

"Your scheme didn't work," he said.

But even as he spoke, the *Thunderbolt* began to turn. Slowly at first; then with increasing speed. Following the angling path of the *Flying Meteor*, following like an obedient duckling in the wake of its watchful mother.

Neal expelled his bursting lungs with a gusty *whoosh*. He had not even known that the taut muscles of his throat had withheld all breathing.

"You spoke too soon, Shep." Strange how calm his voice was, now that victory perched in the offing. "Don't forget—at one thousand miles, swing into a closed orbit on the sixtieth parallel."

"Aye, aye, sir!" Shep grinned delightedly.

ON THE VISOR screen were crowding faces. A dozen bewildered countenances of the captains of the battle fleet, crowding each other, masking, obliterating, clamoring, all discipline or ordered precedence forgotten.

Space Commander Dakin's sharp-visaged face ducked from side to side to gain clear vision. "By God, Cass!" he swore. "You've done it! You've saved the union! But why the sixtieth parallel?"

"You'll see," Neal retorted with

a cryptic smile. To Shep he said: "Got her set properly?"

"Right!"

Shep was a skillful pilot. Earth was perilously near, a great, panoramic, swift-rushing ball beneath. Continents fled past like blurs, oceans tumbled green and blue. And still they dived in a long, straightening slant. Behind them rushed the *Thunderbolt*, and after it, in disciplined array, flung the battle fleet of the union.

"Now!" said Neal sharply.

Shep pointed slightly toward the north pole, made a wide arc, and pushed the *Flying Meteor* into an orbit. Around and around the Earth they swung, once, twice, three times, turning from west to east with the turning globe underneath. North Europe, North Asia, Atlantic, Canada.

"I want you," said Neal slowly, "to slacken speed so that we revolve in the same period of revolution as Earth. Come to a relative position directly over Bering Strait."

Shep looked startled. "Oh!" he gasped, and obeyed.

Meanwhile Neal swung a parabolic repeller ray on the oncoming *Thunderbolt*. As the *Flying Meteor* slowed, the cargo boat with its load of Tycho dust slowed also under the impact of the ray.

Fifty miles behind, motionless with respect to them, motionless with respect to the capital city of the Northeast Asiatic Union. The Bering Straits was a thin, shining hairline beneath, the vast stretch of land on either side blinked back at them.

The *Thunderbolt's* channel of force, ruptured at both ends by the destruction of the two plants on Earth and Moon, had reknit in the tunnel Neal had carved out of Earth's magnetic field for it. Firmly

held in that channel, revolving about Earth at such a speed and at such a distance as to be in a stable, twenty-four-hour orbit, the *Thunderbolt* would seemingly hang permanently motionless just where it was.

Magically the visor screen cleared of its crowding faces. Only Dakin's remained.

"I know now what you have in mind, Cass," he said harshly. "There's no doubt they deserve it. They wanted to wipe us out with the detonation of that load of dust. It's poetic justice. But I can't permit you to do it. Not until I communicate with Washington."

"I had no such intention, Commander Dakin," Neal quietly replied. "Trust me just this little further. Put one of your scout ships in position at a safe distance, but within firing range. Have her train all her armament on the *Thunderbolt* and keep it fixed. Meanwhile, I'll call Washington."

Dakin hesitated, then saluted briefly. "All right, Cass. I'll take your word for it."

He rapped out orders and a ship dissociated itself from the main fleet, raced upward and took its position.

Neal put in his call.

William Pruyn, hawk-faced, gaunt, with imperious air tempered now by grave anxiety, flashed on the screen.

"Great heavens, Cass!" he greeted abruptly. "We don't know what it's all about, but you seem to have saved us all from a horrible disaster. Explain, man; explain!"

Neal saluted. "The Northeast Asiatic Union plotted to destroy our union, sir," he said. "The smash of the *Thunderbolt* would have been their opening gun."

Pruyn said "Ah-h-h!" His face

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grew hard as granite. "No wonder their ambassador has been clamoring for an audience."

"Is he with you now?"

"In the anteroom. I was just admitting him when you called."

"Please ask him in, sir. And . . . uh . . . may I be permitted to speak for you to him?"

Pruyn permitted himself a rare smile. "You seem to have done pretty well so far, young man. You might as well continue."

"Thank you, sir."

THE olive-tinted ambassador hurried into the room, stared impassively at the screen. All his race were well schooled against betraying emotions.

Neal wasted no verbiage. "You know," he started abruptly, "that your plans have miscarried."

The ambassador's face did not change. "I do not know," he said politely.

"Then look." Neal switched the rear screen into contact with the main visor.

The ambassador's eyes took in the picture but betrayed nothing.

"Yes?" he said.

"The *Thunderbolt* that you expected to explode with its cargo on Port New York is now motionless over Ir-tuan, the capital city of our country. It stays there, Mr. Ambassador. I've placed it into a closed orbit that will occupy that position forever. Forever, do you understand?"

The Northeasterner looked contemptuous. "We have a powerful fleet," he said softly. "At a word from our Great Lord it will rise up and wipe out your puny squadron. Then it will take in tow your *Thunderbolt*—straight for your country."

Neal laughed. "You sure give us

little credit for intelligence. At this moment a scout cruiser lies overhead, all guns trained on the cargo boat. At the slightest sign of hostility on your part, she blasts her with shells. The *Thunderbolt* explodes, the dust falls into the stratosphere, and—well, you know the rest. You thought of it before I did."

The envoy did not change his smile. "How many years can your guardian cruiser stay in position?"

"Not long," Neal retorted. "But long enough for me to board the *Thunderbolt* and place a certain little mechanism of my invention into its hold. It is so delicate that the slightest tampering with the ship, the slightest shift from its present orbit, and it detonates the works. Laugh that off."

The ambassador began to sweat. "What do you want?"

"Nothing! I'm keeping the dust over your heads as a sort of peace insurance. As long as you fellows watch your steps and mind your own business, the *Thunderbolt* is harmless. If you make the slightest wrong move, though, I'm having a long-range finder set up in our own country, tuned to the wave length of the detonator within the ship. You act out of turn and, strangely enough, the ship explodes. What's your answer?"

The ambassador bowed. He was dignified in defeat. "I shall communicate with the Great Lord and explain the situation. I am certain he will follow my advice. Our union has no intention of troubling the peaceful waters of Earth."

"I thought as much," grinned Neal. He stared affectionately at the shining, ovoid surface of the *Thunderbolt*. "A little dust sure goes a long way."



BUTYL AND THE BREATHER

By Theodore Sturgeon

The Ether Breathers retired, and the perfume magnate wanted to smoke 'em out. He did! A really good perfumer out to make a foul odor, can accomplish miracles!

Illustrated by Edd Cartier

I WAS still melancholic about chasing the Ether Breather out of the ken of man, the day I got that

bright idea of bringing the Breather back. I should have let it stay in idea form. I should not have gone

to see Berbelot about it. I also should have stayed in bed. I've got brains, but no sense. I went to see Berbelot.

He wasn't glad to see me, which he did through the televisor in his foyer. Quite a gadget, that foyer. I knew that it was an elevator to take guests up to his quarters in the mansion, the "House that Perfume Built." I hadn't known till now that it was also a highly efficient bouncing mechanism. I had no sooner passed my hand over the sensitized plate that served as a doorbell when his face appeared on the screen. He said "Hmph! Hamilton!" and next thing I knew the foyer's walls had extended and pinned me tight. I was turned upside down, shaken twice, and then dropped on my ear outside the house. I think he designed that bouncer just for me. He was a nice old boy, but, man, how he could hang on to a grouch. A whole year, this one had lasted. Just because I had been tactless with the Breather.

It all started the year before, when I sold that icky play to Associated Television. The play was telecast to advertise a Berbelot perfume, but things happened to it. It left the transmitters as broadcast, but the Breather got hold of it before it got to the receiving sets all over the country, and it came out plenty garbled—tinged with the Breather's childlike sense of so-called humor. Berbelot and I had contacted the Breather, using the same broadcasting technique that the Breather had been messing up—polychrome, or color television. We learned that the Breather was some sort of a creature which described itself as "one and many." It lived in the ether, it did not reflect light, and the wave convolutions of polychrome technique exactly matched its etheric

brain waves. Don't let it bother you if you don't savvy all this. I don't. Even Berbelot couldn't understand it. But how was it to tell us what it was when humans themselves have no words to describe such a being? It could only speak the language it learned from humans. Anyway, it wanted to know if it had hurt anyone's feelings. I told it, in a heated moment, that it had, and that it ought to be ashamed of itself, messing up a new industry that way. Profoundly apologetic, it withdrew from the air waves! Just like that! And old Berbelot never forgave me for it. How was I to know—oh, well.

I got up and dusted myself off and swore I'd never bother the irascible old heel again. And then I hunted up a drugstore to call him up. That's the way it was. Berbelot was a peculiar duck. His respect for me meant more than anger against him could make up for. He was the only man I ever met that ever made me sorry for anything.

I went into the visiphone booth and pressed my identification tab against the resilient panel on the phone. That made a record of the call so I could be billed for it. Then I dialed Berbelot. I got his bun-faced valet.

"I want to speak to Mr. Berbelot, Cogan."

"Mr. Berbelot is out, Mr. Hamilton."

"So!" I snapped, my voice rising. "You're the one who tossed me out just now with that salesman manager on your doorstep! I'll feed you your teeth, you subatomic idiot!"

"Oh . . . I . . . I didn't, Mr. Hamilton, really. I—"

"Then if you didn't Berbelot did. If he did, he's home. Incidentally, I saw him in the viewplate. Enough of this chitchat, doughface. Tell

him I want to speak to him."

"B-but he won't speak to you, Mr. Hamilton. He gave strict orders a year ago."

"Tell him I've thought of a way to get in touch with the Ether Breather again. Go on. He won't fire you, you crump from the bread-line. He'll kiss you on both cheeks. Snap into it!"

The screen went vacant as he moved away, and I heard Berbelot's voice—"I thought I told you"—and then the bumble of Cogan's, and then "WHAT!" from the old man, and another short bumble that was interrupted by Berbelot's sliding to a stop in front of the transmitter. "Hamilton," he said sternly into the visiplat, "if this is a joke of yours . . . if you think you can worm your way into my confidence with . . . if you dare to lead me on some wild-goose cha . . . if you—"

"If you'll give me a chance, King of Stink," I said, knowing that if I got him really mad he'd listen to me, being the type that got speechless with rage, "I'll give you the dope. I have an idea that I think will bring the Breather back, but it's up to you to carry it out. You have the apparatus."

"Come up," he whispered, his wattles quivering. "But I warn you, if you dare to take this liberty on a bluff, I shall most certainly have you pried loose from your esophagus."

"Comin' up!" I said. "By the way, when I get into that foyer again, please be sure which button you push."

"Don't worry," he growled. "I have a dingus up here that is quite as efficient. It throws objectionable people like yourself from the sixtieth floor. Do come up." The screen darkened. I sighed and started for the "House that Perfume Built."

THE ELEVATOR glided to a stop that made my stomach feel puffy, and I stepped out. Berbelot was standing in front of it looking suspicious as a pawnbroker. I held out my hand with some remark about how swell it was to see him again, and he just stared at it. When I thought he was going to forego the honor of shaking it, he put his hand into mine, withdrew it quickly, looked at it, and wiped it carefully on his jacket. Without his saying a word I gathered that he wasn't glad to see me, that he thought I was an undesirable and unsanitary character, and that he didn't trust me.

"Did I ever tell you," I said as calmly as I could, "that I am terribly sorry about what happened?"

Berbelot said, "I knew a man who said that after he murdered somebody. They burned him anyway."

I thought that was very nice. "Do you want to find out about my idea or not?" I gritted. "I don't have to stay here to be insulted."

"I realize that. You're insulted everywhere you go, being what you are, I imagine. Well, what's your idea?"

I saw Cogan hovering over the old man's shoulder and threw my hat at him. Since Berbelot apparently found it difficult to be hospitable, I saved him the trouble of inviting me to sit down by sitting down.

"Berbelot," I said, when I had one of his best cigarettes fuming as nicely as he was, "you're being unreasonable. But I have you interested, and as long as that lasts you'll be sociable. Sit down. I am about to be Socratic. It may take a little while."

"I suffer." He sat down. "I suffer exceedingly while you are in the same room." He paused, and then added pensively, "I never thought

I could be so irritated by anyone who bored me. Go ahead, Hamilton."

I closed my eyes and counted ten. Berbelot could manufacture more printable invective than anyone I ever met.

"Question one," I said. "What is the nature of the creature you dubbed Ether Breather?"

"Why, it's a . . . well, apparently a combination of etheric forces imbued with life, living in and us. It's as if the air in this room were a thinking animal. What are you—"

"I'll ask questions. Now, will you grant it intelligence?"

"Of course. A peculiar kind, though. It seems to be motivated by a childish desire to have fun—mostly at some poor human's expense."

"But its reactions were reasonable, weren't they?"

"Yes, although exaggerated. It reached us through color television; that was its only medium of expression. And it raised particular hell with the programs—a cosmic practical joker, quite uninhibited, altogether unafraid of any consequences to itself. And then when you, you blockhead, told it that it had hurt someone's feelings and that it ought to get off the air, it apologized and was never heard from again. Again an exaggerated reaction. But what has that got to do with—"

"Everything. Look; you made it laugh easily. You made it ashamed of itself easily. It cried easily. If you really want to get in touch with it again, you just have to go on from there."

Berbelot pressed a concealed button and the lights took on a greenish cast. He always claimed a man thought more clearly under a green light. "I'll admit that that particular thought-sequence has escaped

me," he nodded, "since I do not have a mind which is led astray by illogical obscurities. But in all justice to you—not that you deserve anything approaching a compliment—I think you have something there. I suppose that is as far as you have gone, though. I've spent hours on the problem. I've called that creature for days on end on a directional polychrome wave. I've apologized to it and pleaded with it and begged it and told it funny stories and practically asked it to put its invisible feet out of my television receiver so I could kiss them. And never a whisper have I had. No. Hamilton; the Ether Breather is definitely miffed, peeved, and not at home. And it's all your fault."

"Once," I said dreamily, "I knew a woman whose husband went astray. She knew where he was, and sent him message after message. She begged and she pleaded and she wept into visiphones. It didn't get her anywhere. Then she got a bright idea. She sent him a tele-facsimile letter, written on her very best stationery. It described in great detail the nineteen different kinds of heel she thought he was."

"I don't know what this has to do with the Breather, but what happened?" asked Berbelot.

"Why, he got sore. He got so sore he dropped everything and ran home to take a poke at her!"

"Ah," said Berbelot. "And the Breather laughs easily, and cries easily, and you think it would—"

"It would," I nodded, "get angry easily, if we could find the right way to do it."

Berbelot rubbed his long hands together and beamed. "You're a hot-headed fool, Hamilton, and I'm convinced that your genius is a happy accident quite unattached to your hypothetical mind. But I must con-

gratulate you for the idea. In other words, you think that if we get the Breather sore enough, it will try to get even, and contact us some way or other? I'll be darned!"

"Thought you'd like it," I said.

"Well, come on," he said testily. "What are we waiting for? Let's go down to the laboratory!" Suddenly he stopped. "Er . . . Hamilton . . . this story of yours. Did that man poke his wife after he got home?"

"I dunno," I said blankly. "I just made up the story to illustrate my point. Could be."

"Hm-m-m. If the Breather decided to . . . I mean, it's a big creature, you know, and we have no idea—"

"Oh, never mind that," I laughed, "the Breather can't get past a television screen!"

Which only goes to show you how little I knew the Ether Breather.

I WAS AMAZED again by Berbelot's laboratory museum. Did you know that in the old days more than two hundred years ago, they used electrically powered sets with a ground glass, fluorescent screen built right into the end of huge cathode tubes? Imagine. And before that, they used a revolving disk with holes punctured spirally, as a scanning mechanism! They had the beginnings of frequency modulation, though. But their sets were so crude, incredible as it may seem, that atmospheric disturbances caused interference in reception! Berbelot had copies of all these old and laughable attempts at broadcasting and receiving devices.

"All right, all right," he snapped, elbow-deep in one of the first polychrome transmitters, "you've been here before. Come over here and give me a hand. You're gawking

like a castor bean farmer."

I went over and followed his directions as he spot-welded, relayed, and wound a coil or two of hair-fine wire. "My gosh," I marveled, "how did you ever learn so much about television, Berbelot? I imagine it must have used up a little of your spare time to make a fortune in the perfume business."

He laughed. "I'll tell you, Hamilton," he said. "Television and perfumery are very much alike. You know yourself that no such lovely women ever walk the Earth as you see every day in the news broadcasts. For the last eighty years, since the Duval color selector was introduced, television has given peach-bloom complexions to all of the ladies that come over the air, and bull-shoulders to all of the men. It's all very phony, but it's nice to look at. Perfumery is the same proposition. A woman who smelled like a rose petal naturally would undoubtedly have something the matter with her. But science gets to work on what has been termed, through the ages, as 'B. O.' My interest in esthetically deluding the masses led me to both sciences."

"Very ingenious," I said, "but it isn't going to help you to make the Breather sore."

"My dear boy," he said, "don't be obtuse. Oh, turn down the nitrogen jets a trifle—that's it." He skillfully spotted seven leads into the video-circuit of the polychrome wave generator. "You see," he went on, running the leads over to a box control with five push buttons and a rheostat set into it, "the Breather requires very special handling. It knows us and how our minds work, or it could never have thought, for instance, of having our secretary of state recite risqué verse over the air, the first time that official used

color television. Now, you are noteworthy for your spontaneity. How would you go about angering this puff of etheric wind?"

