
ASTOUNDING
SCIENCE FICTION
20 CENTS
JUNE 1939
A STREET & SMITH PUBLICATION
HERMIT OF MARS
by CLIFFORD D. SIMAK

HOW ABOUT YOU?

Take it from business men, there's nothing that will kill your chances so quickly as halitosis (bad breath). Some executives get annoyed enough to call the offender's boss and say "Keep that nuisance out of here." Others, less severe but no less annoyed, simply decide not to see the offending salesman a second time.

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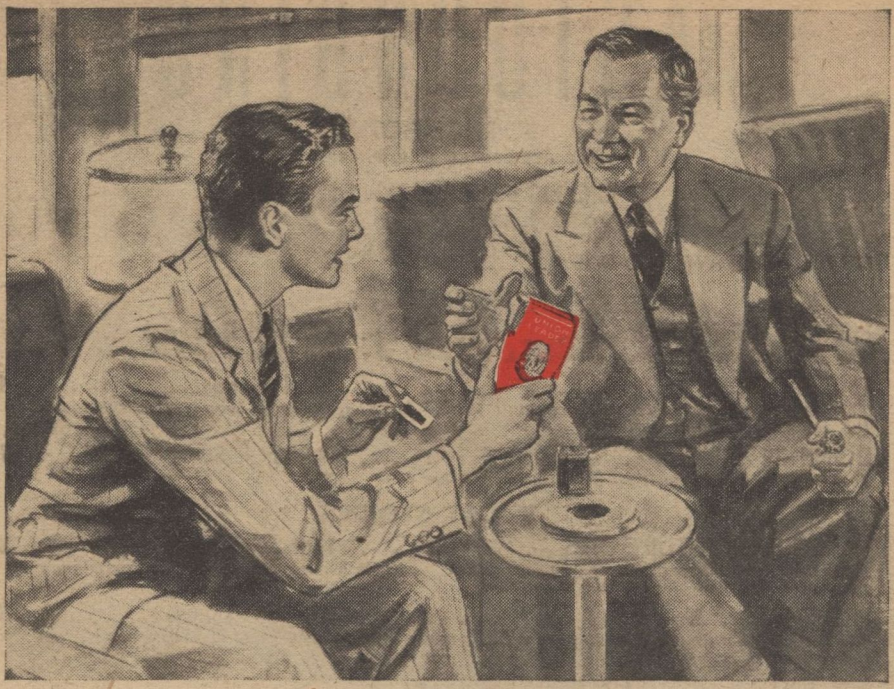

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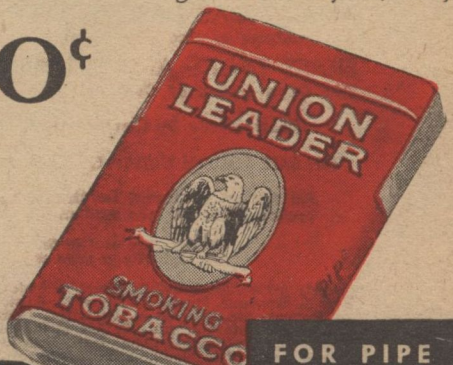

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VOL. XXIII NO. 4

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READERS' DEPARTMENTS

Illustrations by Cartier, de Camp, Kramer, Ley, Orban, Schneeman and Wesso.

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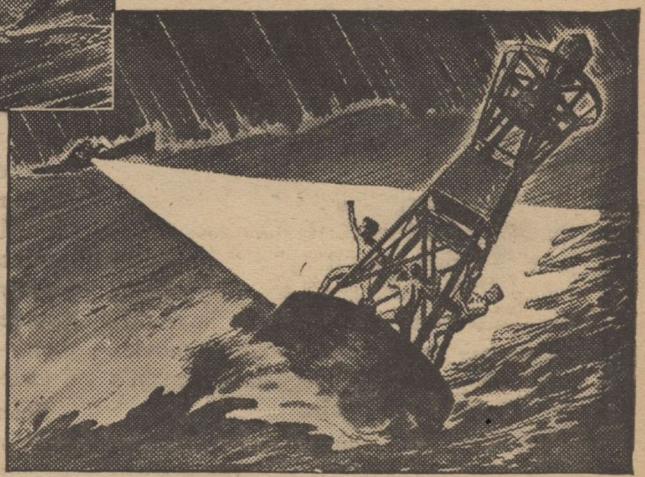
CLINGING FOR THEIR LIVES TO A ROCKING BUOY

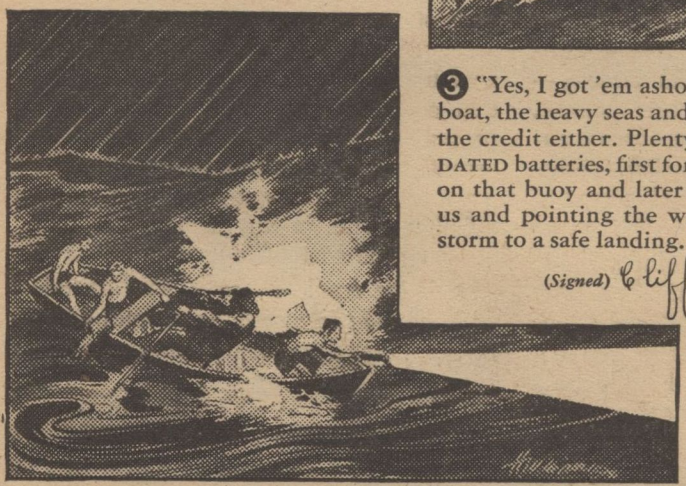
CLIFFORD THORNE, noted Detroit lifeguard, famous for more than 1,000 rescues.

...CLIFFORD THORNE ADDS THREE MORE TO RECORD OF 1000 RESCUES

❶ "I stayed out on Lake St. Claire until well after dark fishing," writes Clifford Thorne of 716 Van Dyke Ave., Detroit, Mich. "As I started rowing home a terrific squall hit. Rowing was almost impossible and the rain was so heavy it blotted out lights half a mile away. And then, over the howl of the wind I thought I heard cries for help.

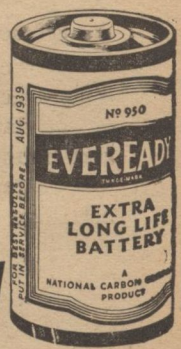


❷ "But I couldn't tell where the sound was coming from. I thought of the powerful, focusing flashlight that lay on the back seat, reached cautiously for it and played it around me... *and there they were!* Three youngsters clinging in terror to a rocking sea buoy. They had tried the usual stunt of swimming out to the buoy and back, but the storm spoiled the plan.



❸ "Yes, I got 'em ashore safely, in spite of an overloaded boat, the heavy seas and the heavy rain, and I can't take all the credit either. Plenty of it belongs to 'Eveready' *fresh* DATED batteries, first for finding the lads on that buoy and later for standing by us and pointing the way through that storm to a safe landing.

(*Signed*) *Clifford Thorne*"



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FUTURE TENSE

Any form of entertainment that finds a considerable audience of patrons must grow out of some fundamental characteristic of the civilization which it serves. Most basic of all characteristics in any of Man's civilizations must be the nature of Man—which doesn't change appreciably in any such brief span as the ten millennia of recorded history.

It's not surprising, in view of this, that the recorder of happenings—the reporter—existed in Babylon and exists today. The historian, the playwright, the dancer—all existed. We have different mechanics of presentation, movies and newspapers and magazines—but it's the old idea over again.

Save for one thing. Science-fiction finds no counterpart in the entertainment of history. They had fantasy—but science-fiction isn't pure fantasy. They had prophecy—but it wasn't entertainment; it was protection, necessary defense against the blank terror of the unknown future.

For the first time in all Man's climb, science-fiction has appeared. As a form of entertainment that has attracted tens and hundreds of thousands of readers, it must represent some totally new characteristic of our new civilization, something newer and deeper than the automobile—the horseless carriage is only an adaptation of old things—or the radio—an improved Greek heliograph system.

It arises, I think, in this: for the first time in all the history of Man's climb, he looks *forward* to better things, and not backward to a forgotten "Golden Age."

When the future was that blank field of unknown terror beyond, prophecy was needed to hope; from that view of it, our modern civilization sees it as a blank, a glowing mist, that conceals unknown grandeur. We want to know what's there—they dreaded knowing, but dreaded more not knowing.

Science-fiction rose when men reached that stage of civilization that looked forward gladly. I think, then, that science-fiction is not a happenstance, a fad that comes and goes by chance listing of public interest, but a characteristic symptom of this stage of evolution, a type of entertainment that would, inevitably, arise in any civilization that reached this particular level of advance.

It is the result of the mental attitude of Mankind; science-fiction comes when science takes some of the tension of terror out of the future tense.

THE EDITOR.

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Oh, Mr. Mattingly,
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"And I practice no deception
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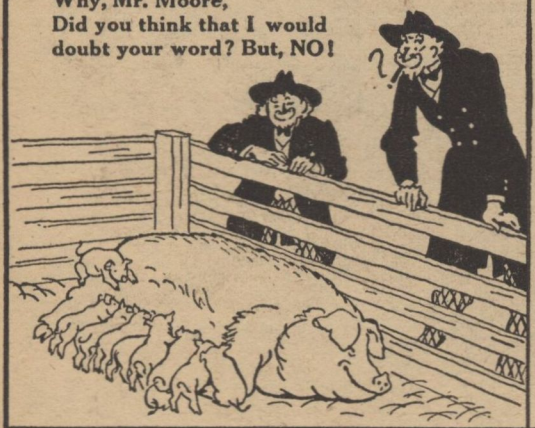
everywhere!"



"Why, Mr. Moore,
Why, Mr. Moore,
Did you think that I would
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HERMIT OF MARS

By CLIFFORD D. SIMAK

THE SUN plunged over the western rim of Skeleton Canal and instantly it was night. There was no twilight. Twilight was an impossible thing in the atmosphere of Mars, and the Martian night clamped down with frigid breath, and the stars danced out in the near-black sky, twinkling, dazzling stars that jigged a weird rigadoon in space.

Despite five years in the wilderness stretches of the Red Planet, Kent Clark

still was fascinated by this sudden change from day to night. One minute sunlight—next minute starlight, the stars blazing out as if they were electric lights and someone had snapped the switch. Stars that were larger and more brilliant and gave more light than the stars seen from the planet Earth. Stars that seemed to swim in the swiftly cooling atmosphere. By midnight the atmosphere would be cooled to almost its minimum temperature, and then the stars would grow still and even more brilliant, like hard diamonds shining in the blackness of the sky, but they would be picturesque, showing their own natural colors, blue and white and red.

Outside the tiny quartz "igloo" the night wind keened among the pinnacles and buttresses and wind-eroded formations of the canal. On the wings of the wind, almost indistinguishable from the wind's own moaning, came the mournful howling of the Hounds, the great gaunt, shaggy beasts that haunted the deep canals and preyed on all living things except the Eaters.

Charley Wallace, squatting on the floor of the igloo, was scraping the last trace of flesh from the pelt of a Martian beaver. Kent watched the deft twist of his wrist, the flashing of the knife blade in the single tiny radium bulb which illuminated the igloo's interior.

Charley was an old-timer. Long ago the sudden goings and comings of Martian daylight and night had ceased to hold definite wonder for him. For twenty Martian years he had followed the trail of the Martian beaver, going farther and farther afield, penetrating deeper and deeper into the mazes of the even farther canals that spread like a network over the face of the planet.

His face was like old leather, wrinkled and brown above the white sweep of his long white beard. His body was pure steel and whang-hide. He knew all the turns and tricks, all the trails and paths. He was one of the old-time canal-men.

The heater grids glowed redly, utilizing the power stored in the seleno cells during the hours of daylight by the great sun-mirrors set outside the igloo. The atmosphere condensers chuckled softly. The electrolysis plant, used for the manufacture of water, squatted in its corner, silent now.

Charley carefully laid the pelt across his knees, stroked the deep brown fur with a wrinkled hand.

"Six of 'em," he said. His old eyes, blue as the sheen of ice, sparkled as he looked at Kent. "We'll make a haul this time, boy," he said. "Best huntin' I've seen in five years or more."

Kent nodded. "Sure will," he agreed.

The hunting had been good. Out only a month now and they had six pelts, more than many trappers and hunters were able to get during an entire year. The pelts would bring a thousand apiece —perhaps more—back at the Red Rock trading post. Most valuable fur in the entire Solar System, they would sell at three times that amount back in the London or New York fur marts. A wrap of them would cost a cool one hundred thousand.

Deep, rich, heavy fur. Kent shivered as he thought about it. The fur *had* to be heavy. Otherwise the beaver would never be able to exist. At night, the temperature plunged to 40 and 50 below, Centigrade, seldom reached above 20 below at high noon. Mars was cold! Here on the equator the temperature varied little, unlike the poles, where it might rise to 20 above during the summer when, for ten long months, the Sun never set, dropped to 100 or more below in the winter, when the Sun was unseen for equally as long.

HE LEANED back in his chair and gazed out through the quartz walls of the igloo. Far down the slope of the canal wall he saw the flickering lights of the Ghosts, those tenuous, wraith-like forms whose origin, true nature, and

purpose were still the bone of bitter scientific contention.

The starlight threw strange lights and shadows on the twisted terrain of the canal. The naturally weird surface formations became a nightmare of strange, awe-impelling shapes, like pages snatched from the portfolio of a mad artist.

A black shape crossed a lighted ravine, slunk into the shadows.

"A Hound," said Kent.

Charley cursed in his whiskers.

"If them lopers keep hangin' around," he prophesied savagely, "we'll have some of their pelts to take out to Red Rock."

"They're mighty gun-shy," declared Kent. "Can't get near one of them."

"Yeah," said Charley, "but just try goin' out without a gun and see what happens. 'Most as bad as the Eaters. Only difference is that the Hounds would just as soon eat a man, an' the Eaters would rather eat a man. They sure hanker after human flesh."

Another of the black shapes, slinking low, belly close to the ground, crossed the ravine.

"Another one," said Kent.

Something else was moving in the ravine, a figure that glinted in the starlight.

Kent leaned forward, choking back a cry. Then he was on his feet.

"A man," he shouted. "There's a man out there!"

Charley's chair overturned as he leaped up and stared through the quartz.

The space-armored figure was toiling up the slope that lead to the igloo. In one hand the man carried a short blast rifle, and as they watched, the two trappers saw him halt and wheel about, the rifle leveled, ready for action, to stare back at the shadows into which the two Hounds had disappeared only a moment before.

A slight movement to the left and behind the man outside caught Kent's eye and spurred him into action.