"Well, I'd . . . I'd tell it it was a dirty so-and-so. I'd insult it. I'd say it was a sissy and dare it to fight. I . . . I'd—"

"That's what I thought," said Berbelot unkindly. "You'd cuss it out in your own foul idiom, forgetting that it has no pride to take down, and, as far as we know, no colleagues, communities, enamora-tae, or fellows to gossip to. No, Hamilton, we can't insult it. It can insult us because it knows what we are and how we think, but we know nothing of it."

"How else can you get a being sore, then, when you can't hold it up to ridicule or censure before itself or its fellow creatures?"

"By doing something to it personally that it won't like."

"Yeah—take a poke at it. Kick it in its vibrations. Stick a knife into its multiple personality."

Berbelot laughed. "To change the subject, for no apparent reason," he said, "have you ever run across my *Vierge Folle*?"

"A new perfume? Why, no."

Berbelot crossed the room and came back with a handful of tiny vials. "Here."

I sniffed. It was a marvelously delicate scent. It was subtle, smooth, calling up a mental picture of the veins in fine ivory. "Mmm. Nice."

"Try this one," he said. I did. It was fainter than the other; I had to draw in a lot of it before I detected the sweet, faint odor. "It's called *Casviste*," said Berbelot. "Now try this one. It's much fainter; you'll have to really stretch to get it at all."

"Nice business," I grinned. "Mak-

ing the poor unsuspecting male get inside the circle of the vixen's arms before he's under her spell." I'd been reading some of his ad proofs. He chuckled. "That's about the idea. Here."

BERBELOT HANDED me the vial and I expelled all the air in my lungs, hung my nose over the lip of the tube and let the air in with a roar. Next thing I knew I was strangling, staggering, swearing and letting go murderous rights and lefts at empty air. I thought I was going to die and I wished I could. When I blinked the tears out of my eyes, Berbelot was nowhere to be seen. I raged around the laboratory and finally saw him whisk around behind a massive old photo-electric transmitter. With a shriek I rushed him. He got practically inside the machine and I began taking it apart, with the firm conviction that I would keep on taking things apart long after I reached him. Luckily for him there were four thick busbars between us. He crouched behind them giggling until I reached a red-eyed state of wheezing impotence.

"Come out!" I gasped. "You ape-faced arthritic, come out of there and I'll hit you so hard you'll throttle on your shoelaces!"

"That," he said instructively, "was a quadruple quintessence of musk." He grinned. "Skunk." He looked at me and laughed outright. "Super-skunk."

I wrenched ineffectually at the bars. "A poor thing, but your very own, I'll bet," I said. "I am going to stick your arm so far down your neck you'll digest your fingernails."

"Mad, aren't you?"

"Huh?"

"I said, you're sore. I didn't cuss you out, or hold you up to ridicule,

or anything, and look how mad you are!"

I began to see the light. Make the Breather angry by—"What are you gibbering about?"

He took out a white handkerchief and waved it as he unwrapped his body from the viscera of the old-fashioned transmitter. I had to grin. What can you do with a man like that?

"O. K.," I said. "Peace, brother. But I'd suggest you treat the Breather better than you just treated me. And how in blazes you expect to get a smell like that through a polychrome transmitter is a little beyond me."

"It isn't simple," he said, "but I think it can be done. Do you know anything about the wave theory of perception?"

"Not a helluva lot," I said. "Something about a sort of spectrum arrangement of the vibrations of sensory perception, isn't it?"

"Mmm . . . yes. Thought waves are of high-frequency, and although ether-borne, not of an electromagnetic character. So also are the allied vibrations, taste and smell. Sound, too."

"Wait a minute! Sound is a purely physical vibration of air particles against our auditory apparatus."

"Of course—from the source of the sound to that apparatus. But from the inner ear to the hearing center in the brain, it is translated into a wave of the spectrum group I'm talking about. So with touch and sight."

"I begin to see what you're driving at. But how can you reach the Breather with these waves—providing you can produce and transmit them?"

"Oh, I can do that. Simply a matter of stepping up high-frequency emanations."

"You seem pretty confident that the Breather will be affected by the same waves that influence our senses."

"I wouldn't use the same waves. That's why I brought up the spectrum theory. Now look; we'll take thought waves of the purely internal psyche . . . the messages that relay brain impulses to different brain centers. Pure thought, with no action; pure imagery. These are of a certain wave length. We'll call it 1000. Now, take the frequencies of smell, touch and sight waves. They're 780, 850, and 960 respectively. Now, how did we contact the Ether Breather?"

"By the polychrome wave."

"That's right."

"And you mean that the ratio—"

Berbelot nodded. "The ratio between the Breather's thought waves and its sensory vibrations must be the same as that between ours."

"Why must it be?"

"Because its mental reactions are the same, as I told you before—only exaggerated. It reasons as we do, more or less. Its mental set-up corresponds with ours."

"Doggone," I said admiringly, "it's all so simple when you're told how to do it. You mean, then, to discover the ratio between what is to me a pain in the neck, and what it would be to the Breather."

"That's it. But it won't be a pain in the neck."

"Where will it be, then?"

"You're tuning in the wrong frequency," he chuckled. "I'm going to make him suffer the best way I know how, and—my business is perfumery."

"Ah," I breathed.

"Now, I'm going to cook up something really pretty. I'm going to turn out a stench that will make



*That was the first mirror image I ever saw
that could kick itself out of the mirror—*

the Breather's illimitable edges curl!"

"From the smell of that essence of ancient egg you just gassed me with," I said, "it ought to be pretty."

"It will be. Let's see; for a base we'll use butyl mercaptan. Something sweet, and something sour—"

"—something borrowed and something blue."

"Don't be a silly romanticist." He was busy at his chemical bench. "I'll scorch a little pork fat and . . . ah. Attar of roses."

For a moment he was quiet, carefully measuring drops of liquid into a sealect exciter. Then he flipped the switch and came over to me. "It'll be ready in a jiffy. Let's rig up the transmitter."

WE DID as we had done before, a year ago. We maneuvered the transmitting cells of the polychrome transmitter over and above a receiver. It would send to Berbelot's country place eight hundred miles away by a directional beam, and return the signal by wire. If the Breather interfered, it would show up on the receiver. When we had done it before, we had had the odd experience of holding a conversation with our own images on the screen.

"Now I'll distill my *odeur d'odore*," he said, "and when it's run through, you can be my guinea pig."

"Not on your life, Berbelot," I said, backing away. He grinned and went about fixing his still. It was a beautiful little glass affair, and he worked entirely under a huge bell jar in transferring it from the exciter. Butyl and burned meat and attar of roses. My gosh.

In half an hour it was ready—a dusty-brown colloid, just a few drops in the retort. "Come on, Hamilton," said Berbelot, "just a little sniff. I want to give you a preview."

"Uh-huh!" I snorted. "Here—wait."

I gave a buzz on the buzzer, and in a couple of seconds Cogan, Berbelot's valet, popped in. Cogan's face always reminded me, for some reason, of a smorgasbord tray.

"Did you bring your nose?" I asked, leading him over to the chemical bench.

"Yessir."

"Well"—I slid back the little panel in the neck of the retort, standing at arm's length—"stick it in there."

"Oh, but I—" He looked plaintively toward Berbelot, who smiled.

"Well . . . oh!" The "Well" was diffidence, and the "Oh" was when I grabbed him by the collar and stuck his face in the warm fumes.

Cogan went limp and stiffened so fast that he didn't move. He rose slowly, as if the power of that mighty stench was lifting him by the jawbone, turned around twice with his eyes streaming, and headed for the door. He walked lightly and slowly on the balls of his feet, with his arms bent and half raised, like a somnambulist. He walked smack into the doorpost, squeaked, said "oh . . . my . . . goodness—" faintly, and disappeared into the corridor.

"Well," said Berbelot pensively, "I really think that that stuff smells bad."

"Seems as though," I grinned. "I . . . oh, boy!" I ran to the retort and closed the slide. "Good gosh! Did we give him a concentrated shot of *that*?"

"You did."

IT PERMEATED the room, and of all malodorous effluvia, it was the most noisome. It was rotten celery, than which there is no more sickening smell in nature. It was rancid butter. It was bread-mold. It was garlic garnishing fermented Limbur-

ger. It was decay. It was things running around on six legs, mashed. It was awful.

"Berbelot," I gasped, "you don't want to kill the Breather."

"It won't kill him. He just won't like it."

"Check. *Whew!*" I mopped my face. "Now how are you going to get it up to the Ether Breather?"

"Well, we'll use the olfactometer on it," he said.

"What's that?"

"Trade gadget. I knocked it together years ago. Without it I wouldn't have made a cent in this business." He led me over to a stand on which was an enormously complicated machine, all glittering relays and electratomic bridges. "Good heavens!" I said. "What does it do—play music?"

"Maybe you wondered why I could reel off so much about the wave theory of sensory perception," he said. "Look—see these dials? And this sensitized knob?"

"Yeah?"

"That fist size, faceted knob has each of its twelve hundred and two sides coated with a different chemical reagent, very sensitive. I drop it into a smell—"

"You *what?*"

"You heard me. An odor is an emanation of gases from the smellable specimen, constituting a loss of mass of about one fifty-billionth in a year, more or less, depending on the strength of the odor and the consistency of the emanating body. Now, I expose this knob to our Cogan-crusher"—he walked over to the retort with the knob in his hand, trailing its cable, and slid the panel back a bit—"and the gas touches every surface. Each reacts if it can. The results are collected, returned to the olfactometer, translated into a number on the big dial."

"And that is—"

"The ratio I spoke to you about. See . . . the dial reads just 786. With the frequency of abstract thought set arbitrarily, at one thousand, we have a ratio between this smell and thought."

"Take it easy. Berbelot. I'm a layman."

He smiled. "That gives us an equation to work with. 786 is to 1000 as x is to our polychrome wave."

"Isn't that a little like mixing liquor?" I said. "One set of figures is in thought vibrations, the other in radio waves."

"Ratios are like that," he reminded me. "I can have one third as many apples as you have oranges, no matter how many or how few oranges you have."

"I consider myself stood in the corner," I said. "By golly, with that gadget, no wonder your perfumes are practically a monopoly nowadays. Would it be giving away a trade secret to tell me what went into that *Doux Rêves* of yours? How on Earth did you figure out that odor? It'll make a ninety-year-old woman put on lipstick and a centenarian buy spats."

He laughed. "Sure, I'll tell you. *Doux Rêves* is 789.783 on that dial, which happens to be the smell of a rich juicy steak! But they don't associate it with steak when they buy it—at three hundred an ounce. It just smells like something desirable."

"Berbelot, you're chiseling the public."

"Mmm-hm. That's why I pay half a billion in income tax every year. Get over on that bench."

"In front of the receiver? What are you going to do?"

"Oh, I'll have to be over here by the transmitter. I've got to adjust

a carrier wave that will have the right ratio to the polycrome wave. Don't turn on the receiver yet."

I sat down. This amazing man was about to pull something unheard of. I didn't feel comfortable about it, either. How could he be so confident? He didn't know much about the Breather, any more than I did. He was acting like a man in perfect control of everything—which he was—who didn't have to worry about taking a rap for what he was about to do. Well, he built that smell, didn't he? I didn't. I could always blame him for it, even if I was the instigator. I remember wondering if I'd be able to convince the Ether Breather of that, in case the Breather got tough. Oh, well.

"O. K., Hamilton. Turn her on!"

I did so, and a few seconds later the transmitting floods clicked on. From the suspended bank of cells came a hum as soft as their soft glow. The screen flickered and cleared, and I saw myself in it, almost as if I were looking into a mirror, except that my image was not reversed. "O. K., Berbelot."

"Right. Here goes a shot of Berbelot's *Essence of Evil!*"

I heard a switch click and then the faint grate of a rheostat. I stared at my image and my image stared back, and Berbelot came and stood where he could see. It was only later that I remembered noticing that he was careful to stand out of range of the transmitter. The image didn't change—each tiny movement was mine, each facial twist, each—

"Look!" snapped Berbelot, and faded back to his switchboard again.

For a moment I didn't notice anything in particular, and then I saw it, too. The smallest possible twitching of the nostrils. A sudden little movement of the head. And then

a just audible sniffing through the speaker. As suddenly the movement stopped.

"You got something that time, Berbelot," I yelped, "but it seems to have gone away again. The image is true."

"Splendid!" said the old man. He clicked off the transmitter and the receiving screen glowed blankly. "Now listen. I only gave it about as much as we got a few minutes ago when you left the slide open. This time I'm going to give it what you gave poor Cogan!"

"My gosh! What am I supposed to do?"

"Sit tight! If and when the Breather starts kicking, give it right back to him. Don't admit that we did it to coax him back, or, being what he . . . it . . . is, he'll just get coy and disappear again."

"I think you're right. Want me to get him real mad, then?"

"For a while. Then we'll sign off and go to work on him tomorrow. After a bit we'll tell him the whole story; he'll think it's funny. Having fun seems to be his reason for living—if you can call that super-cosmic existence living. Then he'll be appeased. Y'know, Hamilton, if we get him running errands for us he might make us a nice piece of change. We could buy up an advertising agency and have him blank out all competition with his typically wise-guy sort of interference, for instance."

"You think of everything! All right, let's go!"

The floods and cells lit up again, and in a few seconds I was staring at myself in the screen. It made me feel a little queasy. There I was looking at myself, looking at myself, looking at myself, as it were. It dizzied me.

The rheostat twirled over, and an

auxiliary somewhere deep in the complicated transmitter moaned quietly. For about five minutes I strained my eyes, but not by the slightest sign did my image show that it sensed anything off-color.

"Are you sure your gadgets are working all right?" I asked Berbelot.

"Absolutely. Nothing yet? I'll be darned. Wait. A little more juice here, and I think I can build that smell up a—"

"WHAT GOES ON HERE?" roared the speaker.

I stared. I was still seated, but my image was rising slowly. One odd thing about it—when it had been my true image, it showed me from the waist up. As it rose from the bench in the picture, it had no legs. Apparently the Breather could only distort just those waves that were transmitted. A weird sight.

I'd never have known that as my face. It was twisted, and furious, and altogether unpleasant.

"Are you doing that, punk?" it asked me.

"Wh-what?"

"Don't be like that," whispered Berbelot. He was off to one side, staring entranced and exultant into the receiver. "Give'm hell, Ham!" I drew a deep breath. "Am I doing what, and who's a punk?" I asked the receiver pugnaciously.

"That stink, and you are."

"Yeah, I'm doing it, and who are you to call me one?"

"Well, cut it out, and who do I look like?"

"I wish you boys would have one conversation at a time," said Berbelot.

"None of your lip, pantywaist," I told the Breather, "or I'll come out there and plaster your shadow with substance."

"Wise guy, huh? Why, you insig-

nificant nematode!"

"You etheric regurgitation!"

"You little quadridimensional stinkpot!"

"You faceless, formless, fightless phantasm!" I was beginning to enjoy this.

"Listen, mug, if you don't stop that business of smelling up my environment I'll strain you through a sheet of plate glass."

"Try it and I'll knock you so flat you'll call a plane a convex hemisphere."

"If you had the guts that God gave a goose, you'd come up here and fight me."

"If you weren't about as dangerous as a moth on a battle cruiser, you'd come down here and fight."

"Touché," said Berbelot.

"Oh, yeah?" said the Breather.

"Yeah."

"Chiché," said Berbelot.

"I don't like your face," said the Breather.

"Take it off then."

"Not as long as I can insult you by making you look at it."

"It's more of a face to brag about than you got."

"Why, you hair-mantled, flint-hurling, aboriginal anthropophagus!"

Berbelot clicked off both transmitter and receiver. It was only then that I realized the Breather had made me see red. I was in the laboratory, on my feet, all set to take a swing at a thousand-dollar television set.

"What'd you do that for?" I snapped, turning on Berbelot.

"Easy, lad, easy!" he laughed.

"The Breather's had enough, in the first place. In the second place, he was quoting Carlyle, an ancient seventeenth or eighteenth century author. You ran him plumb out of originality. You did fine!"

"Thanks," I said, wiping my

fevered brow. "Think he was sore?"

"I gathered as much. We'll work on him in the morning. I'm going to leave the smell on—just a suggestion of it, so he won't forget us."

"Don't you think he'll start messing up commercial programs again?"

"No. He knows where the trouble is coming from. He's too sore just now to think of anything but that source. He might think of the commercials later on, but if there's any danger of that we'll wise him up and laugh the whole thing off."

"Darned if you don't get me into the doggonedest things," I said wonderingly.

He chuckled, and slapped me on the back. "Go on upstairs and get Cogan to feed you. I'll be along soon; I have some work to do. You're spending the night here, my boy."

I thanked him and went upstairs. I should have gone home.

I WAS dog tired, but before I thought of going to bed I had some figuring to do. It had been a delicious meal, though from the way Cogan acted I thought dark thoughts about arsenic in the coffee and or a knife in the back. But the room he had shown me to was a beauty. Berbelot, as I should have expected, was as good at decorating as he was at anything else. The place was finished in chrome and gray and black, the whole thing centering around a huge mirror at one end. Building a room around a mirror is the most complimentary thing a host can do in a guest room.

It was a fascinating mirror, too. It wasn't exactly silvered—it was of a dull gray sheen, like rough-finished stainless steel. And whether it was metal or glass I couldn't tell. It gave a beautiful image—deep and true, and accentuating natural color.

Probably something he "knocked together" himself.

I walked up and down absently, thinking about Berbelot and the Breather. They had a lot in common. No one could tell exactly what they were, or how great, or how powerful. Thinking about the Breather's series of cracks at me, I realized that he, or it, had spoken exactly in my idiom. Berbelot did that, too. And yet I knew that both of them could have completely swamped me with dialectical trickery.

My shadow caught my eye and I amused myself for a moment by making shadows on the wall opposite the mirror. A bird—a cat—a funny face. I'd done it ever since I was a kid and the thing fascinated me. I was pretty good at it. I wandered around the room making shadow pictures on the wall and thinking about the Breather and Berbelot, and then found myself looking into that deep mirror.

"Hi!" I said to my reflection.

It looked out at me placidly. Not a bad-looking guy, in a pair of Berbelot's cellusilk pajamas and that cocky expression. That was quite a mirror. What was it that made a guy look different? The color trick? Not entirely. Let's see. I stuck out my tongue and so did my reflection. I thumbed my nose, and turned cold inside. I knew now what it was.

The image was—not reversed.

I stood there with my right arm up, my right thumb to my nose. The reflection's right arm—the one toward my left, since it was facing me—was raised, and it thumbed its nose. I was white as a sheet.

Was I bats? Did I have a mental hangover from seeing that unreversed image in the television set downstairs?

"This is awful," I said.

It couldn't be a mirror. Not even Berbelot could build a—or was it a mirror? A—a television screen? Couldn't be—not with the depth it had. It was almost as if I were standing in front of a glass cabinet, looking at me inside. The image was three dimensional. I suddenly decided I had been thumbing my nose long enough. This must be some trick of that old devil's, I thought. No wonder he didn't have dinner with me. He was rigging up this gadget while I was eating. If it *was* a television screen—and I'd never heard of one like this—then that thing in there wasn't me—it was the Ether Breather. I listened carefully, and sure enough, heard the hum of transmitting cells. What a gag! There were cells somewhere hidden in this room, sending my image away and returning it by wire! But that screen—

My reflection suddenly set its legs apart and put its hands on its hips. "What are you looking at?" it asked me.

"N-nothing," I said as sarcastically as I could while my teeth were chattering. "The Breather again, huh?"

"That's right. My, but you're ugly."

"Mind your tongue!" I said sharply. "I can switch you off, you know."

"Heh!" he jeered. "I don't have to be afraid of that any more, thanks to a trick you just showed me."

"Yeah? You can't kid me, bud. You're just some amoral cosmic ray's little accident."

"I warn you, don't get tough with me."

"I'll do what I please. You couldn't pull your finger out of a tub of lard," I euphemized.

He sighed. "O. K. You asked for it."

And then I had to live through the worst thing that any poor mortal in the history of the world ever experienced. It's one thing to have an argument with yourself in the mirror. It's something entirely different to have your reflection reach out a leg, kick down the mirror with a shattering crash, walk up to you and belt you in the mouth a couple of times before it smears you on the carpet with a terrific right hook. That's what happened to me. Just that, so help me, Hannah.

I lay there on the rug looking up at me, which had just socked I, and I said "Whoowie!" and went to sleep.

I've no idea how long I lay there. When light glimmered into my jarred brain again. Berbelot was kneeling beside me chafing my wrists. The beautiful mirror—or whatever the devil it was—was in some thousand-odd pieces on the floor, and I had gone to about as many pieces physically. I finally realized that Berbelot was saying something.

"Hamilton! What happened? What happened? Do you realize you just busted thirty thousand dollars' worth of apparatus? What's the matter with you . . . are you sick?"

I rolled over and sat up, then went hand over hand up Berbelot until I was standing beside him. My head felt like a fur-lined ball of fire and every time my heart beat it blinded me.

"What did you wreck that receiver for?" Berbelot said irascibly.

"Me wreck it? Me didn't wreck it . . . I wrecked it," I said groggily. "I was standing in front of the mirror when who should kick it down and poke me but myself"—I shook my head and let the pain

of it shake my carcass—"Ow. *Whew*. I was just—"

"Stop it!" Berbelot snapped.

Almost suddenly I recovered. "Receiver . . . what do you mean receiver?"

Berbelot was hopping mad. "The new job," he shouted, pointing at the débris. "My first three-dimensional television receiver!"

"Three . . . what are you talking about, man?"

He calmed down the way he invariably did when he was asked a question about television. "It's a box of tiny projectors," he said. "They're set . . . studded . . . inside that closet affair behind the screen you just broke. The combined beams from them give a three-dimensional, or stereoscopic, effect. And now you've gone and wrecked my screen," he wailed. "Why were you ever born? Why must I suffer so because of you? Why—"

"Wait a minute, Pop—hold on there. I didn't bust your precious screen."

"You just said you did."

"Mmm-mm. So help me. It was the Breather. I had a little argument with him and he kicked down the screen and came out and beat the stern off me."

"*What?*" Berbelot was really shocked this time. "You're a gibbering maniac! That was your own image! You were broadcast and your image reproduced there!"

"You're a muddy-headed old stink-merchant!" I bellowed. "I suppose I kicked down your mirror, put three teeth on hinges, and then knocked myself colder'n a cake of carbonice just for a chance to lie to you!"

"This is what comes of getting an overgrown cretin to help out in an experiment," moaned Berbelot. "Don't try my patience any more, Hamilton!"

"Your patience? What the hell was that new-fangled set doing in this room anyway?"

He grinned weakly. "Oh—that. Well, I just wanted to have some fun with you. After you left I tuned in on the Breather and told him to stand by; I'd put him in touch with . . . with the guy that was smelling up his world."

"You old crumb! Fun! You wanted me to argue with that misplaced gamma-particle all night, hey? Why, I ought to . . . I think I will at that!" And I grabbed him by the neck.

"Allow *me*," said a voice behind us, and we were seized, each by a shoulder. Then our heads were cracked violently together and we found ourselves groveling at the feet of my spittin' image. Berbelot looked up at my erstwhile reflection in silent awe.

"Where were you?" I growled.

"In the corner," he said, throwing a thumb over his shoulder. "You're a pretty-looking pair, I must say."

"Berbelot," I said, "meet your Ether Breather. Now I'm going to stand on your face until you eat the shoes off my feet, because you called me a liar."

Berbelot said, "Well, I'm damned!"

The Breather remarked quietly, "You two better explain yourselves in a hysterical hurry. Otherwise I shall most certainly take you apart and put you together again, alternating the pieces."

"Oh, we were just trying to get in contact with you again."

"What for?"

"We were interested in you. We talked to you a year or so ago and then you disappeared. We wanted to talk to you again." In spite of my anger at him I found something else to admire Berbelot for. He had

remembered the Breather's peculiar childishness and was using it just when somebody had to do something, quickly.

"But you told me to stop interfering!" Presto—the creature was already plaintive, on the amicable defensive. Its mutability was amazing.

"He told you," Berbelot snorted, indicating me, where I rolled and moaned over my twice-bruised scone, "I didn't."

"Don't you speak for each other, then? We do."

"You—singular and plural—are a homogeneous being. All humanity is not blessed with my particularly affable nature."

"Why, you old sociophagus!" I snorted, using up my choicest word, and lunging at him. For every inch of my lunge the Breather calmly kicked me back a foot. I did some more moaning.

"You mean you are my friend and he is not?" said the Breather, staring at me coldly as one does at a roach which is going to be stepped on if and when it moves out from the wall.

"Oh, I wouldn't go so far as to say that," said Berbelot kindly.

I HAD an inspiration which, for all I know, saved my life. "You said you learned from me how to come out of the television set!" I blurted.

"True. I should be grateful for that, I suppose. I shall not tear you in little pieces." He turned to Berbelot. "I heard your call, of course, but being told once was enough for me. I did not understand. When I say anything I generally mean it. Humans are not understandable, but they are very funny."

The scientist in Berbelot popped up. "What was that you said about Hamilton showing you how to come out of the set?"

"Oh, I was watching him from the screen over there. I am sorry I broke it. He was walking around the room making pictures on the walls with shadows. That's what I am doing now."

"Shadow pictures?"

"Certainly. I am a creature living in five dimensions and aware of four, just as you live in four dimensions and are aware of three. He made three-dimensional shadows that were projected on a two-dimensional surface. I am making four dimensional pictures that are being projected in three dimensions."

Berbelot frowned. "On what surface?"

"On that of your fourth dimension, of course."

"Our fourth. Hm-m-m . . . with what light source?"

"A five-dimensional one, just as your Sun, for instance, has four."

"How many dimensions are there altogether?"

"How high is up?" twinkled the Breather.

"Could I project myself into your world?"

"I don't know. Maybe . . . maybe not. Are you going to stop making that awful smell?" he said suddenly.

"Of course! We only made it to get you angry enough to come to us for a talk. We didn't mean anything by it."

"Oh!" squealed the Ether Breather delightedly. "A joke! Fun!"

"Told you he'd take it well," murmured Berbelot.

"Yeah . . . suppose he hadn't? You're a rat, Berbelot. You made darn sure that if someone had to take a rap from this aeration here,

it wouldn't be you. Nice guy." There was a strained silence for a while, and then I grinned. "Aw, hell, you had it doped out, Berbelot. Shake. I'd have done the same if I had the brains."

"He isn't bad at all, is he?" asked the Breather in surprise, staring at me.

"Well, is everything all right now, Breather? Do you feel that you're welcome to come any time you wish?"

"Yes . . . yes, I think so. But I won't come this way again. I can only take form in that lovely new three-dimensional machine of yours, and I have to break a screen to get out. I am sorry. I'll talk to you any time, though. And may I do something for you sometime?"

"Why should you?" I piped up glumly.

"Oh, think of the *fun* we'll have!"

"Would you really like to do something for us?"

"Oh, yes. Please."

"Can you direct that interference of yours into any radio frequency at any time?"

"Sure."

"Now look. We are going to start a company to advertise certain products. There are other companies in the same business. Will you leave our programs strictly alone and have

all the fun you want with our competitors?"

"I'd love that!"

"That will be splendid!"

"Berbelot, we're rich!"

"You're rich," he corrected gleefully, "I'm richer!"

The Breather said, "Is there anything more?"

"We'll get in touch with you once in a while through our polychrome," said Berbelot. "How are you going back? Want me to get started on another screen?"

"Get back? What do you—oh. Ha, ha! When Hamilton made a butterfly in shadow on the wall, how did they get 'back'? I haven't been anywhere. I'm still"—he waved his arms—"all around. I'll just stop making shadows, like this." And he vanished.

Just vanished, that's all.

So that's how Berbelot and I started the Hamilton Advertising Service. My name because Berbelot doesn't want his fingers too evidently in too many pies, what with his perfumery, his radio and electric and atomic power and utilities and so forth, endlessly. And, of course, you've heard of Hamilton Ads. There just ain't no others. Not after the Breather got to work on our competitors. Tell you about it sometime.

THE END



THE SEARCH FOR ZERO

By Willy Ley

The first of two articles on why science didn't get to first base for six thousand years. It's easy enough to draw a line from A to B—once you can find where A is!

Illustrated by Willy Ley

IN my library I have a small book. It measures only four and one half by six inches, weighs exactly five and one half ounces and contains, save for a fifty-word preface, nothing but tables and figures and formulas. If anybody wants to know the specific gravity of pure lead this book tells it. It also tells about the compounds formed by lead, how many there are, what they are and what they do. The book contains logarithms and square roots, tables about the electrical resistance of wires of various metals and tables about the tensile strength of the principal kinds of wood. It contains the equations that express the orbit of a planet and it contains a formula that permits one to prophesy how far one could see from a certain elevation. And another table can be used to predict whether meat could be cooked in an open pot in that altitude.

And that, gentlemen, is science.

It is science not only because specific weights, chemical compounds, melting points, square roots and equations are scientific facts, but because of the inference that can be drawn from these tables and figures. It says that water boils at 100 degrees C. and that silver melts at 955 degrees; it says that a spherical ball of copper weighs $\frac{4}{3}$ times pi times the radius to the

third power times the specific gravity of copper. In saying this, it also says that this is always and invariably so. It says that nothing could change the numerical relation of the surface of a cube to its volume—in short that the world is an orderly world, in spite of all its bewildering complexity.

And that *is* science.

It took some time until such a book could be written or compiled, close to, say, ten thousand years. Or rather: the last two hundred of the last ten thousand years. And only for the last fifty years or so has science felt able to say why it took so long.

It is, of course, easy to be wise after the event. Two months after a lost election, every party member knows exactly why it was lost. Two years after a lost battle every young lieutenant can find out for himself just what mistake was made. Any freshman in chemistry today knows why Sir Humphrey Davy failed to isolate aluminum, and any garage mechanic could suggest important improvements to Robert Fulton and James Watt. Fact is that they all really are wiser after the event and wonder why they had to be taught their lesson so forcibly. Thus science, about sixty or seventy years ago, when discoveries were made in quick succession and in large num-



The alchemists went in for symbols—complex allegories like this representation of iron. Tough on a chemist who wasn't an artist!

bers, wondered why it took so long until these discoveries were made.

The answer, supplied mainly by historians, was, that in former times, "pure science" simply did not exist. What we now call the beginnings of science was in the hands of artisans and was, therefore, applied science. Which means that no research of any kind was undertaken unless a new problem presented itself. And as soon as a satisfactory answer to this problem was found research ceased. There was no struggle for the "best" answer, because the conception that problems must necessarily have an optimal solution did not exist. Hardly anybody bothered about the theoretical reasons for the results obtained—certainly not the artisans that obtained them. And the philosophers that occasionally did wonder about a theory made their "theory" or "system" before looking at the facts. If those facts then did not quite agree with the system, they were either made to agree or ignored with dignity. Thus,

concluded the historians, there was no science until some naturally curious people began to wonder about "best answers" and "general principles" after realizing that the facts had to come first and the "system" had to be molded to the facts.

This explanation, adorned and embroidered with gems of erudition scintillating in the light of after-knowledge, was—and is—also accepted by most scientists who usually add that political factors have to be blamed to a large extent for the tardiness of development. In saying this they think of religious dogmas, wars, revolutions, the smallness of countries and general political unrest. The historians again are ready to agree with the scientists about this addition—and only rarely somebody wonders why science progressed so nicely during the last two and a half centuries that, after all, had their full share of wars, revolutions, conquests, persecutions and general unrest.

It seems that there has to be another answer.

It seems that there is.

IN SCIENCE there prevails the friendly custom to adorn certain important scientists with the title "Father of—" It is interesting and helpful to see during what period these "fathers" lived. Only a few of them are contemporaries. Konrad Gesner of Switzerland—he died in 1565, which year will serve to mark down the period of these men—is styled Father of Zoölogy, his contemporaries, Brunfels and Fuchs, are termed Fathers of Botany. Andreas Vesalius of about the same time is the Father of Anatomy. But the Father of Chemistry is the Frenchman Lavoisier, who died during the French Revolution; the Frenchmen George Cuvier is Father of Paleon-

tology for a book published in 1824—and all the other “fathers” are considerably younger. Only two of them go back to classic times, Archimedes as “Father of Mechanics” and, of course, Euclid. Judging by the absence of such title in astronomy one may conclude that astronomy is the oldest science—as indeed it is.

And here, in my opinion, we have the answer.

Astronomy forced its disciples to realize something of utmost importance very early. Astronomical events occur with precision and regularity, thus astronomers learned to think in conceptions of precision, regularity, periodicity and invariability—all of which has the tendency to converge upon predictability—very early while observing the movements of the lights in the heavens. Day and night changed with regularity, sometimes the days were longer, sometimes the nights, but even that could be predicted. The stars rose, wandered across the sky and disappeared beneath the horizon in a measured tread. Some of them wandered among the other stars, but it was easy to see that they did not wander about as unpredictably as a grazing cow on a field, but that they obeyed rigid rules in their wanderings. These rules could be established by observation and once it was believed that such a rule had been found it could easily be tested by a prediction.

“In about three weeks this or that star will not appear above the horizon any more, if it really moves as I think it does,” an ancient astronomer might have said to himself and, possibly, to his pupils. They would watch, and after about three weeks bright Venus would fail to appear.

The observations had been correct, a rule was established. That these ancient astronomers were keen observers has been learned again recently, when it was found that the precession of the equinoxes is really a Babylonian discovery. That is something that is hard to discover, working without instruments—but once astronomers had learned that events in the sky occurred with regularity and precision and that they were subject to rules, they did discover it.

It is for that reason that astronomy became the first science. And save for some branches of mathematics and mechanics it remained the only science for many centuries to come. Because people had not then realized that other things and events also obey rigid rules. In short, people lacked the conception of orderliness.

AT FIRST SIGHT such a statement is hard to believe. Just look at the classic poems and tragedies. They certainly are constructed with great orderliness, events occur in logical succession and the whole story is full of poetic justice. Granting the latter, one may ask: are they? They are not, as a rule.

Whenever the poet found himself and his characters in a blind alley, he had to call on the gods to straighten matters out, to provide inspirations or to actually slay a few obstacles. The spectators did not mind these interruptions of what we now call logical development; in fact, they expected it. When Odysseus found himself in real distress he called on Pallas Athene, his immortal friend and helper. And: “flashing she fell to the Earth from the glittering heights of Olympus” and intervened in favor of her hero.

Nobody resented that *deus ex machina*, nobody resented a few minor or even major miracles as long as they helped justice, poetic or otherwise. These people had a sense of justice, but *not* a conception of law and order except in human relations—and astronomy.

"Justice" and "law and order" are usually taken to be the same, but they are not. People have been thrown off high cliffs very unjustly for criticizing some tribal law, but the laws of gravity that made them fall, progressed in a most orderly manner. The difference is, of course, that "justice" refers to man made laws, while the velocity and the time of falling obeys a man found law. And while the tribal law that led to the execution might conceivably be repealed, no chieftain yet has been able to repeal the law of gravity.

I am not exaggerating. These highly cultured people of classic times did not recognize the difference between man made and man found laws. They did sense that there might be a difference of that kind, but their gods—to speak in modern terms—could repeal those laws men could not repeal. Consequently there was no conception of law and order in Nature. That most important conception—that nothing happened haphazardly—was lacking. And for this reason—or lack of reason—facts were just facts, unrelated to each other. Not only that the facts were unrelated due to the lack of theories; nobody even thought that they might be related by theories.