He leaped across the igloo and jerked from its rack his quartz-treated space suit, started clambering into it.

"What's the trouble?" demanded Charley. "What the hell you doin'?"

"There's an Eater out there," shouted Kent. "I saw it just a minute ago."

He snapped down the helmet and reached for his rifle as Charley spun open the inner air-lock port. Swiftly Kent leaped through, heard the inner port being screwed shut as he swung open the outer door.

Cold bit through the suit and into his very bones as he stepped out into the Martian night. With a swift flip he turned on the chemical heat units and felt a glow of warmth sweep over him.

The man in the ravine below was trudging up the path toward the igloo.

Kent shouted at him.

"Come on. Fast as you can."

The man halted at the shout, stared upward.

"Come on!" screamed Kent.

The spacesuit moved forward.

Kent, racing down the ravine, saw the silica-armored brute that lurched out of the shadows and sped toward the unsuspecting visitor.

KENT'S RIFLE came to his shoulder. The sights lined on the ugly head of the Eater. His finger depressed the firing mechanism and the gun spat a tight column of destructive blue fire. The blast crumpled the Eater in midleap, flung him off his stride and to one side. But it did not kill him. His unlovely body, gleaming like a reddish mirror in the starlight, clawed upon its feet, stood swinging the gigantic head from side to side.

A shrill scream sounded in Kent's helmet phones, but he was too busy getting the sights of the weapon lined on the Eater again to pay it any attention.

Again the rifle spat and purred, the blue blast-flame impinging squarely on the silica-armored head. Bright sparks

flew from the beast's head and then suddenly the head seemed to dissolve, melting down into a gob of blackened matter that glowed redly in places. The Eater slowly toppled sidewise and skidded ponderously down the slope to come to rest against a crimson boulder.

Kent signaled to the visitor.

"Come on," he shouted. "Quick about it! There may be more!"

Swiftly the man in the space suit came up the slope toward Kent.

"Thanks," he said as he drew abreast of the trapper.

"Get going, fellow," said Kent tersely. "It isn't safe to be out here at night."

He fell in behind the visitor as they hurried toward the open port of the air lock.

The visitor lifted the helmet and laid it on the table and in the dim light of the radium bulb Kent saw the face of a woman.

He stood silent, staring. A visit by a man to their igloo in this out-of-the-way spot would have been unusual enough; that a woman should drop in on them seemed almost incredible.

"A woman," said Charley. "Dim my sights, it's a woman."

"Yes, I'm a woman," said the visitor, and her tone, while it held a hidden hint of culture, was sharp as a whip. It reminded one of the bite of the wind outside. Her eyebrows were naturally high arched, giving her an air of eternal question and now she fastened that questioning gaze on the old trapper.

"You are Charley Wallace, aren't you?" she asked.

Charley shifted from one foot to another, uncomfortable under that level stare. "That's me," he admitted, "but you have the advantage of me, ma'am."

She hesitated, as if uncertain what he meant and then she laughed, a laugh that seemed to come from deep in her throat, full and musical. "I'm Ann Smith," she said.

She watched them, eyes flickering from one to the other, but in them she saw no faintest hint of recognition, no start of surprise at the name.

"They told me at Red Rock I'd find you somewhere in Skeleton Canal," she explained.

"You was a-lookin' for us?" asked Charley.

She nodded. "They told me you knew every foot of this country."

Charley squared his shoulders, pawed at his beard. His eyes gleamed brightly. Here was talk he understood. "I know it as well as anyone," he admitted.

She wriggled her shoulders free of the spacesuit, let it slide, crumpling to the floor, and stepped out of it. Kent stored his own suit on the rack and, picking the girl's suit off the floor, placed it beside his own.

"Yes ma'm," said Charley, "I've roamed these canals for over twenty Martian years and I know 'em as good as most. I wouldn't be afraid of gettin' lost."

Kent studied their visitor. She was dressed in trim sports attire, faultless in fashion, hinting of expensive shops. Her light brown, almost blond hair, was smartly coifed.

"But why were you lookin' for us?" asked Charley.

"I was hoping you would do something for me," she told him.

"Now," Charley replied, "I'd be glad to do something for you. Anything I can do."

Kent, watching her face, thought he saw a flicker of anxiety flit across her features. But she did not hesitate. There was no faltering of words as she spoke.

"You know the way to Mad-Man's Canal?"

IF SHE HAD slapped Charley across the face with her gloved hand the expression on his face could not have been more awe-struck and dumfounded.

He started to speak, stuttered, was silent.

"You can't mean," said Kent, softly, "that you want us to go into Mad-Man's Canal."

She whirled on him and it was as if he were an enemy. Her defenses were up. "That's exactly what I mean," she said and again there was that wind-like lash in her voice. "But I don't want you to go alone. I'll go with you."

She walked slowly to one of the two chairs in the igloo, dropped into it, crossed her knees, swung one booted foot impatiently.

In the silence Kent could hear the chuckling of the atmosphere condensers, the faint sputter of the heating grids.

"Ma'm," said Charley, "you sure must be jokin'. You don't really mean you want to go into Mad-Man's?"

She faced him with a level stare. "But I do," she declared. "I never was more serious in my life. There's someone there I have to see."

"Lady," protested the old trapper, "someone's been spooffin' you. There ain't nobody over in Mad-Man's. You couldn't find a canal-man, in his right mind, who'd go near the place."

"There is," she told him. "And probably you'll laugh at this, too, but I happen to know it to be the truth. The man I want to see is Harry, the Hermit."

Kent guffawed, softly, little more than a chuckle under his breath. But she heard and came up out of the chair.

"You're laughing," she said and the words were an accusation.

"Sit down," said Kent, "and let me tell you something. Something that no canal-man could admit, but something that every one of them know is the truth."

Slowly she sat down in the chair. Kent sat easily on the edge of the table.

"There isn't any such a person as Harry, the Hermit," he said. "It's just a myth. Just one of those stories that have grown up among the canal-men. Wild tales that they think up when they sit alone in the desolation of the Martian wilderness. Just figments of imagination they concoct to pass away the time. And then, when they go out with their furs, they tell these stories over the drinks at the trading posts and those they tell them to, tell them to the others —and so the tale is started. It goes from mouth to mouth. It gains strength as it goes, and each man improves upon it just a little, until in a year or two it is a full-blown legend. Something that the canal-men almost believe themselves, but know all the time is just a wild canal-tale."

"But I know," protested Ann. "I know there is such a man. I have to see him. I know he lives in Mad-Man's Canal."

"Listen," snapped Kent and the quiet casualness was gone from his words. "Harry, the Hermit, is everywhere. Go a few hundred miles from here and men will tell you he lives here in Skeleton Canal. Or he is down in the Big Eater system or he's up north in the Icy Hills. He is just an imaginary person, I tell you. Like the Paul Bunyan of the old lumberjacks back on Earth. Like Pecos Pete of the old American southwest. Like the fairies of the old Irish stories. Some trapper thought him up one lonely night and another trapper improved on him and a fellow dealing a stud poker hand in some little town improved a little more until today he is almost a real personage. Maybe he is real—real as a symbol of a certain group of men—but for all practical purposes, he is just a story, a fabrication of imagination."

THE GIRL, he saw, was angry. She reached into the pocket of her jacket and pulled out a flat case. Her hands trembled as she opened it and took out a cigarette. She closed the case and tapped the cigarette against her thumbnail. A

pencil of metal, pulled from the case, flared into flame.

She thrust the white cylinder between her lips and Kent reached down and took it away.

"Not here," he said and smiled.

She flared at him. "Why not?" she asked.

"Atmosphere," he said. "Neither Charley nor I smoke. Can't afford to. The condensers are small. We don't have too much current to run them. Two persons is the capacity of this igloo. Everything has to be figured down to scratch in this business. We need all the air we get, without fouling it with tobacco smoke." He handed her the cigarette.

In silence she put it back in the case, returned the case to her pocket. "Sorry," she said. "I didn't know."

"Sorry I had to stop you," Kent told her.

She rose. "Perhaps I had better go," she said.

Charley's jaw went slack. "Go where?" he asked.

"My canal car," she said. "I left it about a mile from here. Went past your place before I saw the light."

"But you can't spend the night in a car," protested Kent. "I'm afraid you'll have to stay here."

"Sure," urged Charley, "we can't let you go. Sleeping in a car is no picnic."

"We're harmless," Kent assured her.

She flushed. "I wasn't thinking of that," she said. "But you said two persons was the capacity of the igloo."

"It is," Kent agreed, "but we can manage. We'll cut down the heater current a little and step up the condensors. It may get a little chilly, but we can manage with air."

He turned to Charley. "How about a pot of coffee," he suggested.

Charley grinned, waggled his chin whiskers like a frolicsome billy goat. "I was just thinkin' about that myself," he said.

ANN SET down the coffee cup and looked at them. "You see," she explained, "it's not just something I want to do myself. Not just some foolish whim of mine. It's something I've got to do. Something that may help someone else—someone who is very dear to me. I won't be able to sleep or eat or live, if I fail at least to try. You have to understand that I simply must go to Mad-Man's Canal and try to find Harry, the Hermit."

"But there ain't no Harry, the Hermit," protested Charley. He wiped the coffee off his beard and sighed. "Goodness knows, I wished there was, since you're so set on findin' him."

"But even if there isn't," said Ann, "I'd at least have to go and look. I couldn't go through life wondering if you might have been mistaken. Wondering if I should have given up so easily. If I go and try to find him and fail—why, then I've done everything I can, everything I could have expected myself to do. But if I don't I'll always wonder . . . there'll always be that doubt to torment me."

She looked from one face to the other.

"You surely understand," she pleaded.

Charley regarded her steadily, his blue eyes shining. "This thing kind of means a lot to you, don't it?" he said.

She nodded.

Kent's voice broke the spell. "You don't know what you're doing," he said. "You flew down from Landing City to Red Rock in a nice comfortable rocket ship, and now because you covered the hundred miles between here and Red Rock in a canal car, you think you're an old-timer."

He stared back at her hurt eyes.

"Well, you aren't," he declared.

"Now, lad," said Charley, "you needn't get so rough."

"Rough!" said Kent. "I'm not getting rough. I'm just telling her a few of the things she has to know. She

came across the desert in the car and everything went swell. Now she thinks it's just as easy to travel the canals."

"No, I don't," she flared at him, but he went on mercilessly.

"The canal country is dangerous. There's all sorts of chances for crack-ups. There are all sorts of dangers. Every discomfort you can imagine. Crack your car against a boulder—and you peel off the quartz. Then the ozone gets in its work. It eats through the metal. Put a crack in your suit and the same thing happens. This atmosphere is poisonous to metal. So full of ozone that if you breathe much of it it starts to work on your lung tissues. Not so much danger of that up on the plateaus, where the air is thinner, but down here where there's more air, there's more ozone and it works just that much faster."

She tried to stop him, but he waved her into silence and went on:

"There are the Eaters. Hundreds of them. All with an insane appetite for human bones. They love the phosphate. Everyone of them figuring how to get through a car or a spacesuit and at the food inside. You've never seen more than a couple of Eaters together at a time. But Charley and I have seen them by the thousands—great herds of them on their periodic migrations up and down the canyons. They've kept us penned in our igloo for days while they milled around outside, trying to reach us. And the Hounds, too, although they aren't so dangerous. And in the deeper places you find swarms of Ghosts. Funny things, the Ghosts. No physical harm from them. Maybe they don't even exist. Nobody knows what they are. But they are apt to drive you mad. Just looking at them, knowing they are watching all the time."

Impressive silence fell.

Charley wagged his beard.

"No place for a woman," he declared. "The canal ain't."

"I don't care," said Ann. "You're trying to frighten me, and I won't be frightened. I have to go to Mad-Man's Canal."

"Listen, lady," said Charley, "pick any other place—any other place at all—and I will take you there. But don't ask me to go into Mad-Man's."

"Why not?" she cried. "Why are you so afraid of Mad-Man's?"

She tried to find the answer in their faces but there was none.

Charley spoke slowly, apparently trying to choose his words with care. "Because," he said. "Mad-Man's is the deepest canal in this whole country. Far as I know, no man has ever been to the bottom of it and come out alive. Some have gone down part way and came back—mad and frothin' at the mouth, their eyes all glazed, babblin' crazy things. That's why they call it Mad-Man's."

"Now listen to me," said Ann. "I came all this way and I'm not turning back. If you won't take me, I'll go alone. I'll make it somehow—only you could make it so much easier for me. You know all the trails. You could get me there quicker. I'm prepared to pay you for it—pay you well."

"Lady," said Charley slowly, "we ain't guides. You couldn't give us money enough to make us go where we didn't want to go."

She pounded one small clenched fist on the table. "But I want to pay you," she said. "I'll insist on it."

Charley made a motion of his hand, as if sweeping away her words. "Not one cent," he said. "You can't buy our services. But we might do it anyhow. Just because I like your spunk."

She gasped. "You would?" she asked.

Neither one of them replied.

"Just take me to Mad-Man's," she pleaded. "I won't ask you to take me down into the canal. Just point out the best way and then wait for me. I'll

The maddened Eaters were driven on, over the edge, by the mass of the charging herd behind.

make it myself. All I want to know is how to get there."

Charley lifted the coffee pot, filled the cups again.

"Ma'm," he said, "I reckon we can go where you can go. I reckon we ain't allowin' you to go down into Mad-Man's all by yourself."

DAWN ROARED over the canal rim and flooded the land with sudden light and life. The blanket plants unfolded their broad furry leaves, spreading them in the sunshine. The traveler plants, lightly anchored to boulders and outcroppings, scurried frantically for places in the Sun. The canal suddenly became a mad flurry of plant life as the travelers, true plants but forced by environment to acquire the power of locomotion, quit the eastern wall, where they had traveled during the preceding day to keep pace with the sunlight, and rushed pell-mell for the western slope.

Kent tumbled out of the canal-car, rifle gripped in his hand. He blinked at the pale Sun that hung over the canal rim. His eyes swept the castellated horizon that closed in about them, took in the old familiar terrain typical of the Martian canals.

The canal was red—blood red shading to softest pink with the purple of early-morning shadow still hugging the eastern rim. A riot of red—the rusted bones of a dead planet. Tons of oxygen locked in those ramparts of bright red stone. Oxygen enough to make Mars livable—but locked forever in red oxide of iron.

Chimney and dome formations rose in tangled confusion with weathered pyramids and slender needles. A wild scene. Wild and lonesome and forbidding.

Kent swept the western horizon with his eyes. It was thirty miles or more to the rim, but in the thin atmosphere he could see with almost telescopic clearness the details of the scarp where the plateau broke and the land swung down in wild gyrations, frozen in red rock, to the floor of the canal where he stood.

Under the eastern rim, where the purple shadows still clung, flickered the watch-fires of the Ghosts, dim shapes from that distance. He shook his fist at them. Damn the Ghosts!

The slinking form of a Hound skulked down a ravine and disappeared. A beaver scuttled along a winding trail and popped into a burrow.

Slowly the night cold was rising from the land, dissipated by the rising sun. The temperature would rise now until mid-afternoon, when it would stand at 15 or 20 below zero, Centigrade.

From a tangled confusion of red boulders leaped a silica-armored Eater. Like an avenging rocket he bore down on Kent. Almost wearily the trapper lifted his rifle, blasted the Eater with one fierce burst of blue energy.

Kent cursed under his breath.

"Can't waste power," he muttered. "Energy almost gone."

He tucked the rifle under his arm and glared at the tumbled Eater. The huge beast, falling in mid-leap, had plowed a deep furrow in the hard red soil.

Kent walked around the bulk of the car, stood looking at the uptilted second car that lay wedged between the huge boulders.

Charley climbed out through the open air lock and walked toward his partner. Inside his helmet he shook his head. "No good," he said. "She'll never run again."

Kent said nothing and Charley went on: "Whole side staved in. All of the quartz knocked off. Ozone's already got in its work. Plates softening."

"I suppose the mechanism is shot, too," said Kent.

"All shot to hell," said Charley.

They stood side by side, staring mournfully at the shattered machine.

"She was a good car, too," Charley pronounced, sadly.

"This," declared Kent, "is what comes of escorting a crazy dame all over the country."

Charley dismissed the matter. "I'm going to walk down the canal a ways. See what the going is like from here on," he told Kent.

"Be careful," the younger man warned him. "There's Eaters around. I just shot one."

THE OLD MAN moved rapidly down the canal floor, picking his way between the scattered boulders and jagged outcroppings. In a moment he was out of sight. Kent walked around the corner of the undamaged car, saw Ann Smith just as she stepped from the air lock.

"Good morning," she said.

He did not return the greeting. "Our car is a wreck," he said. "We'll have to use yours from here on. It'll be a little cramped."

"A wreck?" she asked.

"Sure," he said. "That crash last night. When the bank caved under the treads, it smashed the quartz, let the ozone at the plates."

She frowned. "I'm sorry about that," she said. "Of course, it's my fault. You wouldn't be here if it weren't for me."

Kent was merciless. "I hope," he sighed, "that this proves to you travel in the canals is no pleasure jaunt."

She looked about them, shivered at the desolation.

"The Ghosts are the worst," she said. "Watching, always watching—"

Before them, not more than a hundred feet away, one of the Ghosts appeared, apparently writhing up out of a pile of jumbled rocks. It twisted and reared upward, tenuous, unguessable, now one shape, now another. For a moment it seemed to be a benign old grandfather, with long sweeping beard, and then it turned into something that was utterly and unnamably obscene and then, as suddenly as it had come, it disappeared.

Ann shuddered. "Always watching," she said again. "Waiting around corners. Ready to rise up and mock you."

"They get on your nerves," Kent agreed, "but there's no reason to be afraid of them. They couldn't touch you. They may be nothing more than mirages—figments of the imagination, like your Harry, the Hermit."

She swung about to face him. "How far are we from Mad-Man's?" she demanded.

Kent shrugged his shoulders. "I don't know," he said. "Maybe a few miles, maybe a hundred. We should be near, though."

From down the canal came Charley's halloo. "Mad-Man's," he shouted back to them. Mad-Man's! Come and look at it!"

Mad-Man's canal was a continuation of the canal the three had been traveling—but it was utterly different.

Suddenly the canal floor broke, dipped down sharply and plummeted into a deep blue pit of shadows. For miles the great depression extended, and on all sides the ground sloped steeply into the seemingly bottomless depths of the canyon.

"What is it, Charley?" asked Kent and Charley waggled his beard behind the space-helmet.

"Can't say, lad," he declared, "but it sure is an awe-inspirin' sight. For twenty Martian years I've tramped these canals and I never seen the like of it."

"A volcanic crater," suggested Ann.

"Maybe," agreed Charley, "but it don't look exactly like that either. Something happened here, though. Floor fell out of the bottom of the canal or somethin'."

"You can't see the bottom," said Ann. "Looks like a blue haze down there. Not exactly like shadows. More like fog or water."

"Ain't water," declared Charley. "You can bet your bottom dollar on that.

If anyone ever found that much water on Mars they'd stake out a claim and make a fortune."

"Did you ever know anyone who tried to go down there, Charley?" asked Kent. "Ever talk to anyone who tried it?"

"No, lad, I never did. But I heard tell of some who tried. And they never were the same again. Somethin' happened to them down there. Somethin' that turned their minds."

KENT FELT icy fingers on his spine. He stared down into the deep blue of Mad-Man's and strained his eyeballs trying to pierce the veil that hid the bottom. But that was useless. If one wanted to find out what was down there, he'd have to travel down those steeply sloping walls, would have to take his courage in hand and essay what other men had tried and gone crazy for their pains.

"We can't use the car," he said suddenly and was surprised at his words.

Kent walked backward from the edge of the pit. What was happening to them? Why this calm acceptance of the fact they were going to go down into Mad-Man's? They didn't have to go. It wasn't too late yet to turn around and travel back the way they came. With only one car now, and many miles to travel, they would have to take it slow and easy, but they could make it. It was the sensible thing to do, held none of the rash foolhardiness involved in a descent into those blue depths before them.

He heard Charley's words, as if from a great distance.

"Sure, we'll have to walk. But we ought to be able to make it. Maybe we'll find air down there, air dense enough to breathe and not plumb full of ozone. Maybe there'll be some water, too."

"Charley," Kent shouted, "you don't know what you're saying. We can't—"

He stopped in mid-sentence and listened. Even as he talked, he had heard that first weird note from up the canal, a sound that he had heard many times before, the far-away rumble of running hoofs, the grating clash of stonelike body on stonelike body.

"The Eaters!" he shouted. "The Eaters are migrating."

He glanced swiftly about him. There was no way of escape. The walls of the canal had narrowed and closed in, rising sheer from the floor on either side of them, only a few miles away. There was no point of vantage where they could make a stand and hold off the horde that was thundering toward them. And even if there were, they had but little power left for their guns. In the long trek down the canal they had been forced to shoot time after time to protect their lives, and their energy supply for the weapons was running low.

"Let's get back to the car!" screamed Ann. She started to run. Kent sprinted after her, grabbed her and pulled her around.

"We'd never make it," he yelled at her. "Hear those hoofs! They're stampeding! They'll be here in a minute!"

Charley was yelling at them, pointing down into Mad-Man's. Kent nodded, agreeing. It was the only way to go. The only way left open for them. There was no place to hide, no place to stand and fight. Flight was the only answer—and flight took them straight into the jaws of Mad-Man's Canal.

Charley bellowed at them, his bright blue eyes gleaming with excitement. "Maybe we got a chance. If we can reach the shadows."

They plunged down, going at a run, fighting to keep their balance. Soft, crumbly rock shifted and broke under the impact of their steel-shod feet. A shower of rubble accompanied them, chuckling and clinking down the slope. The sun blinked out and they plunged into the deep shadows, fought to reduce

their speed, slowed to a walk.

Kent looked back. Above him, on the level of the canal floor, he saw a fighting mass of Eaters, indescribable confusion there on the rim of the skyline, as the great silica-armored beasts fought against plunging into Mad-Man's. Those in front were rearing, shoving, striking savagely, battling against being shoved over the edge as those behind plowed into them. Some of them had toppled onto the slope, were sliding and clawing, striving to regain their feet. Others were doggedly crawling back up the slope.

The three below watched the struggle above them.

"Even them cussed Eaters are afraid to go into Mad-Man's," said Charley.

THEY WERE surrounded by Ghosts. Hundreds of them, wavering and floating, appearing and disappearing. In the blue shadows of the sunken world they seemed like wind-blown flames that rocked back and forth, flickering, glimmering, guttering. Assuming all kinds of forms, forms beautiful in their intricacy of design, forms angularly flat and ugly, gruesome and obscene and terrible.

And always there was that terrible sense of watching—of ghostly eyes watching and waiting—of hidden laughter and ghoulish design.

"Damn them," said Kent. He stubbed his toe and stumbled, righted himself.

"Damn them," he said again.

The air had become denser, with little ozone now. Half an hour before they had shut off their oxygen supply and snapped open the visors of their helmets. Still thin, pitiful thin by Earthly standards, the air was breathable and they needed to save what little oxygen might remain within their tanks.

Ann stumbled and fell against Kent. He steadied her until she regained her feet. He saw her shiver.

"If they only wouldn't watch us," she whispered to him. "They'll drive me mad. Watching us—no indication of friendliness or unfriendliness, no emotion at all. Just watching. If only they would go away—do something even!" Her whisper broke on a hysterical note.

Kent didn't answer. What was there to say? He felt a savage wave of anger at the Ghosts. If a man could only do something about them. You could shoot and kill the Eaters and the Hounds. But guns and hands meant nothing to these ghostly forms, these dancing, flickering things that seemed to have no being.

Charley, plodding ahead down the slope, suddenly stopped.

"There's something just ahead," he said. "I saw it move."

Kent moved up beside him and held his rifle ready. They stared into the blue shadows. "What did it look like?" Kent asked.

"Can't say, lad," Charley told him. "Just got a glimpse of it."

They waited. A rock loosened below them and they could hear it clatter down the slope.

"Funny lookin' jigger," Charley said.

Something was coming up the slope toward them, something that made a slithering sound as it came, and to their nostrils came a faint odor, a suggestion of a stench that made the hair crawl on the back of Kent's neck.

The thing emerged from the gloom ahead and froze the three with horror as it came. A thing that was infinitely more horrible in form than any reptilian monster that had ever crawled through the primal ooze of the new-spawned Earth, a thing that seem to personify all the hate and evil that had ever, through long milleniums, lived and found its being on the aged planet Mars. A grisly death-head leered at them and drooling jaws opened, displaying fangs that dripped with loathsomeness.

Kent brought his rifle up as Ann's shriek rang in his ears, but Charley

reached out and wrenched the weapon from his hand.

His voice came, cool and calm.

"It's no time to be shootin', lad," he said. "There's another one over there, just to our right and I think I see a couple more out just beyond."

"Give me that gun!" yelled Kent, but as he lunged to jerk it from Charley's grasp he saw, out of the tail of his eye, a dozen more of the things squatting just within the shadows.

"We better not rile them, son," said Charley softly. "They're a hell's brood and that's for sure."

He handed the rifle back to Kent and started backing up the slope, slow step by slow step.

TOGETHER the three of them backed slowly away, guns held at ready. In front of them, between them and the squatting monstrosities, a single Ghost suddenly materialized. A Ghost that did not waver but held straight and true, like a candle flame burning in the stillness of the night. Another Ghost appeared beside the first, and suddenly there were several more. The Ghosts floated slowly down the slope toward the death-head things, and as they moved they took on a deeper color, more substantiality, until they burned a deep and steady blue, solid columns of flame against the lighter blue of the eternal shadow.

Staring, scarcely believing, the three saw the gaping ghouls that had crept up the slope, turn and shuffle swiftly back, back into the mystery of the lower reaches of Mad-Man's.

Kent laughed nervously. "Saved by a Ghost," he said.

"Why, maybe they aren't so bad after all," said Ann and her voice was scarcely more than a whisper. "I wonder why they did it."

"And how they did it," said Kent.

"Principally," said Charley, "why they did it. I never heard of any Ghost ever takin' any interest in a man, and I have trod these canals for twenty Martian years."

Kent expelled his breath. "And now," he said, "for Lord's sake, let's turn back. We won't find any hermit here. No man could live out a week here unless he had some specially trained Ghosts to guard him all the time. There isn't any use of going on and asking for trouble."

Charley looked at Ann. "It's your expedition, ma'am," he said.

She looked from one to the other and there was fear upon her face.

"I guess you're right," she said. "No one could live here. We won't find anyone here. I guess it must just have been a myth, after all." Her shoulders seemed to sag.

"We'll go on if you say the word," said Charley.

"Hell, yes," declared Kent, "but we're crazy to do it. I understand now why men came out of here stark crazy. A few more things like these we just seen and I'll be nuts myself."

"Look!" cried Ann. "Look at the Ghosts. They are trying to tell us something!"

It was true. The Ghosts, still flaming with their deep-blue color, had formed into a semicircle before them. One of them floated forward. His color flowed and changed until he took on a human form. His right hand pointed at them and then waved down the slope. They stared incredulously as the motion was repeated.

"Why," said Ann, "I do believe he's trying to tell us to go on."

"Dim my sight," shrieked Charley, "if that ain't what the critter is tryin' to tell us."

The other Ghosts spread out, encircled the three. The one with the manlike form floated down the slope, beckoning The others closed in, as if to urge them forward.

"I guess," said Kent, "we go whether we want to or not."

Guarded by the circle of Ghosts they went down the slope. From outside the circle came strange and terrible noises, yammerings and hissings and other sounds that hinted at shambling obscenities, strange and terrible life forms which lived and fought and died here in the lower reaches of Mad-Man's.

The shadows deepened almost to darkness. The air became denser. The temperature rose swiftly.

They seemed to be walking on level ground.

"Maybe we've reached the bottom," suggested Kent.

The circle of Ghosts parted, spread out and the three stood by themselves. A wall of rock rose abruptly before them, and from a cave in its side streamed light, light originating in a half-dozen radium bulbs. A short distance to one side squatted a shadowy shape.

"A rocket ship!" exclaimed Kent.

The figure of a man, outlined against the light, appeared in the mouth of the cave.

"The hermit," cried Charley. "Harry, the Hermit. Blast my hindsight, if it ain't old Harry, himself."

Kent heard the girl's voice, beside him. "I was right! I was right! I knew he had to be here somewhere!"

THE MAN walked toward them. He was a huge man, his shoulders square and his face was fringed in a golden-yellow beard. His jovial voice thundered a welcome to them.

At the sound of that voice Ann cried out, a cry that was half gladness, half disbelief. She took a slow step forward and then suddenly she was running toward the hermit.

She flung herself at him. "Uncle Howard!" she cried. "Uncle Howard!"

He flung his brawny arms around the space-armored girl, lifted her off the ground and set her down.

Ann turned to them. "This is my uncle, Howard Carter," she said. "You've heard of him. His best friends call him Mad-Man Carter, because of the things he does. But you aren't mad, really, are you, uncle?"

"Just at times," Carter boomed.