To cite an example that will show what I mean: People knew, of course, that water boiled when put on a fire. Greek philosophers held that a brighter flame was hotter than a dark flame—that this is not al-

ways true is unimportant—which shows that they had some dim conception of temperature. It was also known that wine boiled; it was known that oil boiled. But it took many centuries to conceive the idea that the boiling was not a haphazard occurrence but that it took place inevitably as soon as the liquid had reached a certain temperature. It took many centuries to conceive the idea that there is such a thing as a boiling point!

Of course you cannot arrive at a science if you do not know that a substance must have a boiling point. That is the important thought, it is relatively unimportant to know what temperature is needed. Once you know that there is a boiling point you can fairly easily think of ways and means to establish its position, first in relation to the boiling points of other substances and later in relation to an arbitrary scale of degrees of temperature. But you cannot invent a thermometer without knowing that there is such a thing as a fixed boiling point. You cannot arrive at a science as long as you believe that ice does not have to melt. (The ice that did not melt was rock crystal.) In short you cannot arrive at anything as long as you believe that things happen in a senseless manner, without rhyme or reason, law or order.

What good would even the knowledge of a large number of facts do if that basic conception of order is lacking? Besides, eulogizing accounts to the contrary notwithstanding, there were very few facts about Nature known in early civilization. The wisest men of ancient Greece knew less than a quarter of the number of facts contained in the most elementary book for children of today. And a good deal of those thou-

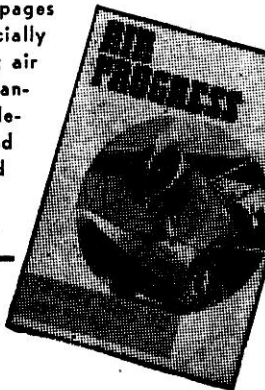
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sands of years had to be spent amassing facts. But there were only a very few facts known and they were known in an isolated manner.

It was, to use another example, or rather comparison, like knowing that there is "three" and "four" and "six" and "five"—but without even guessing that three, four, five and six follow each other in a certain rigid order, that two threes make one six and that "two" follows "one" as invariably as one minus one is zero. You cannot count and make even simple additions or subtractions unless you know that the sequence of numbers is rigid, that the various operations follow rigid rules, that one always equals one and that there is a starting point for the whole thing, called zero. But all the laws can be found quite easily as soon as the three factors, the existence—or nonexistence—of zero, the unit "one" and the rigidity of sequence are known. Thus, if you were to search systematically, you would have to look for zero, the starting point, first, then determine the unit and then you could go ahead and find the sequence. It is what a child does when it learns to count—and as for science, all those facts tabulated in the small volume are units for counting.

We now know—again in the light of afterknowledge—that "zero" does not necessarily have to be a "natural zero," but that it may be agreed upon. The "zero" on the thermometer scale is a well-known and at the same time very typical example. The "natural zero" for counting temperatures is, of course, absolute zero, and recording temperatures in "C a"—centigrade absolute—is slowly coming into practice. On that scale ice melts at 273.1 C a, and water boils at 373.1 C a.

While this is a convenient way of counting, measurements of tempera-

tures can be recorded just as accurately by using the centigrade scale with zero located at the melting point of ice or by using the Fahrenheit scale where the unit differs and where "zero" is just an arbitrarily established point with only historical significance. It does not matter in what language you write, or whether you use the Roman, Gothic, Greek or Cyrillic alphabet, whether you write on paper, papyrus, wood or stone, as long as you can read it again.

THE METHOD of "counting by agreement," that holds true for temperatures and a few basically similar things, does not work everywhere, however, and the stumbling block for many branches of science has been the search for zero—the search for the point from which to count and for the unit with which to count. It is only a logical conclusion to say that a science that cannot "count" is not a science but merely a collection of facts. Early chemistry is a good example for such a science in its prescientific stage. By the same token a philosophic thought, even if it happens to be right, cannot be regarded as a scientific theory. Biology and the theory of evolution is an example for that.

It is quite true that Pliny's Natural History, for example, contains a number of passages that might be—and are, by some—regarded as a first early conception of the evolutionary ideas that rocked and shocked the nineteenth century. Still these thoughts of Roman and Greek times were only philosophic thoughts because the unit of biological "counting" was then still unknown. Interestingly enough, biology is the second science that reached a cer-

tain stage of maturity, probably because the "units"—the species—were given. But between classic times and Darwin, biology had to evolve through two very important stages every science has to pass through. They are especially clear and sharply defined in the case of biology and shall, therefore, be treated as examples. The two stages are that of "writing lists" and "classifying facts."

We'll say that the Greeks of the period said to be the one of Homer—about three thousand years ago—were acquainted with three dozen different animals and six dozen different plants native to their country. These plants and animals were common knowledge and nobody thought about them at all. Then the Greeks got into closer contact with Egypt, which brought ten new and, therefore, intriguing animals and a few more plants to their knowledge. The first lists were then written. Then India became known, the lists lengthened. They grew still longer during the time of the Roman Imperium, but even Pliny the Elder's far-famed Natural History of close to half a hundred books is merely a tremendously long list of things. In the late Middle Ages several learned monks wrote big encyclopedias about everything then known. They are long lists, nothing else. Even those books of the "fathers" of zoölogy and botany I mentioned above are only long lists. That Gesner started classifying his animals was merely for convenience; there was too much for one volume. Thus he wrote two volumes on four-footed animals, one on birds, one on fishes or rather animals living in water, and planned a fifth volume on animals with more than four legs living in air, we'd say insects. Within each book the

order was alphabetical and the bat appears among the birds, the dolphin among fishes, crabs and sea serpents and the hippopotamus among the fresh-water animals.

Biology started "counting" two hundred years later when the Swede Karl von Linné began to classify living things into families, orders and classes. If that had not been done, others would not have wondered whether the "families" and "orders" might not perchance be real families and orders with some sort of natural relationship. Only because the lists had grown long enough Linné could classify them; only because they were classified Darwin could think of evolution. And only because lists, classification and theories of evolution existed, could Hugo de Vries attach special significance to his accidental discovery of two new varieties of the American evening primrose in Holland—the germ of the theory of mutants. And if all that had not been done there would be no progressing, orderly, useful and interesting science of biology but only a collection of alphabetical lists that, by their very length, would be so tremendously dull that few people could be interested in them.

The example of biology was useful for another reason, too. It is one of the few sciences that did not follow a wrong path for long. Linné, it is true, had decreed the "constancy of species"—but there were always some who strongly suspected that that was a man made and not a man found law and did not pay much attention to it.

THE OTHER sciences did not, as a rule, escape the fate of finding themselves not only in a blind alley but seeing themselves at the same time surrounded by hostile philosophers who had built systems upon what

otherwise would have been temporary errors and, therefore, objected most violently against the removal of those cornerstones.

Astronomy, earliest of the sciences, experienced that fate. Although it had started amassing and classifying facts soon, and knew the units with which to count and how to count, it had chosen the wrong theory. Aristarch of Samos had advocated the heliocentric system, much as we have it now, but general opinion decided in favor of the so-called Ptolemaic system with Earth in the center of the Universe. Then astrology grew up, a very interesting attempt to project the orderliness of the heavens onto the Earth. It was an attempt that went haywire and did so with dire consequences to astronomy.

For some time astronomy developed—one is tempted to say degenerated—into philosophy. And when astronomy tried to come back into its own rights it had to struggle hard. The new originator of the heliocentric system, Nicholas Copernicus, wisely delayed publication of his book until he felt that death was approaching. And Galileo Galilei was commanded "not to hold, teach nor defend the condemned doctrine." But the chief enemy of the "new" system was not the Church, as many people believe. It is true that the Church took the steps it deemed necessary, but it did so more or less in the rôle of a policeman who feels that he has to establish human law and order when too many people are shouting too loudly. Of course it may happen—and often does—that the wrong party gets arrested because organizations, especially large ones, are even less infallible than individuals.

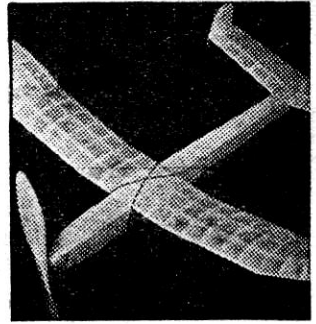
The ones that did the shouting in

the case of the heliocentric system were astrologers and philosophers. The astrologers were, naturally, afraid that the belief in horoscopes—and their proceeds therefrom—would dwindle if the Earth was thrown into the void, whirling around the Sun as a planet among planets. And the philosophers were proud fathers of even prouder systems that were too delicate to stand acceleration.

When Galilei discovered the large moons of Jupiter, the Florentine astronomer Francesco Sizzi wrote with fervor and fire that that could not be true: "There are seven windows in the head, two nostrils, two eyes, two ears and a mouth; so in the heavens there are two favorable stars, two unpropitious, two luminaries and Mercury alone undecided and indifferent. From which and many other phenomena of nature, such as the seven metals, et cetera, we gather that the number of planets is necessarily given. Moreover, the satellites are invisible to the naked eye, and therefore can have no influence on the Earth, and therefore would be useless, and therefore do not exist—"

Of course I like the sermon preached against Galilei by Father Caccini—on the text: "Ye men of Galilee why stand ye gazing up into heaven"—better than that, but Signore Sizzi's elaborations provide a clue as to the mental attitude. It may be summed up in saying that new thoughts and discoveries were not welcomed with enthusiasm but greeted with distrust. How could there be *new* thoughts when everything was already known. There were seven planets, seven seas, seven metals, seven colors in the rainbow—to add new planets did not mean enrichment of knowledge and thought, it meant only trouble, destruction of mental security and the

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A fair sample of the disagreement as to the proper symbol for a few metals. The alchemists didn't get together very well.

terrible realization that the road to knowledge was truly endless.* The revolt against Galilei was the revolt of those that were peacefully resting on one milestone of that road and had convinced themselves and others that they had reached the goal.

WE NOW know that most of the important things had yet to be learned. The philosophers had to

* A point might be added here; early learned men sought not knowledge, but memory. The ambitious sages started out to become famous for knowing all things. Their reaction of angry annoyance was only human when it was made more and more—painfully!—clear that since “all things” weren’t known, they couldn’t possibly “know all things.” That’s a vast difference in attitude, and an attitude still dying only slowly. Even today, some men strive still to gain respect for what they know, not for what they learn. But the world in general now rates highest—or wisest—the man who *learns* most; not merely the man who knows most. After all, a well-trained librarian “knows”—via books that he can instantly lay hands on—more than any human being can possibly remember. The old attitude is dying for much the reason the vaudeville “strong man” act died; a small machine can make the biggest man look silly when it comes to strength.—ED.

realize that no knowledge is truly definite, the scientists still had to conceive the idea of general principles and general orderliness. Astronomy was still far in advance of all the other sciences, because in that field the conception of orderliness had prevailed from the beginning. Although a few astronomers found themselves caught in the philosophical turmoil they had caused without really knowing it—they had practically been forced to talk facts while the others talked ideas—astronomy as a science was bound for progress in a straight line. Astronomy was just then amassing the additional facts leading to the general principles of Kepler and Newton; astronomy only had to work a little longer in a field cleared

by Nature herself. It was the other sciences—physics and, especially, chemistry—that faced the really difficult tasks. Physicists and chemists—or those that would be termed thus now—faced not only human enemies that forcefully defended so-called logic, they had to battle natural obstacles, i. e., complications of Nature.

Compared to the lot of the early chemists even that of the early physicists was still simple. The chemists did not only have to hunt for their natural units—the elements—that by their very nature were hiding beautifully and effectively in all kinds of disguises, they also had to clear a lot of wild growths from their way that were obstructing the view. The physicists only had to find what they were looking for—the complications being that they did

not know just exactly what it was they were trying to find, and that Nature—applying three or four different laws at the same time—offered composite answers that were hard to untangle. But they did not have to fight many wrong ideas; they suffered primarily from lack of ideas.

I hear the objection that Galilei had to disprove the Aristotelian notion that bodies fall faster, the heavier they are, and that by experimentation he ushered in a new era of science. It is true that wrong notions existed, but there were only a very few of them. It is also true that Galilei's method of experimenting, instead of sitting on soft pillows and disputing about the facts of Nature, showed a new way. But the important thing is not that he experimented. Others had done that before him. Archimedes had made experiments, Claudius Ptolemy—near the end of the first century in Alexandria—had experimented, measuring angles of incidence and refraction and arranging them in a most modern manner in tables. Others also had experimented and had done sound work, but very rarely, if ever, had they looked for general principles. If the notion had been that two particular balls of equal size, but one made of wood and the other of gold, would fall with different speeds because gold is heavier—specific gravity has been known since ancient times—somebody may have experimented to show that the wooden and golden balls fell with the same speed. The new thought was: "Let's see how different materials behave." And the result was a few general formulas.

Those branches of physics closer to chemistry had a harder time. It was there that conception lagged behind and where Nature really went to town on complicated answers. It is a bit difficult for us to understand why intelligent men failed to see things and connections that we adorn with "of course," "naturally," "obviously," and "evidently."

We see all those things with a bird's-eye view, we know it all intimately. To walk from this village to the next through the forest is so easy. Just follow that path and in about three hours you'll be there. Of course you must not make any of the seven possible wrong turns, and of course you must not follow one of the many blind alleys that lead nowhere, while naturally you

Salt:	3	℥	25	⊕	⊙	⊠	∇
Potash:	∇	℥	⊕	∧	℞	∇	⊕
Brass:	3	∇	⊕	5	∇	XX	e
Glass:	∞	∞	5	5	5	••	
Urin:	⊕	∧	∧	∇	∇	∇	∇
Vinegar:	∞	X	∇	∧	∇	∇	∇
Alcohol:	∞	∞	∞	∞	∞	∞	∞
Red Lead:	∞	∞	∞	∞	∞	∞	∞
Water:	∇	∇	∇	∇	∇	∇	∇
Alum:	∞	∞	∞	∞	∞	∞	∞
Amalgam:	∞	∞	∞	∞	∞	∞	∞

Symbols varied so widely it was practically impossible to understand what the other fellow was talking about.

must not try to cross the river up here but a little farther down—all things "of course"; if and when you know them. But suppose you didn't know?

SOMETIME during the early twelfth century people in southern Italy, pharmacists in all probability, began to distill the heavy sweet wine of their country and to produce alcohol, a very watery kind of alcohol, we'd say. "Of course"—one would think—the fact that wine could be distilled and "spirits of wine" obtained that way should lead to a number of "rather obvious" conclusions. It should lead to the conclusions that wine consisted of, at least, two different liquids, one probably just water and the other the "spirits." It should lead to the conclusion that the "spirits" always boiled and evaporated before water was warm enough to boil and to evaporate. It should lead to the discovery of the boiling points of two different liquids and to the conception of a general theory of boiling points and of distillation, to be augmented by systematic determination of the boiling points of all available liquids.

It did not. It was just accepted as a fact.

And even if a monk, living peacefully in a monastery down there at the shore of the tideless blue Mediterranean, had conceived a general principle and tried to find it he might have experienced another setback. Supposing he did construct a primitive thermometer and boiled water and found to his immense surprise that it always boiled at the same temperature. Supposing he marked this point on his thermometer, calling it, say 500. Then he tried spirits of wine. Surprisingly, that other liquid boiled also constantly at a certain temperature, but not the

same as water. Somewhat doubtful about the whole thing, he marked that point 400 and intrusted instrument and a long letter to a pilgrim returning back to France, with instructions to deliver instrument and letter to Frater Petronius, his old friend who resided in a monastery high up in the frigid regions of the Alps. And then, after a year or so Frater Petronius wrote back, saying that although he had found water to boil constantly at the same temperature he found it to boil at the point marked for "spirits of wine"—while the latter, when tested, boiled always at a lower temperature, but by no means always at the same point of the thermometer.

Of course, we'd answer—Frater Petronius' "spirits of wine" was not pure, it was watery by varying degrees. And then there is a nice difference in barometric pressure between the Mediterranean seashore and the Alpine passes. Yes—of course. But what would you think if you did not know about barometric pressure and chemical impurities? You'd probably give up and revert to writing lists. Nature seldom displays one law at a time.

The mystery of the constancy of the boiling point was solved in 1714—yes, "as late as that"—by Gabriel Daniel Fahrenheit of Danzig. Before him others—Huygens and Amontons, if you want to know the names—had found that water has a constant boiling point. Fahrenheit wondered whether that may hold true for other liquids, too. And he did what could have been done centuries earlier; he systematically tested various liquids for their boiling points, measured and tabulated them. He was elected to the Royal Society for this work. Incidentally, he already knew that barometric pressure did have an influence. The

apparent disorder in Nature revealed itself as what I called a composite answer to the question asked by way of experiment, the simultaneous operation of two different laws.

It is evident—to us—that, if the trouble lay in the absence of clearly defined conceptions and in the presence of composite answers, chemists must have had the most difficult time. They did.

Even a modern chemist looks wonderingly at an unexpected result occasionally, and asks himself how many different reactions took place instead of the one he wanted. But he, at least, has a clear conception of possible reactions and knows the ninety-two “zeros” of his science—the elements. We know now that nine true elements were known in their—commercially—pure state to the ancient world. Seven of them were metals: gold, silver, copper, iron, lead, tin, and mercury; two were nonmetals: sulphur and carbon. A tenth element, antimony, was probably known in Roman times, but was believed to be a variety of lead. What handicapped the ancients and others after them was that they did not know that these things *were* elements.

One is tempted to say that if physics suffered from the lack of general ideas, chemistry suffered on account of them. The conception of a chemical element—which means the assumption that there exists only a limited number of truly different substances while all others are combinations of these substances—was advanced very early. But since the few then known true elements were not recognized as such, this essentially correct thought had to wander aimlessly through a jungle of unexplained facts and hazy philosophies.