"He's always going off on expeditions," said the girl. "Always turning up in unexpected places. But he's a scientist for all of that, a really good scientist."

"I've heard of you, Dr. Carter," said Kent. "I'm glad to find you down here."

"You might have found worse," said Carter.

"Dim my sights," said Charley. "A human being living at the bottom of Mad-Man's!"

"Come on in," invited Carter. "I'll have you a cup of hot coffee in a minute."

Kent stretched out his legs, glad to get out of his spacesuit. He glanced around the room. It was huge and appeared to be a large cave chamber. Perhaps the cliffs that rimmed in Mad-Man's were honeycombed with caves and labyrinths, an ideal place in which to set up camp.

But this was something more than a camp. The room was well furnished, but its furnishings were a mad hodge-podge. Tables and chairs and heating grids, laboratory equipment and queer-appearing machines. One machine, standing in one corner, kept up an incessant chattering and clucking. In another corner, a mighty ball hung suspended in mid-air, halfway between the ceiling and the floor, and within it glowed a blaze of incandescence which it was impossible to gaze directly upon. Piled haphazard about the room were bales and boxes of supplies.

Kent waved his hand at a pile of boxes. "Looks like you're planning on staying here for a while, Dr. Carter," he said.

The man with the fearsome yellow beard lifted a coffee pot off the stove and chuckled. His chuckle thundered in the room. "I may have to stay quite a while longer," he said, "although I doubt it. My work here is just about done." He poured steaming coffee into the cups. "Draw up your chairs," he invited.

He took his place at the end of the small table. "I imagine you are hungry," he said. "It's tiring work coming down into Mad-Man's. Almost five miles."

Charley lifted his cup to his mouth, drank deeply, wiped his whiskers carefully. "It's quite a little walk, I'll admit," he said. "For twenty Martian years I've trapped the canals and I never saw the like of it. What made it, Doc?"

Dr. Carter looked puzzled. "Oh," he said, "you mean what made Mad-Man's."

Charley nodded.

"I really don't know," said Carter. "I've been too busy on other things since I came here to try to find out. It's a unique depression in the surface of the planet, but as to why or how it came to be, I don't know. Although I could find out for you in a minute if you want to know. Funny I never thought of finding out for myself."

HE GLANCED around the table and his eyes came to rest on Ann. "But there's something I do want to know," he said, "and that is how this precious niece of mine ferreted me out."

"But, Uncle Howard," protested Ann, "I didn't ferret you out. I wasn't looking for you at all. I didn't even know you were anywhere around. I thought you were off on one of your crazy expeditions again."

Charley choked on a mouthful of food. "What's that?" he asked. "You weren't hunting for him?" He jerked his thumb at Dr. Carter.

Ann shook her head. "No," she said. "I was looking for Harry, the Hermit."

"Cripes," exploded Charley, "I thought we had found him. I thought your uncle here was the hermit. I thought you knew all along."

Dr. Howard Carter's fork clattered on his plate. "Now wait a minute," he roared. "What's all this talk about hermits?"

He eyed Ann sternly. "You didn't tell these men I was a hermit, did you."

"Hell," said Kent, "let's just admit there's no such a person as Harry, the Hermit. He's just a myth. I've told you so all along."

Ann explained. "It was this way. I was looking for Harry, the Hermit. Jim Bradley, the famous explorer, told me that if Harry, the Hermit, really existed, Mad-Man's was the place to look for him. He said Mad-Man's was the only place where a man could live for any length of time in any comfort. And he said he had reason to believe someone was living in Mad-Man's. So I started out to look."

"But," demanded her uncle, "why did you want to find this hermit? Just curiosity?"

Ann shook her head. "No, not curiosity," she said. "You see, uncle, it's dad. He's got into trouble again—"

"Trouble," snapped Carter. "Some more of his fool experiments, I suppose. What is it this time? Perpetual motion?"

"Not perpetual motion," said the girl. "This time he was successful. Too successful. He built a machine that had something to do with space-time, with the interdimensions. He tried to travel to another dimension. That was a month ago."

"And he isn't back yet," suggested Carter.

The girl glanced at him. "How did you know?" she demanded.

"Because I warned him that is what

would happen if he went monkeying around with extra-dimensions."

"But what had the hermit to do with all this?" asked Kent.

"Bradley told me he thought that the Hermit really was Prof. Belmont. You know, the great physicist. He disappeared a couple of years ago and never has been heard of since. Bradley thought he might be down here, conducting some sort of experiments. That might have given rise to the hermit legend."

Charley chuckled. "I heard stories about Harry, the Hermit, ten years ago," he said. "I judge, ma'am, from what you say, that they're just getting out to civilization. Nobody gave rise to those stories, they just grew."

Carter had shoved his plate to one side. Now he leaned forward, resting his arms on the tabletop. "Belmont did come here," he said. "But he's dead. The things out there killed him."

"Killed him!" Ann's face suddenly was white. "Are you sure of that?"

Carter nodded.

"He was the only man who could have helped dad," the girl said tensely. "He was the only man who could have understood—"

"The Ghosts told me," said Carter. "There's no mistake. Belmont is dead."

Charley set down his coffee cup and stared at Carter. "You been talkin' with them Ghosts, mister?" he asked.

Carter nodded.

"Dim my sights," said Charley. "Who'd 've thought them things could talk."

But Carter paid no attention. "Ann," he said, "maybe I can do something for you. Perhaps not myself. But the Ghosts can."

"The Ghosts?" asked Ann.

"Certainly, the Ghosts. What would anyone come here to study if not the Ghosts? There are thousands of them in Mad-Man's. That's what Belmont came here to do. When he didn't come back, and no one was able to locate him, I came out here secretly. I thought maybe he found something he didn't want the rest of the world to know, so I didn't leave any tracks for anyone else to follow."

"But how could the Ghosts help anyone?" asked Kent. "Apparently they are an entirely different order of being. They would have nothing in common with mankind. No sympathies."

CARTER'S beard jutted fiercely. "The Ghosts," he said, "are beings of force. Instead of protoplasm, they are constructed of definite force fields. They live independently of everything which we know as essential to life. And yet they are life. And intelligent life, at that. They are the true, dominant beings of Mars. At one time they weren't as they are now. They are a product of evolution. The Eaters evolved by taking on silica armor. The Hounds and beaver met conditions by learning to do with little food and even less water, grew heavy fur to protect them against the cold. It's all a matter of evolution.

"The Ghosts could solve many of the problems of the human race, could make the race godlike overnight. That is—if they wanted to. But they don't want to. They have no capacity for pity, no yearning to become benefactors. They are just indifferent. They watch the pitiful struggle of the human race here on Mars, and if they feel anything at all, it is a smug sort of humor. They don't pity us or hate us. They just don't care."

"But you," said Ann, "you made friends with them."

"Not friends," said her uncle. "We just had an understanding, an agreement. The Ghosts lack a sense of cooperation and responsibility. They have no sense for leadership. They are true individualists, but they know that these very lacks have stood in the way of

progress. Their knowledge, great as it is, has lain dormant for thousands of years. They realize that under intelligent leadership they can go ahead and increase that knowledge, become a race of purely intellectual beings, the match of anything in the System, perhaps in the galaxy."

He paused for a moment, drummed his fingers on the table.

"I'm furnishing them that leadership," he declared.

"But what about dad?" asked Ann. "You and he never could get along, you hated one another, I know, but you can help him. You will help him, won't you?"

The scientist rose from the table, strode to the chattering, clucking machine at the other side of the room. "My communicator," he said. "A machine which enables me to talk with the Ghosts. Based on the radio, tuning in on the frequencies of the Ghosts' thought-waves. Through this machine comes every scrap of information which the Ghosts wish to relay to me. The thoughts were recorded on spools of fine wire. All I have to do to learn whatever has been transmitted over the machine is to put on a thought-translation helmet, run the spools of wire through it, and the thoughts impinge on my brain. I hear nothing, feel nothing—but I know. The thoughts of the Ghosts are impressed into my brain, become my thoughts."

Charley waggled his beard, excitement and wonder written on his features. "Then you know everything that's going on all over Mars," he said. "The Ghosts are everywhere, see everything."

"I know everything they think is important enough for me to know," Carter declared. "They can find out anything I might want to know."

"How do you talk to them?" asked Kent.

"Same process," said the scientist. "A helmet that broadcasts my thoughts to them."

He picked up a helmet and set it on his head. "I'm going to find out about your father," he told Ann.

"But he isn't in this space-time," objected Ann. "He's somewhere else."

Carter smiled. "The Ghosts know all about him," he said. "A few weeks ago they told me about a man lost outside of our space-time frame. It must have been your father. I didn't know."

He looked squarely at the girl. "Please believe me, Ann. If I had known who it was I would have done something."

The girl nodded, her eyes bright.

SILENCE fell upon the room. Finally Carter lifted the helmet from his head, set it back on the metal bench.

"Did you—did the Ghosts know anything about it?" asked the girl.

Her uncle nodded. "Ann," he said, "your father will be returned. No mortal man could get him back into his normal dimensions, but the Ghosts can. They have ways of doing things. Warping of world lines and twisting of interdimensional co-ordinates."

"You really mean that?" Ann asked. "This isn't just another of your practical jokes."

The golden beard grinned broadly and then sobered. "Child," he said, "I don't joke about things like this. They are too important."

He looked about the room, as if expecting something, someone.

"Your father will be here any moment now," he declared.

"Here!" exclaimed Ann. "Here, in this room—"

Her voice broke off suddenly. The room had suddenly filled with Ghosts, and in their midst stood a man, a man with stooped shoulders and heavy-lensed glasses and lines of puzzlement upon his face. Like a puff of wind the Ghosts

were gone and the man stood alone.

Ann flew at him. "Father," she cried. "You're back again, father."

She went into his arms and the man, looking over her shoulder, suddenly saw the man with the beard.

"Yes, Ann," he said, "I am back again."

His face hardened as Carter took a step toward them.

"You here," he snapped. "I might have known. Where there's anything afoot you're always around."

Laughter gurgled in the throat of the bearded giant. "So you went adventuring in the dimensions, did you?" he asked, mockery in his voice. "You always wanted to do that, John. The great John Smith, only man to ever go outside the four dimensional continuum."

His laughter seemed to rock the room.

"I suppose you got me out," said Smith, "so you could gloat over me."

The men stood, eyes locked, and Kent sensed between them an antagonism that was almost past understanding.

"I won't thank you for it," said Smith.

"Why, John, I never expected you to," chortled Carter. "I knew you'd hate me for it. I didn't do it for you. I did it for your little girl. She came from Landing City across hundreds of miles of deserts and canals to help you. She came down into Mad-Man's. She's the one I did it for. For her and the two brave men who came with her."

For the first time, apparently, Smith noticed Kent and Charley.

"I do thank you," he said, "for whatever you have done."

"Shucks," said Charley, "it wasn't nothin'. Nothin' at all. I always wanted to see Mad-Man's. Nobody ever came down here and came out sane. Most of them that came down didn't come out at all."

"If it hadn't been for my Ghosts neither would you," Carter reminded him.

"Father," pleaded Ann, "you mustn't be like this. Uncle brought you back. He was the only man who could have. If it hadn't been for him, you would still be out in the extra-dimension."

"What was it like, John?" asked Carter. "Dark and nothing to see?"

"As a matter of fact," said Smith, "that is exactly what it was."

"That's what you thought," jeered Carter. "Because you had no sense of perception to see or hear or make any contacts or associations in that world. Did you actually think your pitiful little human senses would serve you in a place like that?"

"What do you know about it?" snarled Smith.

"The Ghosts," said Carter. "You must not forget. The Ghosts tell me everything."

CARTER looked around the room. "And now," he said, "I fear that you must go." He looked at Ann. "I did what you wanted me to do, didn't I?"

She nodded. "You are turning us out?" she asked.

"Call it that if you wish," said Carter. "I have work to do. A great deal of work to do. One of the reasons I came to Mad-Man's was to be alone."

"Now look here, mister," said Charley bluntly. "It's a long pull up Mad-Man's. A longer pull back to our igloo. You aren't turning us out without a chance to rest, are you?"

"He's crazy," said Smith. "He's always been crazy. He's sane only half of the time. Don't pay any attention to him."

Carter paid Smith no attention. He addressed Charley. "You won't have to walk back," he said. "My rocket ship is out there. Take it." He chuckled. "You needn't bother bringing it back. I'll give it to you."

"But, uncle," cried Ann. "What about yourself?"

"Don't worry about me," Carter told her. "I won't need it. The Ghosts can take me any place I want to go upon a moment's notice. I've outgrown your silly rocket ships. I've outgrown a lot of things."

He swept his arm about the room, pointed at the globe of brilliant fire that hung suspended between floor and ceiling.

"Pure energy," he said. "In there atoms are being created. Millions of horsepower are being generated. An efficient, a continual source of power. Inclosed in a sphere of force waves, the only thing that would stand the pressure and temperature inside the sphere."

He ceased speaking, looked around.

"That's only one of the things I've learned," he said. "Only one of the things. The Ghosts are my teachers, but given time I will be their master."

There was a wild light of fanaticism in his eyes.

"Why, man," said Kent, "you will be hailed as the greatest scientist the world has ever known."

The man's eyes seemed to flame. "No, I won't," he said, "because I'm not going to tell the world. Why should I tell the world? What has mankind ever done for me?" His laughter bellowed and reverberated in the domed room. "Find out for yourselves," he shouted. "Go and find out for yourselves. It will take you a million years."

His voice calmed. "The Ghosts are almost immortal," he said. "Not quite —almost. Before I am through with this, I will be immortal. There is a way. I almost have it now. I will become a Ghost—a super-Ghost—a creature of pure force. And when that happens, the Ghosts and I will forsake this worn-out world. We will go out into the void and build a new world, a perfect world. We will live through all eternity and watch and laugh at the foolish strugglings of little people. Little people like mankind."

The four of them stared at him.

"You don't mean this, Howard," protested Smith. "You can't mean it."

The wild light was gone from Carter's eyes. His voice boomed with mockery. "You don't think so, John?" he asked.

He reached into his shirt front, pulled out something that shone in the light of the radium bulbs. It was a key, attached to a string hung around his neck. He pulled the loop over his head, handed the key to Kent.

"The key to the rocket ship," he said. "The fuel tanks are nearly full. You fly her at a 30-degree angle out of here to miss the cliffs."

Kent took the key, turned it awkwardly in his hands.

Carter bowed ceremoniously to them, still with that old trace of mockery. "I hope you have a fine trip," he said.

Slowly they turned away, heading for the door.

Carter called after them.

"And you might tell anyone you see not to try to come into Mad-Man's. Tell them something unpleasant might happen."

Charley turned around. "Mister," he said, "I think you're batty as a bedbug."

"Charley," declared Carter, "you aren't the first one to say that to me. And maybe . . . well, sometimes, I think, maybe you are right."

THE STURDY rocket ship blasted its way across the red deserts. Far below, the crisscrossing of the canals, more deeply red, were etched like fiery lines.

"Lad," said Charley to Kent, "there's another story to tell the boys. Another yarn about Harry, the Hermit."

"They don't believe it," Kent declared. "They'll listen and then go out and re-

tell it and make it a little better. And someone else will make it better yet. All we can do, Charley, is to give rise to another, an even greater, Harry, the Hermit."

Ann, sitting beside her father, smiled at them. "Just a couple of myth-makers," she said.

Charley studied the terrain beneath them, combed his beard. "You know," he said, "I still think that bird back there was off his nut. He'll try makin' himself into a Ghost—and just be an ordinary Earth kind of ghost. The kind that just ain't."

A Ghost suddenly materialized, shimmered faintly in the rocket cabin.

And for the first time known to man, perhaps for the first time in all history, the Ghost spoke, spoke with a voice they all recognized, the voice of the man back in Mad-Man's, that voice with its old mockery.

"So you think so, do you?" said the Ghost.

Then he faded from their view.

"SENSITIVE INSTRUMENT"

The human senses, of course, are pretty crude. But—are they? It's true, of course, that a camera-plate attached to a given telescope can see fainter stars than can the human eye, because the camera-plate waits patiently, building weak impression on dim imprint till a visible result is obtained. That's fine for some things—but no camera-plate ever recorded an image of the markings on Mars; air stirring above distorts and blurs the image. The human eye sees in an instant, and records that moment of clear sight on the brain; the camera-plate is too insensitive. Bright moonlight is almost strong enough, it seems, to read a newspaper by—but try taking a photograph!

The human eye, in fact, is so immensely sensitive to light that one quantum of light per second is enough to give rise to an image! But at the same time, the eye is so rugged that a hard blow from an angry fist merely blurs it for an hour or so.

The eye's sensitivity is due to a beautiful arrangement of chemical reactions. Apparently, the photo-sensitive initiating chemical breaks down, under impact of light, to produce, not a substance which affects the optic nerves, and is hence consumed, but a catalytic substance. This catalyst molecule works its way on perhaps one hundred or two hundred molecules of a second substance present, converting them into some compound which may stimulate the nerves. There's a question there. The second compound may, in turn, be a catalyst on yet a third substance, spreading the work to yet greater numbers of molecules, before the nerve-stimulating chemical is reached.

When the primary catalyst substance has been used up—about a tenth to a fifth of a second—the biochemical reactions of the cells of the eye reverse the process, restore it to its original state, and it's ready for another cycle.

This type of vision—the super-sensitive reaction—is not that employed in daylight. In daylight, the intensity of light is so great the primary, super-catalyst cannot exist. It takes about fifteen minutes of near-total darkness before it has been built up. The blinding effect of a weak little match-flame after total darkness is due to the sudden breakdown of that super-sensitive mechanism.

This sensitive mechanism has only one function; it's a detector, rather than an analyzing mechanism, designed purely for sensitivity, and hang the consequences. The result is that it has no color sensitivity. The brightness of "bright moonlight" depends largely on this reaction, with the result that moonlit scenery is very nearly colorless. Light of an intensity so low can but barely stimulate the ponderous photochemical mechanism of the color-sensitive cells. For the same reason, only the very brightest of stars have any color-tinge. The eye, to see them, has to hook in the detector, not the analyzer.

Even in free space, the stars will remain colorless points of brilliance, save for the few that are near and bright enough to stimulate the massive apparatus of the analytical department.

WHEN THE FUTURE DIES

By NAT SCHACHNER

WHEN THE FUTURE DIES

The Green Globes came—and man had to go for lack of a weapon, for lack of time! But—the time machine was a weapon irresistible!

By Nat Schachner

IT was in the spring of 1982 that the strange flotilla thundered down upon an unsuspecting Earth. Where it came from no one knew, nor was the exact truth ever discovered. The best opinion, however, of those who survived the first onslaught was that the invaders were not indigenous to the Solar System; that they came from one of the nearer stars.

In support of this contention it was pointed out that the spaceships were fashioned of a green-glowing metal that had no counterpart on Earth, or any of the planets; or in the fiery bosom of the Sun, for that matter. And, it was further argued, not only did the hulls shine with a green phosphorescence as they flashed across the night skies, but they held within their molecular patterns a blasting, continuous heat of such terrific intensity that would have melted into a showering flux any element, or combination of elements, in the known atomic scale.

The invaders came on a moonless night like a flock of streaking green comets. They landed on an open plain near Bordeaux, right in the heart of world-famous vineyards. There were twenty of their long, tubular spacecraft, pointed at one end, like well-sharpened metal pencils. The canny peasants, aroused by the thunder of their approach, the blast of their green-heated sheaths, fled in terror.

By the time mobilized troops and scientists from the University of Bordeaux and the Sorbonne in Paris had hurried to the scene a thin, translucent bubble, green glowing as the ships dimly wavering within, had surrounded the flotilla. Heat scorched outward from the bubble —so fierce, so incandescent that the country for a mile around was blasted clean of houses, vegetation and every form of life. The parched, brown soil was as bleak as any desert.

More troops were called upon; more scientists mobilized. They tried to signal the ships within the glowing bubble. They sent men clad in asbestos wrappings into the steaming area. They sent planes sealed against heat and cold soaring overhead.

But the unseen visitors did not answer the signals. The men in the asbestos suits were forced back by the furnace-like heat. And three of the planes, diving too close, were shriveled in the frightful bath as though they were midges falling on a red-hot stove.

After that the general in command, Marshal Perraud, a veteran of the Third World War, gave orders to fire. The new thirty-centimeter guns, using explosive shells of semi-atomic power, thundered a salvo. During the War, nothing had withstood their bombardment. Ferroconcrete fortresses, mile-deep Essinot lines, triple-reinforced stratosphere bombers, entire mountains, had been ripped wide open by the famous thirty-centimeters.

Yet now this tenuous bubble, semi-transparent, hiding within its shining

green distortions the wavering shapes of the pencil-shaped craft, refused to collapse under the terrific impact of the screaming shells.

The astonished observers, watching incredulously through vibro-scanners, saw queer, flowing movements within the protective shell. Movements obscured to a large extent by the greenish bubble, giving not even a hint of the strange creatures who followed those patterns. They were not human, that was obvious, nor any form of life understandable to man. For the paths, dimly seen, magnified, traced in three dimensions a complicated weave and design that had no counterpart on Earth. The shadows danced, died suddenly, reappeared elsewhere, seemed literally to twist themselves inside out. To the very end, no one solved the mystery; no one knew if those curious, flowing lines were mere distortions filtering through the bubble, or, in fact, true representations of the alien creatures who had come from outer space. No one knew; for no one ever saw the invaders face to face and lived to tell what he had seen.

AFTER forty-eight hours of continuous bombardment with every weapon and scientific device devised by man, Perraud was compelled to confess defeat. Once he had tried a bayonet charge and lost five thousand men in consequence. The closer they hurled across the waste lands the more frightful became the heat from the delicate, green phosphorescent bubble. The advance battalion, spurred on by the exhortations of its officers, died in droves with *La Belle France* on their blackened lips.

Perraud swore and tugged at his gray mustache. It was suicide to send more brave men against a furnace. The invaders had not retaliated; they did not even seem to realize that they were being attacked. The strange patterns gyrated their incredible dance within in ceaseless flight. Not once during all the turmoil and thunder of sound had they stopped or hesitated in their courses.

Perraud called Paris. The cabinet went into session. Martial law was declared. Perraud was displaced by Arcot. He had no greater success. Five thousand more men were lost and fifty great bombers. More cabinet sessions. The upshot was sensible. Since the invaders neither attacked nor could themselves be attacked, it was decided to adopt a policy of watchful waiting and let them alone.

Accordingly a forbidden area was declared around the glowing bubble—a sort of no man's land. It inclosed the parched and blasted section, and a two-mile radius beyond. Around the circumference of this circle troops were massed. One hundred thousand men, equipped with every known offensive and defensive weapon, installed behind asbestos shields and yards-thick ferro-concrete; while French scientists worked feverishly in laboratories in search of new methods of penetration and communication with the unseen beings within; or, in the alternative, for new weapons whereby they could be completely destroyed.

But neither one result nor the other was obtained. The bubble remained outwardly quiescent, though the military observers could follow with some difficulty the unceasing signs of activity within. Nothing seemed able to penetrate that semitransparent shell—neither messages nor arms.

For two months the mobilized forces held to their position, tensely observant, not knowing just what to expect, but ready to die, if need be, to resist any further aggression on the part of this alien invasion from space.

The tension of the nation gradually relaxed. It was evident that the bullet-nosed ships and their masters held no schemes of aggrandizement. A huge collective sigh of relief went up. The troops were gradually demobilized; a single battalion was left as a thin guard in the

circumscribing trenches, more to warn off the curiously rash than to defend the country from further invasion.

Tourists came, as was to be expected, to observe the phenomenon. They brought their families and their lunches. The harassed soldiers were hard put to it to keep the unwary out of that zone of fierce, scorching heat. More scientists came, from all over the world. They spoke gravely of intra-atomic patterns, of a possible element of the atomic order of something like 112, whose instability divulged itself in fierce, continuous radiations. They tried to decipher through the most powerful vibro-scanners what curious order of life forms could give rise to those constant, weird gyrations; but without success. They tried communication by radio, by gesticulations, by heliograph, by huge geometric figures outlined in electric lights; yet no response came from within. Finally they, too, gave up in despair. The nine-day wonder was beginning to fade. Other matters distracted the flickle public eye.

Then one day, ten weeks after the sudden appearance of the spaceships, it happened. No one saw it happen, but it must have been about four in the afternoon, just as guard shift was taking place.

THE BUBBLE suddenly expanded. It split into a hundred separate segments, each similar in shape and form to the original bubble, and each swiftly grown to a similar size. The cellular segments lifted lightly into the air. They sped with sentient purposefulness along the radii of a widening circle. They dropped to the ground at spaced intervals, outward from the parent bubble, so as to include within their spheres of influence a territory of over three hundred square miles. The most beautiful, the most fertile section of France was completely obliterated.

For, wherever the bubbles landed, the huge outpourings of heat from their shimmering green shells destroyed towns, villages, trees, houses, all life. Nothing remained but the scorched and smoking soil. Nothing remained of the two thousand troops or the half million inhabitants who were trapped by that sudden irruption. Bordeaux, in whose great public square one of the hemispherical translucencies had come to rest, was a desolate waste. The people died like gnats in the furnace blast. The buildings crumbled and crashed in glowing masses of masonry. Even the steel girders of the larger structures buckled and sagged under the tremendous temperatures.

France was swept by frenzied horror. She had been lulled into a sense of security by the quiescence of the invaders. But now they had acted; half a million people had died, and three hundred square miles of territory were destroyed beyond redemption.

The country was put on a wartime basis. Every able-bodied man was called to the colors. Munition factories worked full speed; munition laboratories at a still greater pace. These aliens were definitely inimical to human civilization and must be wiped out once and for all.

But this was easier said than done. Again vast armies were hurled against the green-glowing bubbles, protected with every weapon at the command of science against the fierce temperatures. In vain! Even those who, clad like strange antediluvian monsters in impervious asbestos, and incased in armored tanks lined with the same material, managed to approach the frail-seeming bubbles, found it impenetrable by shot, shell or old-fashioned ramming. A thousand massed bombers, flying in close formations, unloading their deadly cargoes from above, achieved no better results. Thousands more died in the attempts, and a hundred thousand found themselves erupting with sores and burns dreadfully reminiscent of second-degree radium burns of a former day.

For ten weeks more the bubbles were quiescent outwardly, neither fighting back at the desperate onslaughts of their human foes, nor showing any sign that those within were even aware that such a creature as man existed. Once more France and the expectant world relaxed, thinking that perhaps this time the worst was over.

But at the end of the ten weeks, as though ticked off by a stellar clock, the same phenomenon was repeated. Each of the hundred bubbles expanded and subdivided into a hundred similar offspring. Ten thousand newly hatched shells lifted high and sped swiftly, in spaced patterns, over the surrounding countryside. France was destroyed as far north as the gates of Paris, half of Spain and Portugal succumbed to the holocaust. The loss of life was appalling. Thousands had migrated from the surrounding territories, but millions had remained, stubborn in the belief that the first division of the invaders would be the last. They died now for their stubbornness, caught like insects in this second foray.

It was now no longer a local French problem, outwardly sympathized with, and secretly exulted at, by her neighbors. It was obvious even to the dullest that the invaders had set themselves a methodical course. The original expedition had brought a new form of life, beyond all human knowledge, to colonize the Earth. What had made them migrate in their strange spaceships from their far-distant former home was a mystery. It might have been a stellar cataclysm that swept their world to destruction; it might have been the pressure of superior enemies from whom they fled. The secret of their journey, just as the secret of their habitat and appearance, remained a mystery until the end.

THE SCIENTISTS again talked learnedly: Of life forms who propagated themselves at ten-week intervals, ten offspring at a time, in fission like the amoeba or in spores like the Monocystics. Of reproduction in geometric progression. Of life that fed on mineral soil, free of vegetable or animal contagion. Of earthly elements fashioned by some strange super-science into a new element, hitherto unknown to spectroscopy, with an atomic weight of 112, and glowing with fierce, electronic energy. Of creatures as remote from protoplasmic carbon compounds as it was possible to be.

The scientists talked, but the plain man in the streets knew that the world was doomed. At such a rate of propagation the invasion must accelerate until all Earth was covered with the green-glowing bubbles and their unknown occupants. Within a year at the most—

Enemy nations forgot their nationalistic ambitions in the face of the common peril. The armies and the battle planes of the world converged. General staffs fused and subordinated to a single generalissimo. The laboratories of Earth pooled their resources. Everything else was forgotten except the onsweeping, inexorable expansion of the bubbles.

At the end of the third ten-week period half of Europe was laid waste. This time, though the destruction was infinitely greater, the loss of life was not as great in proportion. Only a million were caught in the fiery bath. The rest had emigrated.

It was the greatest hegira known in the history of the human race. Hundreds of millions partook in terror-stricken flight. They poured into the desert places of Asia; they shrieked and fought desperately for footholds on every possible means of transportation. They clung like black flies to the tops of railroad cars, they clung to the rails of transatlantic steamers, in their madness they even sought precarious perch on the wings of airplanes. A million dollars was offered for an old plane that rested in a museum, and was refused.