The earliest of them was the one fact from the history of science

known to everybody, that “the Greeks believed in the four elements fire, water, air, and earth.” That thought, which did not spring from the brain of one man in its complete form, received its final form when Aristotle converted the elements into “qualities” or “principles”—heat and cold, wetness and dryness. Heat and dryness combined gave *fire*, cold and dryness gave *earth*, cold and wetness *water*, heat and wetness *air*. It was a well rounded system, as far as its philosophical aspects were concerned. And due to Aristotle’s authority, the system persisted for an incredibly long time. Naturally the terms came to be used in a broader and broader sense—earth for all solids, water for all liquids—also for the process of liquefaction by dissolving and melting—and air and fire whenever earth or water did not fit.

LOOKING backward, we see no difficulty in fitting the true elements into this system and we might well use those terms ourselves—earth for the solid state, water for liquids, air for gases, and fire for energy. It would be somewhat confusing, but it might be done. Language plays far worse tricks on us! But this again implies knowledge of the real elements—and that knowledge was lacking. However, our knowledge permits us also to realize how hard the quest of the early chemist in search for elements really was.

Nature is unfair in that respect, elements are never obvious and only rarely conspicuous. The chemical nature of things is so hard to judge. How could one guess that a piece of crystallized carbon—a diamond—is practically a pure element. And that the soot on the marble slab next to the smoking oil lamp is the same. How could one guess that

water was not an element? How could one guess that ice and rock crystal, looking so much alike, were two different compounds? It was obviously only a small difference in quality—the ice displaying a hidden “wetness” and the rock crystal failing to do so. Sulphur and chalk are pretty much the same, except for color and for the fact that one burns and the other does not. Well, that might have to do with the color. If one could “tinge” chalk with “yellowness” it might behave like sulphur. Would become sulphur, in all probability.

Small wonder that chemistry was sidetracked and had to travel first all the way along the wearisome and disappointing road of alchemy. Alchemy began as a fake and ended as one—and the signposts on both ends read “GOLD.” It is true that there were alchemists of high idealism, who wanted to solve the mysteries of Nature, wanted to find an *arcantum*, the “elixir of life,” the ultimate liquid *aurum potabile* to cure all ills of soul and of body. But the others, who wanted just gold and nothing else, were doubtless in the majority and defended themselves saying that *aurum potabile*—the “liquid” gold that would be the veritable panacea—might be too hard to achieve, at least in the beginning. Thus they strove for solid gold. It had its idealistic value, too; they were, after all, trying to “find the cure for the Great Illness of Poverty.” It took a very long time, until the patience of those who helped the alchemists cure that Great Illness—from which the alchemist usually suffered himself too—was exhausted. When it was, alchemy ended in ridicule and the alchemists more often than not on the gallows.

Alchemy really began as a fake.

Its origin had certain not-quite-legal Egyptian business methods of the second and third century of the Christian Era. We know them from papyri—de luxe copies of slightly older scrolls—preserved in tombs from the fourth century A. D. These papyri teach various “arts,” one of them being the mixing of copper with “white” metals so that the resulting alloy could be sold as gold. There are quite a number of different recipes of that kind, and none of them fails to assert that the alloyed or treated metal “would not be recognized as such at first glance even by another artisan.” It was plain counterfeiting, without the slightest shadow of self-deception.

But others apparently reasoned, later on, that the Egyptians at some time had actually transmuted metals—one of the most curious traits in human nature being a desire to believe in “lost arts.” Or else those others may have thought that if a metal could be treated to look like another metal—why, it might also be possible to actually change the nature of the metal. Three hundred years later the belief had crystallized into a system of sorts. In about 600 A. D. the belief was general that a metal consisted of a material ponderable body and a “tinctorial spirit” or soul. Somehow those metals had to be forced to exchange souls. Or else one might find a metal body without a soul and “tinge” it. To strengthen the argument, a search for reasons, for the belief in a “lost art” was made, and in 700 A. D. John of Antiochia claimed seriously that he even knew where the secret of transmuting metals had been written down—on a bull’s hide that was known to legend as the much embattled Golden Fleece!

Needless to say, the alchemists treated their knowledge with secrecy.

To keep it from outsiders they indulged in strange terms like Liver of Sulphur, or Regulus of Mercury. The phrase "Royal and Magnificent Blood of a Gray Dove" has been identified with red lead, while the "Product of the Daughters of the Bulls of Athens" meant honey. In addition to that, they wrote in symbols. One Olympiodorus stated that during the sixth century in using the astronomical symbols for the "planets" to denote certain metals, the Sun meant gold, the Moon silver, Mars meant iron, and so down the list. Of course new symbols were invented all the time, and a survey made a few years ago by G. W. Gessmann shows that in the end about 2,000 different symbols had accumulated. Mercury was represented by 58 different symbols, copper by 46, ordinary table salt by 37, and rock salt by 46!

That overabundance of designations proves clearly that the period of the alchemist, approximately eleven centuries, not only did not help chemistry but actually retarded it. It prevented even the preliminary stages of list writing and classification. Some writers, feeling apparently that they had to display tolerance, have claimed that the

period of alchemy at least led to the discovery of a large number of chemical processes. This claim is dictated by tolerance only, however, not by facts.

Of course a number of processes were discovered during that period, but if they can be traced at all, they can be traced to artisans, dyers, painters, and apothecaries. These men may have dabbled in alchemy, too, of course, but they were not alchemists. The only thing that can be said in favor of the alchemists was that they really worked with substances and did not lean back in a padded chair, trying to deduce by reasoning how those substances would behave if tested.

At the time when most of the other sciences found their "fathers" and had at least accumulated long lists of facts, chemistry had still not even started. Its "lists" were unintelligible, its classification was worse than useless. The chemical units of "counting" were either unknown or unrecognized. Even a complete lack of knowledge would have been advantageous, for what was regarded as knowledge was ballast in reality—ballast that had to be discarded as quickly and as completely as possible.

TO BE CONCLUDED.

THE ANALYTICAL LABORATORY

Results on the August issue aren't complete, because of the comparatively early date at which this summary is being compiled, but results are probably reliable. The standing:

1. Vault of the Beast	A. E. van Vogt
2. Stars Look Down	Lester del Rey
3. Crisis in Utopia	Norman L. Knight
4. Rendezvous	John Berryman
5. Clerical Error	Clifford D. Simak

I have a feeling, incidentally, that next month is going to see "Slan," by A. E. van Vogt, up top there. For that matter, it's a fair bet Van Vogt's going to sit on top for five months running! And it will *not* be for lack of competition!

The Editor.



THE WARRIOR RACE

By L. Sprague de Camp

It should be titled the Earthsavers, perhaps. Anyway, it's a tale of how to unconquer the thoroughly conquered Earth without defying the conquerors. Whacky, but very logical!

Illustrated by Orban

THEY were serious these days, the young men who gathered in Dr. Tadeusz Lechon's room to drink his

mighty tea and set up propositions for him to knock down. Between relief that the war was over without

their having come to harm personally, and apprehension for the future, and some indignation at the prospect of foreign rule, there was not much room left for undergraduate exuberance and orneryness. Something was going to happen to them, they thought. You didn't dare make a mistake.

"Whatever it is," said Tadeusz Lechon, "it is not cowardice, I am sure." He moved his large bald head forward to a cup of tea the color of an old boot, his big gold-plated earrings bobbling. He sucked noisily, watching Frederick Merrian.

Fred Merrian, a sandy-haired sophomore with squirrel teeth, looked grateful, but still defiant. He was in civilian clothes. Baldwin Dowling, the co-ed's dream, was in a very new United States army uniform. His lapel bore the insignia of a piano player. His piano had eight barrels, from which it fired 47-mm. shells at the rate of 960 per minute, with a muzzle velocity of 1310 meters per second. The uniform was so new because, by the time Dowling had reached his unit in Los Angeles, the war was over, and he had been told to return home, free, on anything he liked. He had taken the next plane back to Philadelphia.

Lechon continued: "It is rather an example of the conviction of most thoughtful young men, that human problems *must* have a solution. Those problems being what they are, one cannot prove that any of them has *no* solution, the way Abel proved the problem of solving quintic equations algebraically impossible. So they try one idea after another, these young men; it may be Adrenalism or Anarcho-Communism or Neo-Paganism. In your case it was nonresistance. Perhaps it is well that they do—"

"But—" said Fred Merrian.

Lechon stopped the waiting flood of impassioned argument with a wave. "We have been over all this before. Some day you will tire of Centaurian rule, and join some other movement with equally impractical ideals. Our Centaurian is nosing around the campus. He may visit us. Suppose we let Baldwin tell us what he has learned about them."

"Yeah, what are they like?" asked Merrian.

"Much like other people," said Baldwin Dowling. "They're pretty big. I guess the original group of colonists that went to Proxima Centauri were a pretty tall bunch. They have a funny manner, though; sort of as if they ran by clockwork. You don't get palzy with a Bozo."

Arthur Hsi smiled his idiotic smile. His name was really Hsi Ah-tsê, and he was not at all idiotic. "Came halfway around the world so I could study away from the Bozos. Not far enough, it seems."

Dowling asked: "Heard anything from China?"

"Bozos are busy, trying to make everything sternly efficient and incorruptible, like themselves. May be the greatest fighters on Earth, but don't know China. My father writes—"

"Shh!" hissed Lechon, his big, red face alert. Then he relaxed. "I thought it was our Centaurian." There was an uncomfortable pause; nobody had much enthusiasm left for chatter, even if the superman failed to appear. Finally Lechon took it up: "Everybody I talk to says what an impossible thing it was, that war. But if you read your history, gentlemen, you will see that it was nothing new. In 1241 the Hungarians never dreamed the Mongols had things like divisional organization and wag-wig signals. So they were swamped. Our government

never dreamed the Centaurians had an oxidizing ray, and airplanes with fifteen-centimeter armor. So we were swamped. You follow me? The tune is always different, but the notes stay much the same."

He broke off again, listening. A brisk step approached. Somebody knocked. The history professor said to come in. The Centaurian came.

"My name," he said in a metallic voice, "is Juggins."

He was about thirty, with a lantern jaw, high cheekbones, and outstanding ears. He wore the odd plum-colored uniform of the Centaurians: descendants of those hardy souls who had colonized a planet of Proxima Centauri, had fought a three-generation battle against hostile environment and more hostile natives, and had finally swarmed back to Earth fifty-six years ago.

Australia had been turned over to them, and their science had made this second most useless continent the world's most productive area. Their terrible stay on the other planet had made them something more and something less than men. Now they ruled Earth.

"Hello, Mr. Jug—" began Dowling.

The Centaurian cut him off: "You will not use 'mister' in speaking to a Centaurian. I am Juggins."

"Will you sit down?" invited Lechon.

"I will." The Bozo folded his long legs, sat, and waited for somebody to say something.

Somebody finally did. Dowling asked: "How do you like Philly?"

"You mean Philadelphia?"

"Yeah, sure."

"Then kindly say so. I don't like it at all. It's dirty, corrupt, and inefficient. But we shall fix that. You will do well to co-operate with us.

We shall give you a much healthier life than you have ever known." He got this out with some difficulty, as if saying more than one sentence at a time made him self-conscious.

Even Dowling, who, though a native, was not bothered by an excess of local pride, was taken aback by such candor. He murmured: "You guys don't pull any punches."

"I think I grasp the meaning of your slang expression. We are taught to tell the truth." He made telling the truth sound like a most unattractive occupation.

Hsi spoke up: "I hope you do something about the water system. This morning when I turned on the faucet, I got a live eel, a size twelve rubber, and about a cubic meter of chlorine gas before the water came through."

The Bozo stared at him coldly. "Young man, that is an unpardonable exaggeration. A rubber could not possibly pass through the water pipes."

"He is juckink," said Lechon helplessly, the stress of conflicting emotions bringing out his Polish accent.

Juggins shifted his glare. "I understand. That's what you call a joke, is it? Very funny."

"Have a cigarette," suggested Dowling.

"A cigarette? We never use the filthy weed. It's unhealthy."

"Some tea, then," sighed Lechon.

"Hm-m-m. It is a drug."

Hsi spoke: "Oh, I wouldn't say that, Juggins. It does contain caffeine, which is a stimulant, but most foods have one or more things like that in them."

"Very well, if you'll make it weak. And no sugar."

Hsi poured the tea, and added some very hot water. The Bozo stirred it suspiciously. He looked up to say: "I want you, and everybody

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in the University, to look on me as a kind of father. There's no sense in your taking a hostile attitude, because you can't change conditions. If you will co-operate—Gaw!" He was staring popeyed at his spoon.

The lower half of the spoon had run down into a puddle of molten metal at the bottom of the cup.

"You stir it too hard," said Hsi.

"I—" said Juggins. He glared from face to face. Then he carefully put down his cup, laid the unmelted half of the spoon in the saucer, rose, and stalked out.

LECHON MOPPED his red forehead. "That was terrible, Arthur! You shouldn't play jokes on him. He might have us all shot."

Hsi let a long-suppressed giggle escape. "Maybe so. But I had that Wood's-metal spoon handy, and it was too good to miss."

"Is he real?" asked Merrian.

"Yeah," said Dowling. "A lot of people have wondered if the Bozos weren't robots or something. But they're real people; reproduce in the normal fashion and everything. They're a new kind of man, I guess."

"No," said Lechon. "Read your history, gentlemen. The warrior race. It is the latest example of what can be done with men by intensive training and discipline. The Spartans and the Osmanli Turks did it in their time. Our Centaurian is more like a Spartan Peer than a Turkish Janissary. The latter had a monkish personality; very humble and polite, for all that they were the most efficient soldiers of their time. But Lycurgus would know: our father Juggins for a true Spartiate at once—"

He went on. The three undergraduates listened with one ear. Merrian was in the throes of a soul

search. Was force an evil when used against creatures like these?

Dowling and Hsi, who were not introspective idealists, were concerned with the recasting of their personal plans. Dowling guessed that there would still be local Philadelphia politics to get into when he finished his law course. There'd have to be go-betweens between the supermen and their subjects.

Hsi was thinking of the soft job in the Sino-American Transport Co. that his father would shoehorn him into when he finished college. If he could, by hard work and family influence, worm his way to the directorate, there were some big deals he had in mind. There would be the omnipresent and allegedly incorruptible Bozos. But that incorruptibility was, to his mind, still only alleged.

CLASS REUNIONS, like weddings and funerals, bring together a lot of people who would not ordinarily cross the street to speak to one another. So when the class of '09 broke up after the formalities, Hsi and Dowling and Merrian drifted together and wandered off to a restaurant on Spruce Street to compare biographies.

Baldwin Dowling had filled out a bit, though he still had the wavy black hair and flashing smile. He had acquired a wife and one child. Arthur Hsi looked much the same, but had acquired a wife and six children. Fred Merrian had lost most of his sandy hair, and had received in exchange two wives, two divorces, and a thin feverish look.

Hsi had just come from a trip to Australia, and was full of it. "It's a wonderful place. Everything goes just like clockwork. No tips, no bribes. No fun, either. Every Bozo is a soldier of some sort, even the

ones who run elevators and sell dog biscuit."

Fred Merrian showed signs of building up argumentative back pressure. "You mean you approve of them?" he snapped.

Hsi looked stupidly amused. "I wouldn't say that, Fred. But we have to get along with them. The Sino-American Transport Co. is a huge organization, with subsidiaries all over the Pacific: hotels and airlines and whale hatcheries and things. So must get along with them. What have you been doing the last ten years?"

Merrian looked bitter. "I'm trying to make a living as a writer. But I won't write the sort of trash the cheap magazines buy, so—" He shrugged.

"What about you, Baldwin? I seem to hear about you in politics."

Dowling grinned. "Yeah, maybe you have. I'm the official mediator for the city of Philadelphia. When one of my . . . ah . . . flock gets into trouble with the Bozos, I try to get him out."

"You look prosperous," said Hsi.

"I haven't done so badly." Dowling's smile had a trace of leer. "Sort of like a tribune of the people, as Professor Lechon explained it to me."

"Lechon?" said Hsi. "Is he still here?"

"Yep, and still dishing out the love life of the ancient Parthians." He noted Merrian's expression, and said: "Fred no doubt thinks I'm a raw renegade. But as you said, the Bozos are here, and we've got to get along with them. By the way, I met a man who knows you; Case Young. Said your Chinese business methods had nearly driven him crazy."

"What didn't he like?"

"Oh, the way you never mean exactly what you say, and act hurt when some sucker objects to it. And the . . . ah . . . dryness of the Oriental palm, as he expressed it. Oh, remember the Bozo Juggins? The first administrator of the University of Pennsylvania? He's still here; administrator for the whole metropolitan area."

"Really?" said Hsi. "By the way, did Mr. Young tell you what he had been seeing me about?"

"No."

"Well, I want to talk to you about it." Hsi looked questioningly at Fred Merrian. Merrian looked at his watch, and reluctantly took his leave.

"Too bad," said Dowling. "He's the most decent and upright guy I know. But he isn't practical." He lowered his voice. "I could swear he was mixed up in some anti-Bozo movement."

"That would account for the hungry-wolf look," said Hsi. "Do you know about such movements?"

"I know a lot of things I don't let on. But what's this deal you have in mind?"

"I say nothing about a deal." Hsi paused to giggle. "But I see I can't fool you, Baldwin. You know the Morehouse project?"

"The mailing tube unification plan? Yeah."

"Well, Sino-American controls the Philadelphia-Baltimore tube, as perhaps you don't know. And the tubes from Boston to Miami can't be unified without the Philadelphia-Baltimore link, obviously. But we don't want to sell our stock in the link outright."

"What, then?"