Thousands were crushed in stampedes; overburdened ships and aircraft went down without a trace. Famine swept away its thousands; typhus and cholera took more.

Then even Asia was no longer safe, and a new rush started to the Americas, to Africa, to far-off Australia. And always, at inexorable ten-week intervals, the existing bubbles split into new swarms that expanded outward in an ever-widening circle, and blasted everything out of their path.

The general staff gave up its futile bombardments. If Earth was to be saved, it must find its salvation in the laboratories. Hundreds of thousands of men and women scientists were working feverishly, desperately on the problem. *Find some weapon, some means of offense that will break element 112 and destroy everything within its sheltering walls!* That was the order issued.

"Easier said than done!" groaned Godfrey Talcott, ruffling his gray hair with a despairing gesture. "All we know about the element is what has been observed at a safe distance through telespectroscopes. We can't lay our hands on a sample to analyze or test it. And I'd say only a full, efficient use of subatomic power could touch it."

"That's our problem, then," retorted Raymond Trent, looking up from the cyclotron he was manipulating. "We've already made a start along the path. We've broken down uranium atoms with neutron bullets, and released almost ten percent of the total energy. We've harnessed that power for explosive bullets, for stratosphere planes, and the first rocket lifted last year some five hundred miles out into space before its drive gave out and it fell back."

"Of course it can be done," Talcott said impatiently. "But it takes time. Rome wasn't built in a day, nor did any great scientific discovery, immediately practicable, come fully perfected out of the laboratories—all fiction to the contrary. We have only the vaguest idea of the principles involved. Patient experimentation is required, long months and years of mathematical calculations, tentative blueprints, testings, scrappings, new blueprints, new experiments. Good Lord, man! I'd say fifty years is not too much."

"Fifty years?" Ray Trent echoed. His blue eyes squinted. "Might as well ask for eternity." He strode to the newscaster, flipped it open. The International Broadcasting Co. announcer swam into view. His hand trembled as he read the latest flash.

"Leningrad," he was shouting, all suavity forgotten, "has just radioed. Moscow is destroyed and covered by the invaders. The southwestern part of Russia is a smoking ruin. The Soviets announce they are moving the seat of their government to Irkutsk, on Lake Baikal. From Cairo comes a report—"

RAY flicked him off. He was still young, slightly under thirty. His face was twisted into a hard grimace; his eyes burned. He was a good physicist, but from college days his imaginative mind had preferred to play around with the larger philosophic conceptions of his subject—time, space, the nature of eternity, origins, endings. With an independent income at his disposal, left to him by a thoughtful father who had made his pile in manufacturing motors, he had immersed himself in a combination library, den and laboratory of his own choosing. There had pondered deeply on abstract matters and contrived curious little models which he never showed to visitors.

Since the coming of the spacemen, however, every available scientist had been impressed into the desperate effort to find some method of combatting their geometrically progressive spread. Ray Trent joined up by choice with Godfrey Talcott, his former teacher at the university. Talcott had a reputation as an

authority in electronics. He was about fifty, tall, stooped, gray, and with a long, thin nose. He preferred working by himself, with a single assistant, rather than in a huge laboratory, surrounded by bewildering equipment and an obsequious group of underlings.

"They get underfoot," he complained, and took Ray off with him to his private little affair near Boston.

Ray said quietly now, without any bitterness. "You asked for fifty years? Within a year at the utmost the whole earth will be taken over, and not a human being left alive. Europe is gone; Asia and Africa are next in line. Then —" He shrugged eloquently.

Harsh lines etched themselves into the older man's face. "A miracle may happen, though I don't believe much in miracles. And only if a sufficient number of scientists work simultaneously on the problem, and without interruptions. But if we are compelled to move from place to place, always fleeing the advance, even a century wouldn't be enough."

"Right, and I have an idea. Suppose we shift our best men and the minimum of essential equipment down into Antarctica, where, from the looks of things, mankind will make its last stand."

"You're crazy, Ray," Talcott exploded.

The blond young man shook his head. "Not in the least. It's our only possible chance. There are already meteorological stations dotting the ice. They're pretty well scattered, yet close enough for plane and radio communication. Thirty or forty laboratories, working independently, yet with instant cooperation, freed for almost a year from the sickening disruption of flight from endangered areas, might find something within the limited time to save at least a remnant of the human race from total destruction."

"I still say you're crazy," insisted Talcott. "But it's the only decent suggestion I've heard since this infernal mess started. I'll get in touch with the general staff at once."

THREE WEEKS later the vast ice-cap called Antarctica hummed with unusual activity. Before there had been sotitary wastes, broken only by inconspicuous stations and semiannual relief ships. Now cargo planes hurtled through snow and blizzard and furious storm to unload equipment and somewhat befuddled scientists in a last desperate stand against the ever-expanding death.

Trent and Talcott took over the station that perched precariously on the high interior plateau where the south pole made a mathematical point. The older physicist stared out at the wilderness of ice and snow, dim and spectral in the endless gloom of the south-winter night. "I still don't know why you picked on this most God-forsaken spot of all, Ray," he complained. "The storms howl down here at their worst; even the stratosphere planes may not be able to get through when we need extra equipment in a hurry. Now down on the coast—"

Trent looked at him queerly. "I wanted isolation; plenty of it," he said in a strange voice. I didn't want anyone to know what we are trying to do."

Talcott said, startled: "What do you mean?"

"You remember back in Boston you said it would take at least fifty years to uncover the secret of destructive weapons with full atomic power?"

The older scientist made a hopeless gesture. "Of course. But we've got to keep trying. Besides, what's that got to do with our being isolated?"

Trent's answer was another question. "Suppose," he said slowly, "I could manage to span that fifty years for you—or even a hundred, if necessary—and present you with weapons already made and fashioned that could blast the in-

vaders to pieces—without worrying about the theory involved?"

"And how, my fine young friend," demanded the other sarcastically, "will you provide me with these weapons?"

"By going into the future—that fifty or a hundred years ahead you were talking about—and bringing them back with me."

Talcott got up slowly. "I think," he said with careful intonation, "that perhaps this place has already gotten you. Suppose I send you back to one of the base—"

The younger man grinned. "My craziness is no longer a matter of mere metaphor, eh, Talcott? But I never was more sane in my life."

"And how, please, will you manage to go into the future?"

"With a time machine!"

Talcott blinked, snorted. "It can't be the heat, so it must be the cold. Whoever heard of a time-traveling device outside of fiction?"

"That's no reason to believe the problem can't be solved," Trent retorted. "Ever since I quit college I've been fooling around with the idea. You may remember that time and space, as abstract qualities, were always my obsession. I've gone through the intricate mathematical formulas involved; I was even compelled to create a new method of analysis and re-synthesis to solve my equations. That's all completed. I was on the verge of commencing the actual construction when the invasion broke."

Talcott stared incredulously. "And you think you can build a machine to take you into the future?"

"I don't know," Trent admitted. "That's why I wanted this total isolation. I didn't want the rest of the scientific world to relax their own efforts along the lines of super-atomic power. Human nature is such they might just sit back and wait for us to succeed. *Our chances* are slim, but theirs partakes, as you said, of the order of a miracle." He shook his head. "Only a time machine will solve the problem; nothing else."

In spite of himself, Talcott looked interested. "What's the theory?"

"An electro-magnetic warping of the space-time continuum," Trent explained. "The machine, if it works, will slide around the world line of events and reappear at any specified time and place."

The older man sighed. "I suppose you're right. It's our only chance, slim and far-fetched as that may be. How about the equipment?"

Trent grinned. "I've already arranged for that. It's all packed down here as my private baggage."

"We-e-ll!" sniffed Talcott. "I was wondering how much evening clothes you were bringing along. All right, suppose we get to work."

FOR NINE MONTHS they labored. It was back-breaking, brain-stupefying, nerve-destroying toil. The long antarctic night turned into perpetual day. Incredible blizzards roared over them and sealed them within mountainous drifts. The temperature rose and fell again. The last cargo plane came and went. Its pilots were frightened. "You're wasting your time!" they cried. "It's all over. The human race is wiped out. We're practically the last—"

But Talcott and Trent did not hear. They did not sleep; they had only snatches to eat. Day and night, the alternation of seasons, were but vague patterns to them. Only one thing mattered—the swift progression of calendar days as they flung desperately into their work.

Their minds bleared with formulas; they set up new apparatus, feverishly ripped it down to start afresh; they built strange cages and dismantled them; they impressed cosmic rays and alpha rays into service; they twisted elements with furious distortions, seeking always the warping, electro-magnetic action called for by Trent's equations. Time and

again they thought they were on the proper track, only to meet with sudden blank walls. The solution showed dimly, tantalizingly ahead; but always success eluded them. And they had only weeks now.

Once a week they forced themselves, bleary-eyed, muscles jerking with supreme weariness, to listen to the radio. There were only a few announcers left, and fewer stations, and their news was increasingly tragic.

Europe was gone, Asia and Africa as well; North America baked with searing fires; Brazil lay panting under the swarming bubbles. The southern part of South America and Australia were black upheavals of refugee humanity. Hundreds of millions had died, but hundreds of millions were compressed into smaller and smaller spaces, fleeing the ever-advancing destruction.

Famine and fierce, internecine warfare took immense tolls. Civilization had reverted to savagery; a crust of bread, a foot of ground on which to stand, meant murder and sudden death. The tortured atmosphere and the more tortured sea, writhing under the insupportable burden of the blasting heat, rose in rebellion. Furnacelike siroccos swept over the still-untouched areas; a boiling sea, augmented by melting glaciers, roared in tidal floods over the hapless swarms.

At the end of the ninth month the last overwhelming news sputtered through. It came from the high continental barrier, not five hundred miles from where they listened. There was no other sending station to be heard. The newscaster spoke in a dull monotone. His capacity for emotion had long since drained away.

"The bubbles have spawned again," he said drearily. "Of what was once our earth only this desolate bit of ice and mountain is left. Australia and the South Sea Islands are gone; all South America down to the tip of Patagonia. A few people still perch precariously on Tierra del Fuego; some thousands more swarm on the bleak Grahams; fifty thousand all told have managed, by plane and by boat, to get away in time to reach the ice. There is food for perhaps three months."

Then his nerve broke. He looked out from the screen with an insane giggle. "Three months' food. More than enough. We can throw part of it away. In ten weeks time the bubbles spawn again. Do you understand?" His voice grew high-pitched. "In ten weeks' time we all die; we, the heirs of billions of years. We die, and those damned gyrations from hell take over." He glared at his unseen audience; his face seemed to be an independent mask, jerked by casual strings. "We die!" he sobbed. "I, the last announcer, tell you so. Damn them! Damn you! Damn us all!"

Still screaming, he picked up an iron bar, threw it at the silver mesh. There was a blinding flash; then dark silence.

Ray Trent lifted his head. "That's the end, Talcott," he said quietly. "His nerves couldn't stand it any more. He smashed the last sending station. We'll hear no more; we're cut off from the world."

The older man's shoulders sagged. "What does it matter? You heard what he said. In ten weeks more we're all dead—all our hopes and ambitions; our plans for the future. Wiped out, erased from the memory of the universe as though we had never been."

Ray stared at the complex of equipment. "Ten weeks more!" He seemed to be speaking to himself. "Ten weeks in which to find the secret and create a weapon to save the poor remnant of humanity." He turned suddenly on Talcott. "Can we do it?"

THE SCIENTIST shook his head. "I said in the beginning only a miracle could do the trick. For a while I thought you might be able to supply the miracle. Now that seems over." He

clenched his veined fists. "God!" he choked. "If only they hadn't come for another fifty years. We wouldn't have to worry about time machines then. We are on the direct path. Subatomic power is there. It's only a matter of time; of normal, patient experimentation. Fifty years only, a half century; a mere instant in eternity—yet more than eternity to us now."

Ray Trent had been sitting, his head in his hands. Now he got up excitedly. "Look, Talcott," he said. "You gave me an idea. Suppose we contact the coast and get a picked group—not over a dozen men and women. Suppose, in the ten weeks left us, you and they will burrow deep under the ice here, into the rocky, underlying core. We have power enough on tap to fashion a hollow chamber, stock it with supplies, arrange for constant aeration, and set up a laboratory. Down there, sealed in from heat and cold, they can live, marry, rear children, concentrate every energy on a single problem—the completion of my time machine."

"And suppose it never succeeds?"

Trent shrugged. "Then they'll have to plug away at the original problem of atomic power. *That* will take nearer a hundred years under the cramped and restricted surroundings. Perhaps their children's children will find the answers. With weapons so powered they'll be able to reconquer the earth."

Talcott looked doubtful. "It's a dreary gamble. However, I'll get them together at once. There's a base at Little America I can contact on our transmitter. Endersby is down there. He's a good man. I'll have him pick the dozen and fly up here with food and equipment."

Endersby, at the other end, was equally doubtful; but finally agreed to take the chance. There was nothing else for them to do.

The dozen came up in a dozen separate planes, laden to the struts with hurriedly assembled stores, taken secretly from the general supply. Picked men and women, young in years but old as time in spirit. In their eyes lurked the horrors they had seen; on their faces was set an ineradicable stamp.

They went to work at once, efficiently, swiftly, under Talcott's direction. But there was no drive, no energy to their efforts. In the time machine was their only hope. With that they could tap any age, any vast knowledge! As for the straight problem of atomic power—supposing they succeeded? Fifty to a hundred years of circumscribed living within the bowels of the earth, where they would never see the sun again, or hear the dawn wind through the trees, or watch the mountains light up with supernal glory. A century of molelike drudgery, so that perhaps their children, or their children's children, might reconquer a blasted, useless earth. And how did they know that the invaders, once firmly established, might not also evolve new and superior weapons to batter down those they expected to invent?

They held a conference by themselves finally. Trent and Talcott were not permitted to attend. Then Endersby, as the spokesman, came to the two scientists.

"We've talked it over," he said. "We don't intend to go through with it. We'd rather die right here and now than eke out such an existence underground as you've outlined."

Talcott stared incredulously at their grim, set faces. "But you can't do that," he cried. "The race of man will die with us."

"Let it die then," Endersby said grimly. "There isn't any hope for us, anyway. Unless"—his eyes turned on Ray—"you can make that time machine of yours work."

"O. K., then," Trent agreed. "I'll make a bargain. You go ahead with the underground shelter and I'll concentrate exclusively on the machine. If by the

time the invaders come, I see that the whole thing is hopeless, I'll tell you so, and we can all die decently together. If, however, I find a possibility of success within a short period—say five years at the outside—we'll hole ourselves in and finish the job."

Endersby conferred with the rebellious ones. "It's a bargain," he said. "But we expect you to be honest about it."

"I'll be honest," Trent promised.

FROM that time on Trent took no part in the communal work. The hole deepened hourly; semi-atomic diggers bit through ice and rock; Talcott drove them remorselessly. But the diggers worked only with muscles and main strength, not with their minds.

During their short sleep periods they crowded around Trent instead, watching his progress with a desperate intentness. Every time he swore viciously and tore down what he had just built,

despair clamped upon their hearts; every time he grinned as something clicked in the slowly growing mechanism, their faces lightened and similar smiles twisted their lips.

As the days went on and on it was the time machine, not the underground, that absorbed all their thoughts, all their conversation. Talcott swore at them and flogged them on; they continued their work with mechanical efficiency, but the vitalizing force was gone.

One of them spoke for the others. "I tell you flatly I wouldn't spend even a year underground. Sure, I'll finish it, but I won't go down. Unless Trent's machine comes through, of course."

From open skepticism they had veered around to enthusiastic, abiding faith. The time machine! The time machine! Once it's finished, everything will be all right. We won't have to live like moles. Trent could go a thousand years ahead if necessary—ten thousand, even!

They'd show those damned invaders. A thousand, ten thousand years ahead, the human race would be far advanced; far beyond a bunch of gyrating, geometric abstractions. Trent would bring back with him weapons that would blow them back to the star from which they originally came.

But the days went on, and the weeks, and still Trent worked on desperately, doggedly, seemingly no nearer success than on the first day. The high hopes, the fanatical faith of the others, began to fade. They whispered to each other and looked askance at the thing of bars and wires and tubes.

Raymond Trent paid no attention to them. His face was hollowed out, his eyes were black from lack of sleep. Feverishly he went on—and on, driving himself beyond all human endurance.

Then suddenly, only two days before the alien bubbles were due to spawn again, he straightened his wearied shoulders with a tremendous whoop. Talcott, grim and haggard, had just emerged from the tremendous hole they had dug. The others were deep below, two miles down, their cavern hollowed out of granitic rock, their apparatus almost completely installed. The last desperate touches were being made in a wild race with time. Within forty-eight hours the upper surface would be overwhelmed.

"I've got it!" he shouted a little insanely. "I've got it—got it! And now, by all the gods of man, we'll get those damned green globs! I don't care what they've got, or how soon they come; once I've put this gadget into that set-up I'll go forward till I find something so potent, so deadly, a hand weapon will destroy this whole damned horde!"

Talcott stared at him. "You're sure?"

"As certain as I can be without actually going," Trent nodded, more soberly.

"When?" the old scientist snapped.

"Tomorrow. Three hours to rearrange that hookup, a half hour or so to install this, and then about six hours of tuning, and another three hours of careful testing of parts. Twelve to twelve and a half hours."

Talcott smiled grimly. "It better work the first time. You'll have one day leeway."

Trent laughed with sudden release of strain. "Half an hour will be enough. I can't guess now what I'll have, but I'll go on to the farthest future, when man's power is irresistible, and bring back his deadliest defense!"

IT WAS a simple enough affair. Upright bars ringed in a circular platform on which there was a steel, bolted chair with straps to hold the occupant. Between the bars spread a lacework of fine wires, making an intricate geometric pattern. Small but powerful magnetons radiated from a central spoke. *Dynon* batteries, supercharged, furnished the power. Surmounting each bar were octahedral crystals of synthetic malachine,

flashing with green fires, and sensitive to the lightest magnetic whisper. A huge dial with button inserts was fastened to the arm of the chair.

Endersby, black-haired, tense, growled skeptically. "So you expect to go into the future with that contraption, Trent?"

Now that it was time to go, Ray himself began to have uneasy doubts. "I hope to," he corrected. "If not—" He shrugged.

Ray glanced quickly at his timepiece. Precious seconds were passing. He spoke rapidly. "It's almost noon. Tomorrow at noon the bubbles are due to spawn again. When that happens, what little is left of our world will be swept away." He took a deep breath. "I'll either be back before then with an effective weapon taken out of the future, or else—"

"You'll be dead, and your machine a failure," Endersby broke in harshly.

"Exactly," Ray agreed. "That means you'll have to be prepared for every eventuality. Have most of you down in your sealed-in cavern. Let Talcott and someone else remain up here until about eleven thirty tomorrow morning. If I don't show up by then it shouldn't take more than twenty minutes for them to lower swiftly to the hide-out, place the sealing cap into position, and explode the prepared charges that will block the tunnel from view."

Endersby moved forward suddenly. "I'll stay with Talcott, and good luck, Trent!"

"Thanks!" Ray opened a barred door, stepped into the cage. Through the wire mesh they could see him check his apparatus, then seat himself into the chair and strap his body in. His long, lean hand punched buttons on the dial. In the utter silence the clicks were magnified, ominous.

"I'm setting my goal first for fifty years ahead," his voice came through, curiously muffled. "Some of you may even be alive then." He tried to sound gay. "Don't high-hat me out of your superior age and wisdom."

Ray had turned on the powerful magnetic warps. The malachine crystals dazzled with intense green-blue flame. The magnetons hummed like the droning of a million bees. The time traveler waved his hand.

Then the machine blurred. It became a curious shimmering through which the rear of the station vaguely showed. The shimmering grew more rapid. Only the faintest outlines were visible, a ghostly fantasy of man and cage. Then that died, and the dozen were staring wide-eyed at emptiness. Raymond Trent and his timecraft had disappeared.

"He's really done it," someone said in a half-hysterical voice. "He's gone into the future—the first man in the history of the world."

"And the last—I'm afraid," Talcott said tightly. He was finding difficulty in controlling his voice. He had loved the younger man.

Endersby said: "I owe him more than an apology. Let's hope he comes back. In the meantime, we'd better follow his instructions. If the impossible happens —and he succeeds—we'll have to be prepared. If he doesn't return, we'll have to be prepared just the same."

TEN of the dozen went below. Two miles down, under rock that was the backbone of the earth, in an artificial cavern about an acre in area and fifty feet high, artificially lighted, ventilated and watered. Soil for planting, a dozen chickens for eggs and meat, concentrated foods for perhaps half a century. Small-enough quarters in which to live, a dozen human beings, with love, marriage, offspring, work, research, with but a single driving thought through the years—the discovery of a weapon to blast the mysterious invaders off the outer face of the planet, and the repossession of a scorched and practically useless world.

Pale but determined, they went to

work. Last-minute things, small matters overlooked in the rush of days, but vital for continued existence in the bowels of the earth.

Overhead, two miles up, two men were holding vigil, sitting with burning eyes, waiting for the return of the daring traveler. One full day of breathless waiting, staring at emptiness until their eyes ached and bleared, hoping against hope, knowing in their innermost souls that Ray Trent would never come back, that his pioneer craft had crashed somewhere in the frightening reaches of space and time.

Yet they said nothing of this to each other, but sat rigid, almost unseeing, while the minutes and the hours ticked slowly away. Outside it was the late antarctic summer. The sun moved in a long, slow arc across the heavens, skirting the ice horizon in a vast oval, but never setting.

A blustering storm was gathering over the farther mountains, grim forewarner that the milder weather was over. Soon it would descend in howling blasts of snow, obscuring the heavens, burying the station once more under mountainous drifts.

That would not matter any more. Within a few hours they'd have to retreat to the depths, and the space things would descend in a swarm of green-glowing bubbles to take over the last poor section of a stricken planet.

As the hours slipped away—irrevocable wraiths—the two men watched and waited, not daring even to thrust a sidelong glance at each other. They did not wish to read on another face the aching conviction that was printed on their own. Ray Trent would never come back! He was dead, smashed in some far-off reach of time and space. It was senseless waiting. Down below there was much to do; things forgotten; things to be guarded against when the things came.

Yet they sat there, rigid, silent, not looking at each other.

The outrunners of the storm moved over the grim plateau. Preliminary gusts of wind rattled the station, retreated to gather new force. The sun was a red, wavering ball of misty fire. But still the central space on which they concentrated was bare—bare of cage or human being.

At eleven the next morning urgent messages came up from below. Since Trent had not returned in twenty-three hours, it was senseless to expect him any more. Suppose the terrible bubbles came a trifle ahead of schedule. They'd be taken unawares and destroyed. It took time to seal the cavern and explode the prepared charges.

But Talcott did not stir, and Endersby growled into the little microphone: "We wait until eleven thirty."

At eleven thirty the calls became more urgent, threatening even in their fear. They'd have to seal themselves in if Endersby and Talcott didn't come down in a hurry. The future of all mankind depended on them. Strangely enough, in the actual face of destruction, they had reconsidered, wanted to live.

"Ten minutes more," snapped Endersby. "We've *got* to give Trent a break." Talcott still said nothing; he seemed carved out of rock.

The storm burst with a thundering howl. Outside, the world was a swirling mass of gray, thick flakes, torn into shreds by a wind of hurricane violence. Winter had set in—the last winter the world would see.

At eleven forty the receiver crackled with urgency. Endersby sighed, got up reluctantly. He averted his face. "Come on, Talcott, there's no more use."

But the scientist was staring at a little whirling ball of mist that had materialized inside the station. "Look!" he cried in a thin, cracked voice. "Look at that!"

Endersby stared. "It's the storm outside," he said. "The sudden drop in temperature condensed some moisture. Come on."

But Talcott was on his feet, quivering like a pointing setter. "It's taking form," he shouted. "It's Trent! He has returned!"

The whirling mist had coalesced; it was shimmering now. The walls behind it grew faint, and a definite shape emerged. The shape of a barred cage, of a chair within and a figure strapped in its depths.

Then it became solid with a curious rush; there in the center of the room, at exactly the place where it had taken off into the unknown almost twenty-four hours before.

The figure inside stirred. Fingers plucked stiffly at the straps. Raymond Trent shook himself as though he were slowly coming out of a daze, got up, and walked with stiff, measured tread to the door.

Talcott and Endersby flung themselves forward. Their hearts thumped like pile drivers, sobs of pure joy tore at their throats.

"He's come back," they stammered. "He found the future and he returned!"

They literally dragged the younger man through the door; they pawed his lean figure, pumped his hand with fierce vehemence. They had to make sure that he was real.

"You found the future, didn't you?" Talcott clamored.

Ray had not spoken as yet. Now he said in a flat, toneless voice: "I found the future, Talcott. Fifty years from now."

"Swell! Swell!" jittered Endersby. "Everything's swell now! Where are the weapons you brought back—the advanced weapons that will wipe the space things off the face of the earth? In fifteen minutes they're coming. Give them to—"

For the first time they both noticed the expression on Ray's face. It was hard and rigid, like a mask from which all human feeling, all emotion had been erased.

"I have no weapons," Ray said dully.

"But . . . but—" Talcott stammered. He grasped feverishly at a straw. "Then the principle, the theory of subatomic power, at least. Surely by that time—"

Trent's eyes were stony pebbles. "I have no theories or principles."

"But damn it, man," Endersby exploded. "If they didn't know enough fifty years from now, why didn't you go on—a hundred, five hundred years? We *know* the problem is not insoluble."

Trent looked at them squarely. They fell back aghast at the sudden flare in his eyes. Then that died. The mask fell back into place. "You don't understand," he said. "I went fifty, I went ten thousand years ahead. *There is no future!* The invaders won, of course. That's obvious, isn't it? Naturally, there aren't any men in the future."

IN TIMES TO COME

To those planning on coming to the New York World's Fair during the first week of July, we suggest a coming event outside of Astounding itself, but of interest to Astounding's readers. There will be a convention of science-fiction readers and fans in New York on July 2nd which will be attended, in all probability, by a number of authors, artists, and, it is hoped, there will be some original art work which will be auctioned to support the convention. Those interested in details can get the facts from James V. Taurasi, 137-07 Thirty-second Avenue, Flushing, New York.

Next month, Astounding introduces a new author, and one of unusual promise. We rather suspect the name of A. E. van Vogt will be among those of top favorites a year or so from now. His story "Black Destroyer" merited a cover —and an unusually striking cover it made. Which reminds me, incidentally, that, during the past eighteen issues, Astounding has introduced to science-fiction several new top-rank names— L. Ron Hubbard, Kent Casey, H. L. Gold— You can fill in the list, for there are more than that.

Lester del Rey is one—and he'll be back next month with one of the unique —and delightful—characters of science-fiction: Ignatz. Ignatz is unusual in his habits, for one thing. He likes to sleep in boiling water or on superheated steam pipes. But primarily, he has a reputation for "The Luck of Ignatz"—which is, of course, the story.

THE EDITOR.

THE ANALYTICAL LABORATORY

The results this month brought one point of particular interest: "Catalyst Poison" and "Rope Trick," the two humor stories in the April issue, tied exactly neck-and-neck, point-for-point, in third place. It's the first third-place tie, too.

But the ranking otherwise went as follows:

1. Cosmic Engineers, Clifford D. Simak.
2. One Against the Legion, Jack Williamson.
3. { Catalyst Poison, Malcolm Jameson.
   { Rope Trick, Eando Binder.
4. Worlds Don't Care, Nat Schachner.