"If exchange of stock could be ar-

ranged—some good friends of ours already hold options on forty-five percent of the stock in the new Boston-Miami company—it would give us a strong voice in the affairs of the new company.”

“In other words, majority control?”

“I wouldn’t say that. A strong voice.”

Dowling grinned. “Don’t try to kid me into thinking these ‘good friends’ aren’t Sino-American dummies. How much stock of the new company do you want? Six percent?”

“Seven and a fraction would look better.”

“I get you. But you know how we do things here. The Bozos have their fingers in everything. If you make anything, they grab it; if you lose, that’s your hard luck. All the disadvantages of socialism without the advantages. And it’s as much as your life’s worth to try to hush one of them up. Still, I *might* be able to handle Juggins.”

Hsi giggled. “So they are still incorruptible here, eh? How much of that ‘healthier life’ they promised have you gotten?”

“Well,” said Dowling dubiously, “they did clean things up somewhat.”

“Have you a new water system yet?”

“No, though they’ve been talk—”

Boom! Far off across the Schuylkill, a yellow flash tore the night sky. Other explosions followed in quick succession. Broken glass tinkled. Hsi and Dowling gripped their table. Dowling muttered: “The fools!”

“A revolution?” asked Hsi.

“That’s what *they* think.” The faint tapping of gunfire became audible.

A pair of hard-looking men in uni-

form appeared in the doorway. Dowling murmured: “Watchdogs.” He did not have to describe these police, whose list of virtues stopped with bravery and loyalty to their masters, the warrior race.

There was nothing to do but sit and listen. When the noise abated, Dowling went over to one of the watchdogs and spoke in a low voice.

The watchdog said: “Didn’t recognize you, Mr. Dowling. I guess you can go home, and take your friend.”

As the two men left the restaurant, Hsi was conscious of the hostile glares of the other customers. Outside, Dowling grinned wryly. “Nobody likes special privilege, except when he’s the guy who’s got it. We’re walking.”

“But your car—” wailed Hsi, who was completely unathletic.

“I’m leaving it here. If we tried to drive, the watchdogs would shoot first and ask questions afterward. If we see anybody, we raise our hands and walk slowly.”

Off to the northeast, the sky was red. A lot of houses in North Philadelphia had been set afire by the oxidizers.

Hsi and Dowling spent the next day at the latter’s home, without news of any kind. Edna Dowling tried to pump Hsi on the subject of ancient Chinese art. Arthur Hsi grinned foolishly, and spread his hands. “But Mrs. Dowling, I don’t know anything about art. I am a businessman!”

The next morning a newspaper did arrive over the ticker. It told of outbreaks, and their suppression, in Philadelphia, New York, Detroit, St. Louis—

BALDWIN DOWLING was shown into Juggins’ office. The Centaurian looked much the same, except that

his hair was turning prematurely gray.

"Hello, Juggins," said Dowling. Then he sniffed. He sniffed again. There was an unmistakable smell of tobacco smoke.

Dowling looked accusingly at Juggins. Juggins looked back, at first blankly, then uncomfortably. "What is it?" he barked.

Dowling grinned easily. "Don't worry, Juggins. I won't—"

"You will kindly mind your own business!"

"What are you sore about? I didn't say anything. And I have every intention of minding my own business. That's what I came here about." He explained about the stock exchange proposed by Hsi. He put the most favorable interpretation on it. But Juggins was not fooled.

Juggins thoughtfully studied the ornate penholder that marred the Spartan simplicity of his office. He said: "Your plan may be sound. But if my superiors heard of it, they might take a . . . an excessively rigid view." Silence. "I try to be fair. Haven't I always been fair with the Philadelphians?"

"Of course, Juggins. And it's about time we showed our gratitude, don't you think?"

"Of course we Centaurians aren't swayed by material considerations."

"Sure. You're utterly incorruptible. But it would make me happy if I could show my appreciation. I'm not one of you selfless supermen, you know."

"What had you in mind?"

Dowling told him. Juggins took a deep breath, pursed his lips, and nodded somberly. He kept his eyes

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on the penholder.

"By the way," said Dowling, "now that that's settled, there's another little favor you might do for me. I believe one of the people you captured in the recent uprising was an old classmate of mine named Fredrick Merrian."

"What about him?"

"What are the Centaurians' plans for disposing of the rebels?"

"The leaders will be shot, and the others blinded and jailed for life. I don't think your Merrian was a leader; I'd recognize his name if he were."

"For old times' sake, I wondered if you couldn't do something for Merrian."

"Is he an intimate friend of yours?" Juggins looked at Dowling keenly.

"No; I've seen him only occasionally since we finished college. He means well, but he goes off on crazy tangents."

"I don't know what I could do. I couldn't have him turned loose."

"You don't have to. Put in a death certificate for him. Say he died of natural causes. Then substitute him for one of the regular prisoners in the Lancaster prison farm. They're dying all the time anyway."

"I'll see what I can do."

When Dowling picked up Arthur Hsi, his grin answered the Transport director's question before it was asked.

"How much did he want?" asked Hsi.

"I offered him a hundred thousand, and he took it without argument."

Hsi whistled. "I was authorized to pay ten times that much! Our Bozo doesn't know his own value yet."

"Maybe it's the first real bribe he's taken."

"Really? Well, we don't put him wise to what he could have got, eh? He'll learn soon enough."

FRED MERRIAN shambled into the visitors' room. He looked thoroughly beaten. His hollow eyes lit up a bit at the sight of Dowling, Hsi, and Dr. Lechon.

He sat down. Then he looked puzzled. "How come the guard went out? They don't do that ordinarily."

Dowling grinned. "He's not supposed to hear what we've got to say." He explained the plan for shifting Merrian to the Lancaster farm under a new name.

"Then . . . then I'm going to keep my eyes? Oh—"

"Now, now, don't break down, Fred."

They got the overwrought writer calmed. He said: "I still don't understand why the uprising failed. You have no idea how careful we were. We thought of *everything*."

Dowling said: "Guess you just didn't have the stuff. As long as the Bozos have a large and well-armed corps of watchdogs—" He shrugged.

"You mean it's hopeless? We didn't accomplish anything?"

"Uh-huh. Though you did assure us a new water system at last by blowing up the old one. Knowing you, Fred, I know you'll find that a hard thing to reconcile yourself to."

"I'll never be reconciled to it. There must be *something*."

"I'm afraid not."

"I am not too sure," said Lechon. "Armed uprising, no. With the complicated weapons used nowadays, civilians can do little. It is like trying to stop a . . . a buzz saw with your bare hands. But there are other possibilities."

"What?" asked the three younger men together.

"Read your history, gentlemen. Read your history." And that was all they could get out of him.

"I'M NOT worrying," said Juggins. "We can trust each other." He leaned back in his chair, and sucked on a cigar. He coughed a bit, and said: "Damn, I keep forgetting that one doesn't inhale these things." He had taken to the American fashion of men's earrings.

Dowling smiled. "You mean, we'll *have* to."

"You might put it that way, yes. What's the proposal this time?"

Arthur Hsi explained: "You know the Atlantic City project Sino-American is trying to promote? Our subsidiary is all ready to set up."

"Yes."

"Well, first, there's the Society for Preservation of Ancient Monuments objecting. Say if we modernize Atlantic City we'll ruin it. Say Hotel Traymore has been there three hundred years, and it would be a sacrilege to tear it down."

Juggins waved his cigar. "I can shoot a few of this Society. That'll shut them up."

"Oh, no," said Hsi, shocked. "Cause all kinds of trouble. People would boycott the project."

"Well, what must I do?"

"If you could have some of these old ruins moved, as a government project—"

"Hm-m-m. That would cost money."

"Perhaps my company could see its way to sharing the expense."

Juggins still frowned. "My superior, the Centaurian MacWhirtle, would have to approve. I think he's suspicious of me."

Dowling broke in: "Is MacWhirtle married?"

"Yes, but his wife's back in Australia. Why?"

"I just had an idea. Go on, Arthur."

Hsi continued: "Then there's matter of financing the improvement company. We thought we could have it issue some common stock, some noncumulative preferred. Sino-American could buy most of former; public latter. You and MacWhirtle would have a chance at former also, before it was put on market."

Juggins frowned again. "I seem to remember some rule against non-cumulative preferred. Though I never knew why."

Hsi explained: "This wouldn't be called noncumulative; some fancy name, but would mean same thing. You sell so much noncumulative to public, and hold common. Then year comes along, you tell preferred stockholders, conditions are very bad, can't pay any dividends at all, on common *or* preferred. Then next year you say conditions are better. You pay preferred stockholders their regular seven percent—for that year only. You pay yourself regular dividend on common, plus the common stock dividends you didn't pay previous year, *plus* seven percent preferred stock dividend you didn't pay previous year also. It's wonderful."

"I see," said Juggins. "I see why there's a rule against it. But I suppose that sort of thing is necessary in modern finance."

"Oh, absolutely," said Dowling.

"I try to be fair," said Juggins. "Some of my fellow Centaurians lean over backward. I think they do more harm than good."

"Sure," said Dowling. "And do you suppose we could meet MacWhirtle? Socially, I mean."

Dowling dialed his wrist phone. "Helen? This is Baldwin. . . . Yep, the old political wizard himself. Doing anything next week end? . . . No, no. It's a party. . . . In New York. . . . Uh-huh, got a Bozo for you. . . . Yep, a very big shot indeed. It's all very discreet, understand. . . . This is business. . . . Right. See you Saturday."

THE Centaurian MacWhirtle was a smaller and older edition of Juggins. His manner still retained most of the clockwork stiffness of the uncontaminated Bozo. But it was evident that he was under a strain.

"Sit down!" he barked.

Dowling sat.

MacWhirtle leaned forward. "I understand you're . . . you and that Chinaman Hsi are . . . are willing to let me have some common stock in the Atlantic City Improvement Co. below the price it'll be offered the public at."

"Yep." Dowling grinned. "Reminds me, can my friend Osborn have his secretarial job back?"

"Why? What do you know about Osborn?"

"He was fired for using a preposition to end a sentence *with*. If we're offering the stock to the public *at*—"

The Bozo purpled. "I'll do what I— Why, you insolent—" The sentence died in sputters, while Dowling mentally kicked himself for breaking his long-standing rule never to joke with a Bozo.

MacWhirtle calmed himself enough to ask for more details about the stock. Dowling explained.

MacWhirtle looked intently at his fingernails. He said, barely audibly: "I could use force, but—" He realized that Dowling was listening to him, and yelled: "Get out! I won't have men spying on my private—"

Dowling, annoyed, but not dis-

couraged, got up to leave. MacWhirtle shouted: "Sit down, you silly ass! I didn't mean it seriously. I admit I've got to have money. You said—"

Dowling walked from the hotel where he had met MacWhirtle to Penn Station. It was after four, and the only time of day or night when New York's streets are almost deserted. MacWhirtle had shown a bargaining ability incongruous with the financial innocence expected of a true Bozo.

On West Thirty-sixth he approached a knot of men. He recognized the uniform of the watchdogs.

One of the national police saw him, whipped out a pistol, and fired.

Dowling dived down a set of basement steps. He yelled up: "What the hell's the matter with you?"

There were mutterings in the dark. A deep voice addressed the world at large: "The first open window gets a bullet through it. Go back to bed, all of you." Then the owner of the voice appeared, rocking a bulbous body along on huge flat feet.

The watchdog flashed a light at Dowling's face, and said: "Glory be, if it isn't Mr. Dowling, the Philadelphia mediator! Come out, Mr. Dowling. I'm sorry one of the boys got nervous and took a shot at you. You see . . . some of the Bozos were took sick, and we were helping them. Naturally we didn't want anyone to see them in that condition."

"You'd have been a hell of a lot sorer if he'd hit me," grumbled Dowling. He followed the watchdog down to the knot. The three Bozos were sick, all right. The reek of regurgitated alcohol implied the nature of their sickness.

One of the other watchdogs was muttering: "So these are the super-

men, who never have any fun, eh? Well, well. Well, well."

WEATHERED granite disintegrates, but it takes time. Dowling, as he helped Arthur Hsi to spin their web, reflected that he was getting a paunch. People might refer to him as a "rising young man" still, but without unduly stressing the "young." His daughter was in high school. He was not altogether pleased to see that she was turning into a beauty. He'd have to keep her out of sight of the Bozos with whom he was in constant contact.

Hsi complained: "If we cut a few more Bozos in on this spaceport deal, Sino-American might just as well sell out its American holdings and go back to China."

Dowling grinned. "We've got 'em where we want 'em, haven't we?"

"Oh, yes. They follow our . . . suggestions . . . like little lambs. But—"

Dowling's wrist phone rang. Juggins' voice said hoarsely: "Dowling! A terrible thing has happened! MacWhirtle has just shot Gulick!"

"Killed him?"

"Yes!"

Dowling whistled. Gulick was administrator for all of North America. Juggins continued: "It was a quarrel over . . . you remember that girl, that Miss Helen Kistler, whom you introduced to MacWhirtle last year? It was a quarrel over her!"

"What'll happen?"

"I don't know, but Australia will come down on us. They'll send investigators. God knows what they won't do."

"Well," soothed Dowling, "we'll just have to stick together. Pass the word along to the others."

AUSTRALIA came down on them all right. In a week the Middle Atlantic States swarmed with Bozo investigators, stiff, grim, and arrogant. The plain citizens, whose hatred for their masters had become a bit dulled with familiarity, awoke to find their newspapers plastered with drastic new decrees—to "tighten up the incredibly lax moral standards prevailing in North America." "Absolute prohibition of intoxicating liquors." "No married women shall work for pay." "No smoking in public places, the same to include public thoroughfares, hotels, restaurants—"

Baldwin Dowling entered Juggins' office—the Philadelphia administrator now had a huge one with rugs in which one practically sank ankle-deep. Juggins and five other local Bozos were facing one of the investigators, a small waspish man.

"Get over there with the others," snarled the little man, evidently mistaking Dowling for another Centaurian. The investigator continued his tirade: "And here I find you fallen into the slime of corruption and depravity! Tea! Coffee! Tobacco! Liquor! Women! Bribery! Centaurians, eh? Rotten, filthy, weaklings! You're coming with me now. We're taking a special plane for Australia, where you will stand trial for enough corruption and immorality to hang a continent. Don't worry about packing; you won't need anything but a coffin. Come on!"

He strode to the door and yanked it open. The six Bozos, looking dazed, started to file out. The frightful discipline of their childhood still told.

Dowling caught Juggins' eye. Juggins returned his look dully. Dowling muttered: "Going to let him get away with it?"

"What do you mean?"

"You're bigger'n he is."

Light slowly dawned. Juggins faced his small tormentor. The other Bozos stopped and faced him, too.

"Well?" barked the little man. It did not seem to have occurred to him for an instant that his order might be disobeyed.

The six moved toward him. He looked puzzled, then incredulous, then alarmed, then furious. He reached for his pocket. The Bozos rolled over him in a wave. A gun went off once. The Bozos untangled themselves. The investigator lay with half his face blown off.

"What now?" panted Juggins. "What'll they do when they hear of this? Where can we go? What's that?"

"That" was the noise of an angry mob, flowing along the street outside and smashing things for no reason other than that it was angry.

The Bozos raced downstairs, Dowling after them.

A dozen watchdogs lounged around the entrance of the building. The mob kept clear of them, though none of them had a weapon out.

"Why don't you shoot?" yelled one of the Bozos to the commander of the police.

The watchdog yawned ostentatiously. "Because, Jack, we don't like not being able to smoke in public no more'n they do." And he turned his back on the Centaurian.

That was all the encouragement the mob needed. But by the time they reached the portals, the six Bozos were not there. They had departed for the rear exit with an audible swish.

Baldwin Dowling, prudently keeping out of the mob's way, dialed his wrist phone. "Hey, Arthur! Juggins and his friends killed the in-

vestigator, and skipped! It looks like maybe they've cracked. I'll try to raise New York, and see if I can start a rumpus there. They're a pushover! See if you can find out what's doing in China! I've got to organize an interim government for Philly. If the Bozos don't come back, think of the deals we can put over! Boy, oh boy!"

A telephone call to New York informed Dowling that a mob had formed there—several mobs, in fact—and that the Centaurians had fled or been lynched. Their leader, the new New York administrator, had been dead drunk, and had failed to give orders at the critical time.

The New York mob, like the Philadelphia mob, was not actuated by noble motives of daring all for freedom. They were rioting because they had been forbidden to smoke in public.

THE SAME four men who had met in Dr. Lechon's rooms in the University of Pennsylvania dormitories, so many years ago, met there again. Fred Merrian was tanned and husky, but subdued. The treatment at the Lancaster camp had almost killed him, but ended by hardening him.

He said: "The latest radio news is that the Second Garrison Corps is retreating through Russia."

"Uh-huh," said Dowling. "When they pulled them out of Europe to use against us, Europe went *whoosh*."

"Isn't it wonderful?" said Merrian. "It'll be a cleaner, finer world when we've gotten rid of them." He looked at his watch. "I've got to run. Everybody I ever knew wants to pinch me to see if I'm real."

When he had gone, Tadeusz Lechon—he was quite old now—said: "I didn't want to disillusion him again. You know how he is. It

won't be a cleaner, finer world. It'll be the same old world, with rascals like you two running it."

"If we get rid of them," said Dowling. "They still hold Australia and most of southern Asia. It looks like years of war to me. And if we get rid of the Bozos, a lot of countries will be ruled by watchdogs, who won't be much improvement."

Arthur Hsi asked: "Why did they fold up so easily? One man with machine gun could have dispersed that mob here last month."

Dowling said: "The Bozos didn't have the guts, and the watchdogs didn't want to. So there wasn't anybody to use the machine gun. But it still seems goofy, Dr. Lechon. Why could they beat us twenty years ago, and we beat them now, when they're at least as strong as they were then,

and we're very much weaker?"

Lechon smiled: "Read your history, gentlemen. The same thing happened to the Spartans, remember, when Epaminondas beat them. Why? They were a warrior race, too. Being such, they were unfitted to live among civilized people. Civilized people are always more or less corrupt, though some conceal the fact better than others. The warrior race has a rigid discipline, and an inhumanly high standard of conduct. As long as they keep to themselves they are invincible. When they mix with civilized people, they are corrupted by the contact.

"When a people that has never known a disease are exposed to it, it ravages them fearfully, because they have acquired no immunity to it. We, being slightly corrupt to begin

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BRASS TACKS

Ye Gods! The utter desolation of "Final Blackout" called "pro-war propaganda"!

Dear Mr. Campbell:

Undoubtedly the worst story you have ever printed is L. Ron Hubbard's "Final Blackout." It is bad, not because of its style or because the plot is dull, but because of Hubbard's vicious ignorance of mass psychology and political science, his contempt for a democracy founded upon the will of the people, and his failure to take into account the historical processes of action and reaction.

His initial premise that a devastating war has been raging for years until all Europe is in ruins is absurd. The first World War lasted but little over four years and ended because the troops of all the Continental powers were so near to mutiny that the few rulers who had not already been overthrown were afraid to order further slaughter. Three great dynasties fell—the Romanoffs, the Hapsburgs, and the Hohenzollerns—yet the exhaustion in November 1918 was far from being so complete as Hubbard pictures. The masses of the common people will undergo an immense amount of suffering at the hands of their masters, but a time is at last reached when the people will no longer follow those masters to death. The present European war started with a long stalemate on the Western Front because the rulers of France

and England were afraid of mutiny if their drafted troops were ordered into battle, and it was not until Hitler seized the tactical advantage of attack that they accepted the peril of revolution as a lesser evil than military defeat.

Moreover, Hubbard's depiction of the British Communist Party as stupid and corrupt is a little harsh. Stupidity and corruption do not appear to be rife in the ranks of the Russian Communist Party; on the contrary, the results of allowing the workers to decide for themselves how their industries shall be run appear in the statistics on production and distribution, on the number of students in schools and colleges, and in the advances of Soviet sciences in surgery, botany, chemistry, mathematics, physics, et cetera. This Russian Party is the only set of Communists which we have yet had a chance to observe in action and it is sheer stupidity on the author's part to ignore factual, recorded data in projecting into the future.

The military achievements of the Communists should lead Mr. Hubbard to respect them. As is well known, the Red army smashed the Mannerheim Line in Finland—a feat pronounced impossible by all the other generals in Europe—with fewer lives lost on both sides than were lost by the British in their disastrous attempt to land at Gallipoli in the first World War. In addition, the Soviet army developed the

tactic of landing invading troops from air-planes while other military experts laughed the idea down.

However, I cannot respect either the intelligence or the characters of militarists. The trade of professional murderer is not such as to attract to its ranks the highest type of person, as is shown by the fact that military dictatorships—so lauded by Mr. Hubbard—have invariably been characterized by a callous and brutal suppression of human rights wherever they have been put into force. Compare H. G. Wells' dictum that the world would one day be under the noble and beneficent leadership of the aviators with the wanton and unprovoked bombing of Shanghai, Canton, Ethiopia, Madrid, Warsaw by these same noble aviators.

I hope that you print this letter, but I have my doubts; we are in times now when it takes courage to speak out against the vicious propaganda designed to drag us into a foreign war which Hubbard's story contains. His praise of militarists; his contempt for the "rabble," by which he means those common people who do not want war and who are willing to fight for peace, the "rabble" mentioned by Lincoln in "This country with its institutions belongs to the people which inhabit it"; his disregard of the power of these common people to enforce their desire for peace under our democratic constitution—all these are simply a subtle way of saying, "War is very bad, but it is inevitable and we must therefore follow our brave officers wherever they may choose to lead us."

It is particularly bad that Astounding should print pro-war propaganda of this kind because most of your readers are young men of draft age who may be called upon to shed their blood in a foreign land for the defense of the British Empire. Do not forget that we shall be told that we are fighting for democracy if this country goes to war—but democracy is nothing else but the rule of Hubbard's despised rabble, while his rule of a military oligarchy is a thinly disguised fascism, in no way differing from Hitler's regime.

If American democracy means anything, it means the rule of this so-called "rabble."
—Ray St. Clair, R. F. D. 2004, Richmond, California.

Warnings?

Dear Mr. Campbell:

(1). WARNING to Brass Tacks writers: Too much technical stuff is even more tiresome in letters than in stories.

(2). WARNING to exasperating reader-critics: One of these days I'm going to write a yarn so chockful of deliberate errors, flaws, contradictions and impossible science that it will drive all you error-mad hunters NUTS!!!—John Wasso, Jr., 119 Jackson Avenue, Pen Argyl, Pennsylvania.

It takes the large canvas of a serial to build up a civilization, though! Heinlein has several more excellent yarns to come, and is working on others.

Dear Mr. Campbell:

I'm thinking of getting a rubber stamp that says "I don't like serials. We want Don A. Stuart."

Now that the important business is out of the way, we can get on to the current issue. Norman L. Knight has written some of your best short stories, but something is missing from his serials. I suspect that they are fine stories, but I can't carry interest over from one month to the next, and my friends see that I can't save the magazine to read all the parts at once.

Shorts—fair.

Heinlein started swell and is getting better. In my opinion, the civilization he has painfully built up is too fine to discontinue now. I would suggest a novelette of the colonization of the planets, with some of Heinlein's classical knowledge of what constitutes a culture applied to the frontier. Van Vogt, of course, did the same thing in "Repetition," but this should be even better.

And in closing, "I don't like serials. We want Don A. Stuart."—Lawrence Miller, 2740 Vincent Avenue, Norfolk, Virginia.

Wonder if he'll think the renaissance is over after another year's advances?

Dear Mr. Campbell:

It begins to look as if the renaissance were past. Astounding has had one other, which began when Street & Smith took over, culminating in mid '34 in a brief golden age, ushered in and maintained by Messrs. Smith, Campbell, Williamson, Stuart and Weinbaum. With 1936 came a decline, and Astounding mucked around on a rather low level until the latter part of '37, when Stuart, Smith and Knight raised the level considerably. A number of well-written but random stories appeared, becoming

better-written and more random up to "Gray Lensman." It now appears that a new golden age, due to the efforts of Knight, Heinlein and van Vogt is under way. Since Smith carries his own private little golden age around with him wherever he goes, I can leave him out. Dold was a prime factor in the first era, as are Rogers and Schneeman in the new era. Rogers' last eight covers are the best in the history of science-fiction. I hope Schneeman recovers from his old blurry style as evidenced in the July issue. His composition is perfect, as usual, but ninety percent of the dramatic force is gone.

I would like to remark here that, if we are entering a golden era, this is the best time. Judging from the dozen or so new science-fiction magazines which have come out in the last year, prospects have reached a new high. I would also like to remark that Astounding is still the only science-fiction magazine on the market. Period.

Whereas the first golden age was designed around the traditional physical superforces of science-fiction, the new stories are designed with psychological and sociological forces as their prime motivation. Maybe I can ascribe this to a better understanding of "the science of withering" than your authors have shown before. As evidence that this is the ideal type, I can advance Kipling's two efforts: "With the Night Mail" and "As Easy as A. B. C." They are both of this type, and written by a masterly hand. Forerunners of this type in Astounding are: "The Escape," by Stuart; "The Phantom Dictator," by West; "Frontier of the Unknown," by Knight; and Stuart's "Aesir" stories.

Van Vogt's stories have been a source of great joy to me, because of the way he handled his human characters, and gave them supermannish attributes that really should appear eventually. I look forward to "Slan!" with great expectations. Heinlein's "Coventry" is his best effort yet, what with psychodynamics, social insanity and the light psychological satire throughout the story. I believe Knight is the most polished practitioner of all, with his beautifully thought-out future societies. Since they don't appeal to the instincts of men of the present, I would consider it further proof of their realism.

In accordance with the well-known Hitlerism that anything, no matter how preposterous, will be believed if it is repeated long enough, I would like to object yet once again to the unpleasant cartoons of the Isips. Kramer is infinitely preferable, as is Orban's pen-and-ink style.

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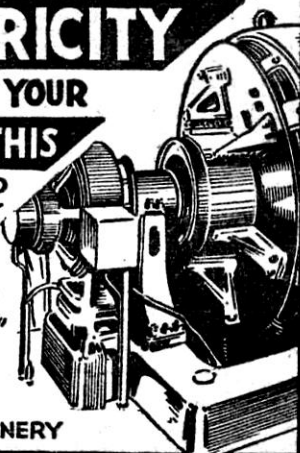
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With what I expect will be lonely praise for that beautiful bit, "Emergency Landing," I retire for the nonce.—Dick Wortman, 842 East Ninety-seventh Street, Seattle, Washington.

"Too many characters."

Dear Sir:

The August Astounding was the first science-fiction magazine I have read cover to cover in the last two years—the first I have bought in a half year. For quite some time I've been of the opinion that s-f story quality was pursuing a definite downward trend. Don't misunderstand me; I still am, though it is interesting to note what changes have come about, what progress, if any, has been made, and what possibilities there are that fantasy may be emerging upon new fields altogether.

I'll get to the point, but first let me warn you—there'll be brickbats. Maybe a bouquet or two, if I cool off toward the end of the letter.

Four of the stories in the August number I'm going to put in a class headed "too many characters." Which speaks for itself. Each yarn was overloaded with principals. "Rendezvous" was an example. It was a short story, a few thousand words perhaps, and the author found time and space to introduce eleven characters, each of whom acted, spoke, argued and fought to make himself heard. To say the least it was very confusing, and distracting from the theme, if any, of the entire story. If Berryman thought it necessary to flood his yarn with loud-mouthed space hands for the sake of atmosphere, why didn't he make a novel out of it and give the burly fellows room enough to spread out? The other three in this unfortunate category are "Done Without Eagles," "Moon of Exile," and "The Stars Look Down." Compare them with some of the older science-fiction classics, citing for example the ease with which Jack Williamson told "The Legion of Space," using only a handful of principals throughout six installments. I ask, why so many unnecessary individuals crammed into short stories?

Getting back to story quality. There seemed a weightlessness in all the stories this month. The ideas may be good and up-to-the-minute, but in presentation they fall down badly. There's one exception, however, which induces me to part the veil of gloom and present a bouquet for A. E. van Vogt's "Vault of the Beast," truly a different story and one that should rank high on annual polls. Fortunately, it was

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the last story I read in this issue. It left me in a good mood and surely will be the reason for my buying the September issue. I hope "Slant" lives up to expectations.

Simak's "Clerical Error" passes inspection, for it was vividly told and brought forth an interesting situation, typical of Simak. I might add there was no excess baggage as far as grimy space hands and swearing officers are concerned.

The cover was good, and the inside stuff isn't bad. Nothing like the drawings of old, but they'll do. Rogers has some good ideas.

All in all, Astounding is still the best of the science-fiction crop. Give me a story as good as "Vault of the Beast" once a month, and I'll be satisfied. One more thing. A special bouquet to van Vogt for those two words, "Poor Frankenstein." Without them, "Vault of the Beast" might have lacked something.—John L. Chapman, 1521 Como Ave., S. E., Minneapolis, Minn.

The "Astounding flavor" isn't so much a style of writing; it comes from the careful handling of the small but important details.

Dear Editor:

The unique literary style of Astounding is becoming more and more distinctive. Of course, your authors "slant" their stories. But it is rather surprising to see how successfully a large number of writers have adopted this unique style. De Camp, Hubbard, Heinlein and Don Stuart appear to be mainly responsible for the Astounding flavor. But in the current—July—issue, Knight, Del Rey, von Rachen, Ryan and the two Williams turn out some very commendable stories in the same vein. Van Vogt, Jameson and several others have done so in other issues.

Why all the above? Well, just this—I like this hard-to-name-but-easy-to-detect quality in Astounding.

Of the complete stories, "Coventry," "The Red Death of Mars," and "Dark Mission," in that order, pleased my fancy most, but "The Mosaic," "The Idealist," and "Emergency Landing" were not far behind.

"Crisis in Utopia" starts very well.

The cover is splendid. The longer you look at it, the more arresting it becomes.—D. B. Thompson, 3136 Q Street, Lincoln, Nebr.

Bet he starts "Slant" without waiting!

Dear Mr. Campbell:

My acute attack of spring fever has finally left me without too many bad effects. I've managed to muster enough ambition to throw a few of my unwanted comments your way. The cover this time is good, more bright colors than usual, but still not glaring. Rogers is a master of working colors, although I can't say much for his women. The green topping is swell.

Now to go down the contents page. Oh, yes, that reminds me. Why don't you switch back to your old style you had in the November '38—I believe—for it was really attractive and well balanced. I haven't read "Crisis In Utopia" as yet, for I always wait till I have all the installments before reading serials. Heinlein outdoes himself this month with a really super yarn, there is something about his stories so much more realistic than most authors. For instance, when MacKinnon traveled so far and swam under the barrier, it was to no avail as far as warning the civilization was concerned, for Fader as well as others had got there ahead of him. What other author would put that real-life twist?

I have appointed myself as a committee of one to welcome Bob Williams back to our fold. If I remember correctly, it's been some time since his stories have frequented the pages of Astounding, and I'm glad he's been able to turn one out with sufficient quality for Astounding Science-Fiction. It was surprisingly good, and Schneeman's second illustration on page 140 is the most beautiful one I've seen in ages. It captures an alien and strange atmosphere that is seldom seen. Laurels to Mr. Schneeman.

I haven't, as yet, read "The Mosaic." From appearances it looks more of the *Unknown* type. Orban didn't do a bad piece of work, but he can go back to *Doc Savage* as far as I'm concerned.

I still can't figure out "Emergency Landing." I have two solutions how that could have got in Astounding. Either Ralph Williams is your brother, or he knows where the body is hidden. "Dark Mission" was good. There is something about Del Rey's stories that don't always click; his best to date are "The Faithful" and "Luck of Ignatz." Oops, skipped "The Idealist." Was O. K., kinda dragged in spots. The Editor's Page was interesting, as usual; Times To Come and Analytical Laboratory, necessary and interesting. Readers' Department, tops, let's have a larger one.

I'm glad to see Van Vogt coming up,

although I'd say he is in a rut with his "monsters" running around through the ship in every story. Am anticipating his superman story and his novel twist.—Lew Martin, 1258 Race St., Denver, Colo.

"Gray Lensman" is still available, but judging from past experience, it won't be for many more months.

Dear Editor:

I've been wondering for a long time just what it is that turns me toward Astounding Science-Fiction every month, but the minute I looked at the July issue I had the answer—it is appearance. The cover by Rogers this month is one of the best I have seen. It has interest, beautiful coloring and still carries the s-f theme. The more covers like this I see, the happier I will be.

Still, I suppose you can't sell magazines just on covers, so I started to analyze the inside of the magazine. The semi-smooth pulp paper and trimmed edges give a distinctly "upper-class" appearance which, I am sure, is appreciated by all of your readers. Also your composition men do wonderful jobs with the page set-ups. Hats off to 'em.

Now for the stories: I started in with "Crisis in Utopia," and went through the whole works, front to back, at one sitting, and wasn't bored once. Here's my rating of the stories:

No. 1—goes to "Crisis in Utopia." Of course, it isn't finished yet, but I was fascinated, and now I'll have to chew my fingernails until the fourth Friday of July, just waiting to find out what happens.

No. 2 "Dark Mission"—very good.

No. 3 "Emergency Landing"—no science, but very interesting.

No. 4 "The Idealist"—might be something for *Unknown* to touch up for a longer story; or did I get the wrong idea? Anyhow, I liked it.

No. 5 "Coventry."

No. 6 "The Science of Withering."

No. 7 "The Red Death of Mars"—and really, I'm ashamed of you for letting the story in. Tut, tut, you must remedy this.

You will notice that I left out "The Mosaic." I have a reason for doing so, because I just can't figure out where to put it. It was good, interesting reading, but for some reason I can't seem to place it, so I just give up. Of course, it was on a very old theme that we s-f fans have read over

and over again, but I believe it was as good a job of it as I have ever seen.

I have a friend that I've been trying to convert to a s-f fan, tsk tsk, fie on him—he reads Westerns, but I'll bet you money he will be a s-f fan after I show him this issue. He won't be able to resist. I've been waiting for an issue like this to show him. It just takes this little push to put him in the s-f ranks.

Will you please tell me where or how I can get all of "Gray Lensman"? I've lost mine. I had the whole story bound—just mercilessly butchered up each magazine it was in and bound the story itself—but then I lent it to a so-called friend and the @#%*** moved away with it, and here I am without "Gray Lensman." Pity me in my plight and tell me what copies of the magazine it was in so I can get it. That is a story I can read over and over again.—Stewart H. Vance, 538 South Hobart Boulevard, Los Angeles, Calif.



SCIENCE DISCUSSIONS

We're rather glad to realize this was an error—

Dear Mr. Campbell:

I have become aware, several weeks too late, that the heat or something slightly ad-dled my wits. I made a bad and major error in the article "Shhhhh! Don't Men-

tion It!" which you published in the August 1940 issue. It was, basically, a simple slip in arithmetic, but like many such, it led me far astray.

To wit: In discussing the danger of gamma ray emission from uranium atomic power plants, I pointed out that while lead is adequate shielding for the weak emission of a tiny particle of radium, a commercial scale atomic power plant would emit billions, even trillions of times as much gamma rays. Now, since lead is not opaque to gamma rays, but merely a dark sort of fog to such penetrant radiation, gamma rays are not stopped dead by it. They're simply absorbed gradually; one half inch of lead absorbs—approximately—one half of the incident gamma rays.

(Here comes the originally arithmetical slip.) Now since uranium power plants will produce billions or trillions of times as much gamma radiation, it will take billions or trillions of times as much lead. Hundreds and hundreds of feet of it, apparently. Seems obvious.

It is; it is also—I sadly admit—very wrong. It works this way; the first half inch of lead reduces the gamma rays to one half. The second to one quarter, the third to one eighth, and the fourth to one sixteenth. It is not an arithmetical progression, but a geometric!

The proper way to find out how many half-inch layers of lead are needed to diminish gamma radiation to one billionth its original intensity is to set up an exponential equation, with the unknown factor not a multiplying factor, but an exponent, thus:

$$\frac{1}{2^x} = \frac{1}{10^9} \text{ or,}$$

$$2^x = 10^9$$

which is most easily solved by converting to logarithms, so that

$$x(\log 2) = 9$$

and solving for x gives 29.76. So 14.88 inches of lead will reduce gamma ray intensity to one billionth. To reduce it to one thousandth of that—to one trillionth of the original intensity—requires x = 39.65, or 19.83 inches of lead!

The expansion of two in a power series gets surprising. Two to the tenth power is only 1024. But the twentieth power is 1,048,576, the thirtieth power is 1,075,789,824, and the fortieth power of two is 1,101,608,779,776. The fiftieth power gets a little boring to work out, and normally available calculating machines can't handle it. It's approximately one quadrillion, seventy-five trillion, two hundred billion.

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Two feet of metallic lead would reduce gamma ray intensity to about one two hundred and eighty trillionth of its original value—which should be reasonably harmless to man or beast, even if the original were a full-fledged atomic power plant.

Which brings to mind the fact that some detectable fraction of cosmic rays is capable of penetrating up to thirty feet of metallic lead, which would reduce gamma rays to something like one over 2.2×10^{211} -th of the original. The orders of numbers have been named out pretty well, and I suppose you could figure out a name for that number which might be something like a couple of "ducentundecillions." It would certainly be easier to say that than to write two with another two and two hundred and ten zeros for support. In any case, it suggests that cosmic rays, whatever they may be, are—penetrative!

The important consequence of that readjustment from an arithmetical expansion, requiring, seemingly, hundreds of feet of lead, to the geometric progression it should be, is that an atomic burner would be adequately shielded by two feet of lead. If you made a lead block four feet on a side, with a two-foot cube hollow in the center, it would weigh about 19 tons. An atomic steam generator then, might be expected to weigh somewhere in the neighborhood of 20 to 30 tons. Rather heavy for automobile use, but ideal for locomotives—which want weight to grip the rails—and steamships. After all, a boiler that weighs only 30 tons, including fuel stores, is immensely lighter, and a boiler and fuel system that took only a four-foot cube would be immensely nicer. So much more cargo.

Also—the army and navy are, at present, both occupied in building planes capable of some 30 to 40 tons lift. Be pretty heavy for 'em—but they could cruise forever!—Arthur McCann.

But—you can illustrate the idea of future science, while the concept of fantasy can't be pictured.

Dear Editor:

To start off this epistle let me first put in a powerful plug. It would be mete, consistent with advance, and in line with reasonable policy to change the cover of Astounding. The job of redressing *Unknown* was so well done that a new face for Astounding would seem to be justifiable. After all, this magazine is an advancing part of the regular life of we who have the gift of vivid imaginations, we who like a goodly portion of science with our science-

fiction, we who have discriminating sense sufficient to desire adequate, wholesome, sensible treatment of science-fiction. The covers have been improving steadily of late, and it would seem more suitable to distinguish Astounding from the other "also-rans" in the field. Let's have a staid — somewhat — distinguished-looking, non-clashing-cover, along the line of the present *Unknown* dress.

In the final analysis, Astounding has advanced beyond the status of a magazine which must have a cover that leaps from the magazine stand and fairly kicks you in the face. Astounding has developed to the point of affording science-fiction for relaxation, and also providing articles of reasonable scientific discussion, in language that eliminates the necessity of six or seven degrees in science to understand and appreciate them. Yeah, verily! Now that you have indicated that you are seriously in the mood for external as well as internal improvement of your works, I am throwing my weight—if any—around for a new cover for this excellent publication!

As for the material in the magazine: The stories are doing O. K. "Final Blackout" was terrific, and would not seem to be too farfetched. As for "The Roads Must Roll," good reading interesting to a point, but something missing. Perhaps I don't appreciate the sociological sciences as much as the mechanical-electrical. Oh, well, you can't have complete and total satisfaction for every reader every time.

I suppose I'm like the rest, waiting VERY impatiently for another E. E. Smith story. I believe there is an inimical galaxy out there that should receive the attention of Kinnison.

Aw, heck, it's too hard trying to pick out the best stories—they're all good, you only get a bad one once in a great while, and we can take it occasionally!

The articles: Ah, the meat of the magazine. First I read one fiction, to get in a good mood, then turn to the article, and forget to go eat dinner. Keep the articles going, swell stuff!

Which brings me to something I wish to bring up, discuss, or invite brickbats concerning which—

The article "Introduction to a Nameless Science"—Wadda ya mean, Nameless? For the last three years I've been waiting for some guy to overcome his inhibitions and expound on "Galactic Electronics."

"Cosmecology" is O. K. for a generalization, but "Galactic Electronics" would seem to be a more precise definition of the reactions of the radiations of the Sun(s). Of course, when we get to the point of

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considering the interactions and the effects of the radiations of one system impinging on the radiations of another, well, then you really have something—cross-multiple modulation, impact oscillations to infinity, cancellations of frequency, phases; collision and decentralization of ionic tracks, et cetera, et cetera, WOW!

Yes, we all know that the radiations from the other galaxies are very weak, but the effects will still be there. When you pull a radio signal out of the mud from about eighteen times down, and select it from among other frequencies three to ten kilocycles away, you are dealing with strengths comparative to the strength of these extragalactic signals, when compared to the terrific power of the cathode—Sun—of our galaxy.

So it is an error to compare electromagnetic waves with cathodic emissions, is it? It's an error to compare our radio frequencies with the "cathode rays" of the Sun, is it? OR IS IT?

For every action there is—should be—a period, oscillatory determinative, wave length, regular wave or force-front variation—aside from variations of cathode temperature. Also still right "For every reaction there must be an equal and opposite reaction." If an ionic emission strikes an electromagnetic wave from the Earth, there must be a reaction—either a new waveform, a re-radiation, a visual display, or sumpin.

We cannot say certainly that such and such a reaction or demonstration is the result of the impinging of the cathodic emissions from the Sun on the electromagnetic wave-fronts from the Earth; we don't know about that, YET! But we still can promulgate a hypothesis; we will advance in knowledge as long as we utilize our imagination to set up possibilities, and then run down the clues, and prove their truth or falsity.

Speaking of the cosmos, Dr. Millikan gave me a bit of a start in an article the other day; that is, I was really worried until I read further in the article. Started off: "Millikan says cosmic rays will never be conquered." To myself: "By the nine hells of Valeria! don't tell me we can't get past the rays to the planets!" Hurriedly rushed through the article to find that he was referring to the possibilities of controlling the rays for power, or mutation research, et cetera, et cetera.

Whew! What a relief, had me skeered a minute!

Thinking of these rays, I wonder what

the children of the intrepid space voyager will look like, if some adequate screen for the rays is not developed before we go gallivantin' off across the stars. This thought also applies to flights to, in, and beyond the heat-layer. The effect depends, of course, on whether we are correct in assuming that the rays are mutation creating.

It would appear—we assume, until knowing better, that we must be screened from the cosmos—that a ship, rocket, or what have you, to carry human beings, would require a tremendous amount and weight of shielding of lead, or similar metal screening, to ward off the concentrated emanations above the screen of the Earth's "atmospheric envelope"—fifty miles up or out. This consideration in view of the fact that the cosmic rays coming in to the Earth now are, while scattered and few and far between, in sufficient quantity to be detected, and pass through a heck of a lot of lead. When we get out of the major portion of the envelope, the intensity will increase, and the requisite screening must, of course, be greater—stronger, more effective. Thus, the weight of such a metal screening would appear to be prohibitive. However, we must first get out there, heh, heh. Perhaps by the time we are to ride out to thirty-five or forty miles, we will have an electronic screen which will shield us from the radiations. Probably should say we must have such a screen. Just as an estimate, we might take the strength of the rays outside the heat layer as five hundred times the strength at the Earth's surface. All right, you math-slide-rule experts, figure that weight!

It is to be expected, however, that we shall be able to determine the "Active Frequencies"—the term is used generally here—of the cosmos sufficiently to at least make a determined effort to devise a screen of the electronic or semi-electronic electromagnetic type, which will at least afford partial protection.

The foregoing thought of the difficulty of securing an effective screen from the cosmos should not be taken as an indication that we can never attain space flight, or even extra heat layer circumnavigation. **WHAT MAN CAN IMAGINE, HE CAN ACCOMPLISH.** It will undoubtedly require considerable time to develop the methods, the applications, and the day of space flight is POSSIBLY far off, as yet, but thirty years past if you had even suggested that it would be possible to send a

reaction rocket even twenty miles out—
heh! Laugh at you? Oh, no, they'd have
probably leased a padded cell for you!!

"Unseen Tools." I'm still poring over
it, enjoyable and instructive.. Why not
have some astronomer or sufficiently quali-
fied author, do an article on the methods,
accuracy, et cetera, of measuring the dis-
tance of the stars, planets, galaxies, et
cetera, including a discussion on the possi-
bility of the variation in speed of light rays,
making the now accepted distances inac-
curate. Also an article on the design con-
struction and operation of a Gieger
Counter. A more technical discussion of
the problems of calculating machinery—
"Machines for Brains" was good, but I
think a little detail on the operation of the
machines, what make them go, et cetera,
would be in line. Then, too, a further de-
veloped discussion of the so-called heat
layer above the Earth, giving the reasons
for determining the existence of same, prob-
able temperature, depth, et cetera, et cetera.
Another on the design problems of rocket
reaction chambers, including the heats to
be dealt with, the metals which have been
used, for the chambers, methods of calcu-
lating thrust—simple—et cetera, et cetera.
—G. R. Wall, Tujunga, Calif.

Another version of the famous "Zeno's
Paradox." Simple? It took two thou-
sand years to develop the mathematics
to answer it!

Dear Mr. Campbell:

Perhaps you can help me find the an-
swer to this:

Take a block of wood and, by means of
an infinite series, bring it closer and closer
to a table. However, if we adhere to the
infinite series and keep dividing the dis-
tance between the wood and the table in
half, we will never be able to place the
block on the table. Thus, theoretically, it
is impossible to place the block upon the
table; however, we know that in practice
we can place the block on the table.

In conclusion we have a theory show-
ing us that the block will not reach the
table and, as far as I know, there is no
theory to disprove this. I would like to
know if there is any proposition which ex-
plains why we can place one object upon
another?

This may sound very simple. It may be
very simple to do and explain, but my
friends and I have discussed it at length
and no satisfactory explanation has been
reached.—John A. Zollinger, 38 Dane St.,
Sayreville, N. J.

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1349, 1350, 1351, 1352, 1353, 1354, 1355, 1356, 1357, 1358, 1359, 1360, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1369, 1370, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1381, 1382, 1383, 1384, 1385, 1386, 1387, 1388, 1389, 1390, 1391, 1392, 1393, 1394, 1395, 1396, 1397, 1398, 1399, 1400, 1401, 1402, 1403, 1404, 1405, 1406, 1407, 1408, 1409, 1410, 1411, 1412, 1413, 1414, 1415, 1416, 1417, 1418, 1419, 1420, 1421, 1422, 1423, 1424, 1425, 1426, 1427, 1428, 1429, 1430, 1431, 1432, 1433, 1434, 1435, 1436, 1437, 1438, 1439, 1440, 1441, 1442, 1443, 1444, 1445, 1446, 1447, 1448, 1449, 1450, 1451, 1452, 1453, 1454, 1455, 1456, 1457, 1458, 1459, 1460, 1461, 1462, 1463, 1464, 1465, 1466, 1467, 1468, 1469, 1470, 1471, 1472, 1473, 1474, 1475, 1476, 1477, 1478, 1479, 1480, 1481, 1482, 1483, 1484, 1485, 1486, 1487, 1488, 1489, 1490, 1491, 1492, 1493, 1494, 1495, 1496, 1497, 1498, 1499, 1500, 1501, 1502, 1503, 1504, 1505, 1506, 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1515, 1516, 1517, 1518, 1519, 1520, 1521, 1522, 1523, 1524, 1525, 1526, 1527, 1528, 1529, 1530, 1531, 1532, 1533, 1534, 1535, 1536, 1537, 1538, 1539, 1540, 1541, 1542, 1543, 1544, 1545, 1546, 1547, 1548, 1549, 1550, 1551, 1552, 1553, 1554, 1555, 1556, 1557, 1558, 1559, 1560, 1561, 1562, 1563, 1564, 1565, 1566, 1567, 1568, 1569, 1570, 1571, 1572, 1573, 1574, 1575, 1576, 1577, 1578, 1579, 1580, 1581, 1582, 1583, 1584, 1585, 1586, 1587, 1588, 1589, 1590, 1591, 1592, 1593, 1594, 1595, 1596, 1597, 1598, 1599, 1600, 1601, 1602, 1603, 1604, 1605, 1606, 1607, 1608, 1609, 1610, 1611, 1612, 1613, 1614, 1615, 1616, 1617, 1618, 1619, 1620, 1621, 1622, 1623, 1624, 1625, 1626, 1627, 1628, 1629, 1630, 1631, 1632, 1633, 1634, 1635, 1636, 1637, 1638, 1639, 1640, 1641, 1642, 1643, 1644, 1645, 1646, 1647, 1648, 1649, 1650, 1651, 1652, 1653, 1654, 1655, 1656, 1657, 1658, 1659, 1660, 1661, 1662, 1663, 1664, 1665, 1666, 1667, 1668, 1669, 1670, 1671, 1672, 1673, 1674, 1675, 1676, 1677, 1678, 1679, 1680, 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2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 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2677, 2678, 2679, 2680, 2681, 2682, 2683, 2684, 2685, 2686, 2687, 2688, 2689, 2690, 2691, 2692, 2693, 2694, 2695, 2696, 2697, 2698, 2699, 2700, 2701, 2702, 2703, 2704, 2705, 2706, 2707, 2708, 2709, 2710, 2711, 2712, 2713, 2714, 2715, 2716, 2717, 2718, 2719, 2720, 2721, 2722, 2723, 2724, 2725, 2726, 2727, 2728, 2729, 2730, 2731, 2732, 2733, 2734, 2735, 2736, 2737, 2738, 2739, 2740, 2741, 2742, 2743, 2744, 2745, 2746, 2747, 2748, 2749, 2750, 2751, 2752, 2753, 2754, 2755, 2756, 2757, 2758, 2759, 2760, 2761, 2762, 2763, 2764, 2765, 2766, 2767, 2768, 2769, 2770, 2771, 2772, 2773, 2774, 2775, 2776, 2777, 2778, 2779, 2780, 2781, 2782, 2783, 2784, 2785, 2786, 2787, 2788, 2789, 2790, 2791, 2792, 2793, 2794, 2795, 2796, 2797, 2798, 2799, 2800, 2801, 2802, 2803, 2804, 2805, 2806, 2807, 2808, 2809, 2810, 2811, 2812, 2813, 2814, 2815, 2816, 2817, 2818, 2819, 2820, 2821, 2822, 2823, 2824, 2825, 2826, 2827, 2828, 2829, 2830, 2831, 2832, 2833, 2834, 2835, 2836, 2837, 2838, 2839, 2840, 2841, 2842, 2843, 2844, 2845, 2846, 2847, 2848, 2849, 2850, 2851, 2852, 2853, 2854, 2855, 2856, 2857, 2858, 2859, 2860, 2861, 2862, 2863, 2864, 2865, 2866, 2867, 2868, 2869, 2870, 2871, 2872, 2873, 2874, 2875, 2876, 2877, 2878, 2879, 2880, 2881, 2882, 2883, 2884, 2885, 2886, 2887, 2888, 2889, 2890, 2891, 2892, 2893, 2894, 2895, 2896, 2897, 2898, 2899, 2900, 2901, 2902, 2903, 2904, 2905, 2906, 2907, 2908, 2909, 2910, 2911, 2912, 2913, 2914, 2915, 2916, 2917, 2918, 2919, 2920, 2921, 2922, 2923, 2924, 2925, 2926, 2927, 2928, 2929, 2930, 2931, 2932, 2933, 2934, 2935, 2936, 2937, 2938, 2939, 2940, 2941, 2942, 2943, 2944, 2945, 2946, 2947, 2948, 2949, 2950, 2951, 2952, 2953, 2954, 2955, 2956, 2957, 2958, 2959, 2960, 2961, 2962, 2963, 2964, 2965, 2966, 2967, 2968, 2969, 2970, 2971, 2972, 2973, 2974, 2975, 2976, 2977, 2978, 2979, 2980, 2981, 2982, 2983, 2984, 2985, 2986, 2987, 2988, 2989, 2990, 2991, 2992, 2993, 2994, 2995, 2996, 2997, 2998, 2999, 3000, 3001, 3002, 3003, 3004, 3005, 3006, 3007, 3008, 3009, 3010, 3011, 3012, 3013, 3014, 3015, 3016, 3017, 3018, 3019, 3020, 3021, 3022, 3023, 3024, 3025, 3026, 3027, 3028, 3029, 3030, 3031, 3032, 3033, 3034, 3035, 3036, 3037, 3038, 3039, 3040, 3041, 3042, 3043, 3044, 3045, 3046, 3047, 3048, 3049, 3050, 3051, 3052

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