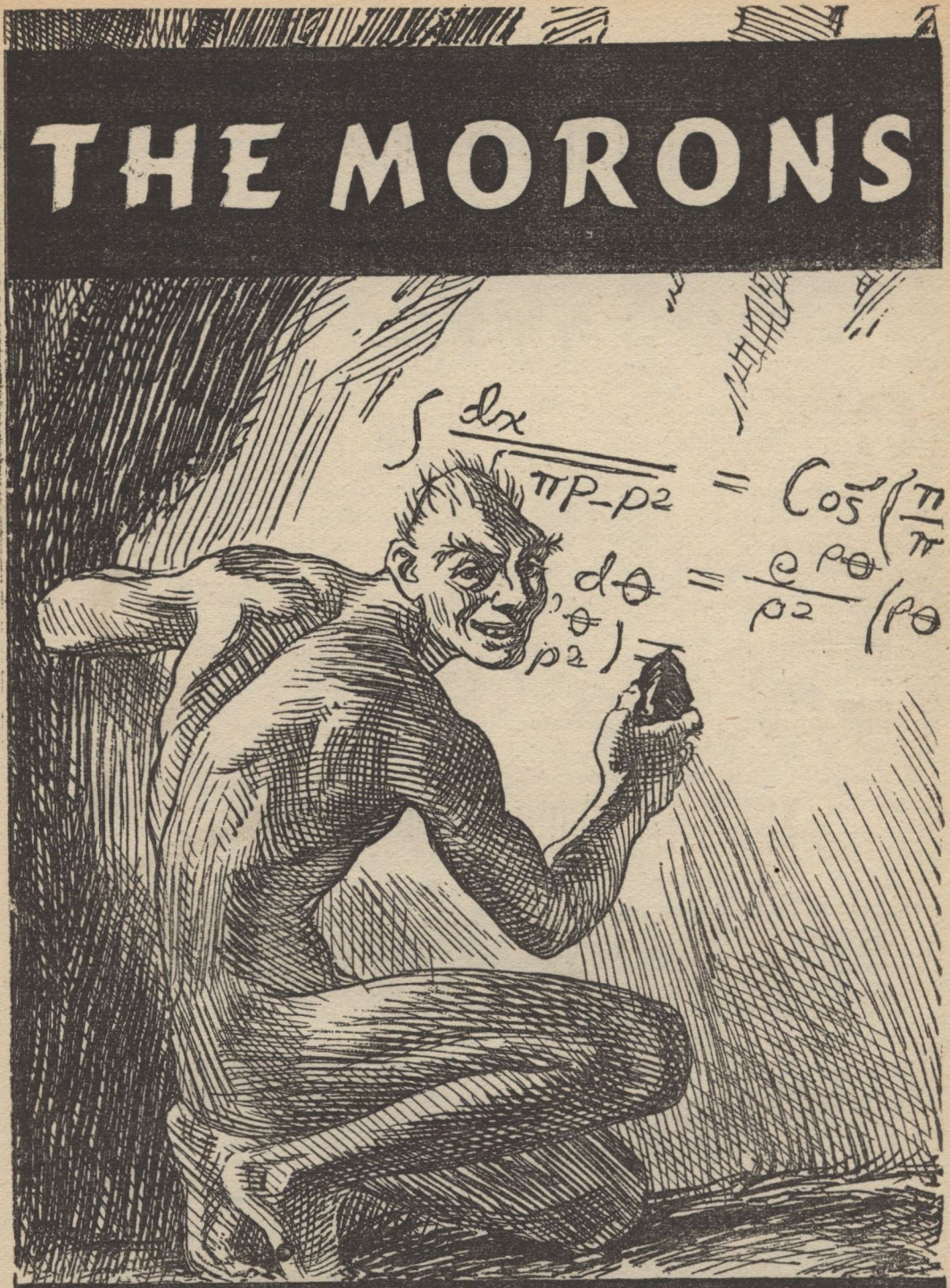
There were a number of comments— annoyed comments, in fact—at the lack of a science article. Reason for its omission was twofold: the presence of the two long installments of the two serials, and the fact that, for some time, I've been contemplating leaving it out. A good researcher runs a blank test now and then just to check up on whether the ingredient is necessary.

The blank test has been run—the reader reaction determined, and—

Gentlemen, there are two articles this month!

THE EDITOR.

THE MORONS



BY HARL VINCENT

THE MORONS

They were a happy, simple people. Stupid, of course —only they did calculus and used atomic weapons!

By Harl Vincent

GRAYSON ran his fingers shakily through thinning, gray hair. Gray fingers of mist reached upward, curling slowly, sliding reluctantly over the blank port window. The scream of the savagely overdriven radite engine rocked the metal bubble jerkily downward. "No solid," he shouted.

"But there is somewhere," Matthews snapped savagely. "It's waiting down there for that other radite to give out."

Grayson picked up the communicator, keeping his eyes fixed out and down. "No solid," he repeated, "and no reading on the sonic altimeter. The gravitic says we're five miles below the surface—theoretically."

He pressed the communicator signal, waited a moment, and called: "Bearing temperatures?"

"It's smoking. It would ha' blown up ten minutes ago if the engineers dat made it knew what dey was makin'," old Nelson answered hopeless. "It's runnin' eighty percent overload, and the—Hey, wait—"

"The repulsion's going," said Matthews flatly. "We'll find that damn solid now all right."

"Stop!" Grayson screamed suddenly. "Sol—"

The keening scream of the overloaded radite engine lurched up the scale and exploded into a ripping grind. Spattering bits of metal hailed against bulkheads and walls; the screaming hiss of a punctured air storage tank coincided with the sudden, sickening sensation of free fall. The bottom dropped out as the last gravity repulser died.

Matthews moved with the automatic reaction-speed of years of piloting. The lower steering rockets blasted a long howl of searing flame, for seconds the unwieldy ship jittered, swooped and balanced on the instability of roaring gas—then relapsed with a squashy thud on land suddenly clearly seen. Two hundred feet above hung the under side of a wavering blanket of mist.

"We join the procession," said Matthews bitterly. "We can't lift from here without those radite engines—and there won't be even a casing of that one." Already his quick strides had swung him down the narrow tube that led to the engine room.

He halted at the doorway. "Nels!" he grunted. "You weren't touched!"

"No, sir. But it won't do any good. The Venus jinx got us like it got everybody else. The rockets couldn't land because they couldn't see, and we couldn't land because the gravity-repulser blew up. And we can't take off like this. We're stuck, sir."

"We wouldn't be if we could just get a message out. We know, now." Matthews spoke bitterly as he stared out of a cracked bulletproof port window. "That damned blanket of mist just hangs there. It's safe enough—if you have a spare radite engine."

"But the ionosphere is so thick here," Grayson mourned, running shaking

fingers through his thin hair. "We can't break through to Earth with even the shortest waves. I'm afraid we haven't done any good."

"Maybe long-wave radio would work?" suggested Nelson doubtfully.

"No—that long-wave type bounces back even in Earth's thin ionosphere. We can't signal." Grayson was sadly positive.

"Maybe," said Matthews thoughtfully, "not all of those earlier rocketship expeditions were entirely wrecked. Maybe some of them—like our expedition—were merely marooned."

"The Italians under Polto were the last—and that was twenty years ago, almost. Is there any hope of fixing up those engines, Nelson?"

The engineer laughed softly and gestured. He clumped across the tight-packed engine room on his one sound leg, yanking queerly at the magnet-tipped wooden stump that replaced his lost leg. He stopped and pointed at a gapping hole in a thick metal and insulation tube. "The shaft of the main radite rotor went through the butt of the rocket tube. We built this trick boat with a couple big tubes, instead of lots of little ones, because it's lighter—like we built it with a couple radite engines instead of several. She won't float off Venus, though, and with one third of the rocket motor gone and both halves of the radite engines peppered through the walls here, we don't go. You can't build up gravity-repulsion without those motors, and we don't have enough machines to build new engines. We got lots of fuel, but no way we can burn it. No, sir. We don't go. What's it like outside?"

"We're near the edge of a swamp," Matthews grunted.

"We landed near the north pole," said Grayson, puzzled. "We should be in frozen land here, even on Venus. I particularly wanted to be away from possible dangerous life forms, and felt sure there wouldn't be any in cold regions of so hot a planet—"

"We missed it somehow, fellow," Matthews sighed. "Let's test the air and see if we get out."

HALF AN HOUR later Grayson appeared in the pilot room. He was equipped with helmet, plaited jacket, hip boots, and had two large-orifice Bronson guns in his belt. He stood staring out the port window at the dark-green vegetation that stood motionless, breathless, under the heavy, lowering ceiling of mist. The mist billowed slowly, lazily—like waves in a placid, inverted sea. The vegetation did not move. Despite the miles-thick mist-layers, the light was comfortably brilliant and queerly shadowless. Nothing whatever moved out there, no leaf, no twig—

"Matthews! There's something living out there!" he yelled suddenly. "Hurry—"

Nelson, from his vantage point at the one uncracked engine-room port suddenly snorted. "It's a man—no, an—Hey, what is dat t'ing? It looks like a cross between an ape and a man."

Grayson stared at the thing that waddled out of the brush placidly. It was manlike, some six feet tall with hunched, hugely muscled shoulders and shambling walk. But the face had the broad, amiable grin of a moron, with dull, deep-set eyes under shaggy brows. He stopped and looked at the window where Grayson stared out. Suddenly Matthews was beside Grayson, looking out in silent fascination.

"He isn't human—but maybe— Do you suppose some of the expeditions weren't entirely wrecked, that he's some half-breed?" Matthews spoke softly.

"No," Grayson spoke softly, too, as though afraid the native could hear. "Impossible. The races of two planets—they could never cross. It's just parallel development. There was the saber-tooth tiger in North America, and in

South America. Because it was isolated and had no large mammalian carnivores, it developed the saber-tooth marsupial. It's just parallel evolution."

The Venusian raised a huge club in his hand and waved it in a gesture that somehow was quite friendly despite the savage bludgeon. "Let's go out." Grayson turned to the lock.

Thirty seconds later he stood in the open outer lock door and looked at the giant native. Under shaggy-haired brows the Venusian looked at the Earthman with the peaceable friendliness of a moron. He grunted queerly clacking, hissing syllables and looked at the Earthman.

Vainly Grayson tried to form the sounds. Tongue-clicks and clucks, and gurgles from a constricted throat were beyond the man trained to English speech. "We need an Arab or a Hottentot," he thought vaguely. They had those queer tongue-clicks and grunts in their languages—were used to them.

The Venusian opened his mouth, twisted it laboriously, and grunted: "Co . . . may . . . stah."

Grayson stared. That labored mouthing—the syllables so unlike his previous words—

The native writhed his lips and grinned wider. "Par . . . lah . . . tay . . . ah . . . tah . . . liyan . . . oh." The moronic giant nodded affably, and his loose lip fell in happy triumph.

"Si . . . Si!" gasped Grayson. "Polto . . . Polto . . . Conoscete Signor Polto?"

"Si." The giant native nodded. "Polto—" He dropped his huge bludgeon to point his finger at his head and make quick circling movements as he shrugged massive shoulders with a queer little gesture that was unmistakably, unquestionably, pure Latin. "Polto dico. Too say batso."

"'You're nuts?'" Grayson looked at the native curiously. Suddenly he realized Matthews and Nelson had joined him. "He's speaking Italian!" Grayson snapped. "Polto landed here—or near here. He—"

"I speak Italian, too," Matthews interrupted. "Where is Polto?" he asked the native, proving his statement.

"He come. Queen Theresa come. They come slow."

"Who are you?"

"T'rog," said the Venusian.

Matthews shook his head. "Not to us. We can't say that. We'll call you Throg. Understand?"

"What's he say?" asked Nelson uneasily. "How come he talks Italian?"

"Apparently every expedition that's tried to make Venus did as we did and headed for the pole. Polto did. He landed alive, apparently. He's taught them Italian, probably because he couldn't handle their clicks and clacks. This one's name is T'rog. You stick your tongue on the roof of your mouth, snap it off with a clicking noise and say 'rog' at the same time."

Old Nelson looked at him. "Not me. I don't do those things."

GRAYSON was suddenly, vaguely surprised to realize that there were half a dozen—a dozen!—of the natives. They seemed to grow out of the ground soundlessly. All looked at the ship and the Earthman with friendly, stupid grins. Some carried massive bludgeons, some bows and arrows, some huge spears. Others—a very few—carried queerly bent sticks with jagged chips and bits of crystalline rock fastened on firmly.

Throg spoke suddenly. "Polto come slow, but Queen Theresa she come slower. Polto round bend."

Abruptly a group of natives burst into sight, with a sweating, panting, ragged little gray bearded human among them. The gray-bearded little figure stopped abruptly. "A ship!" he yelled, and ran forward exultantly, dancing in joy. "A ship—and it is not smashed to ruin! It

is safe! We go home—Theresa, my little Theresa and I go home!"

"You're Signor Polto?' asked Grayson.

The little man pulled himself upright with a sudden, curious dignity. "Si, signor—I am Polto, the first man of Earth to land alive on Venus. The only man to land alive on Venus, till you came."

Matthews looked at the natives. Some women had come; blocky, hunched females with the same blankly friendly, moronic eyes. They stared in the same childish, interested way as the men. "My little Theresa" and "Only man to land alive on Venus" came back to him. He wondered about this Queen Theresa.

Grayson was speaking, shaking his head. "I'm afraid, Polto, we've come to join you, rather than to take you back to Earth. The ship isn't much damaged—but the engines are hopelessly ruined. The hull without power is as useless as a broken ship. What happened to you?"

Polto shrugged. "We had to lower on rockets—very slowly. That is fatal. Rocketships must never go slowly. We thought we would make it, because we carried more energy in our fuel—we used stabilized atomic oxygen and boron, you know—than any before. But we used it all, and still the mist. We dropped perhaps five hundred feet, and because the ship was very lightly built, it crumpled gently. We were not all dead—I lived, and—"

A wild scream flared out of the dripping jungle growth. There was a directionless quality to it that was terrifying. It came from one direction and all directions; something was happening back in the moveless, dripping jungle under the lazily eddying blanket of fog. The natives suddenly danced to their feet, and stared toward the dense, swampy growth. An odor of rotting vegetation and silence filled the air.

Another throaty scream shot out of nowhere, then a chorus of shrieks and a vast animal roar of hate and pain. And, for a single infinitesimal instant, a queerly sweet humming noise. The vast roaring bellow of anger was cut off as though by a suddenly dropped soundproof wall.

The natives were suddenly grinning, moving in an eddying whorl toward the jungle growth. Every face was livened with a keen and evident anticipation. Even Polto seemed to feel a keen anticipation. "Xyll!" he grunted. "They found xyll. Good. They will like and remember you, for you brought good luck. There will be a feast."

The natives were eddying back, and a terrific crashing of underbrush and chanting accompanied their return. A score of them were tugging at each of three ropes, and presently they dragged the thing into the swampy clearing. The other natives were following it with keen interest, and Grayson and Matthews stared with equal fascination. It was an ugly, horn-skinned monster with four blocky legs and a huge knobbed tail. Rows of spikes like gigantic porcupine quills protruded from its neck and head, and huge dinner-plate eyes covered the sides of a tiny head perched like a control cabin above an immense scoop-shaped mouth.

"There will be a feast," repeated Polto. "A very great feast. Xyll is good, very good."

Throg had drifted back and stood looking up at them. "You make roar again, please?" he suggested with a toothy, friendly grin.

"Roar?" said Matthews, bewildered.

Polto was suddenly laughing uproariously. Tears streamed down the seamed, weather-beaten cheeks and tangled in the unkempt beard. "Roar! Si, roar, my friends. Throg, he has the idea! You landed with the rockets for a moment—just a moment—but it was a mighty roar. So the xyll roars back and forth when they hunt their mates! You have

the xyll-call in your ship!"

Matthews grunted. "We can't do it again. The tubes are clogged with swamp mud now, and we'd just blow up the ship. And I couldn't balance the ship down on those tubes again if our lives hung on it again. That was luck, not science."

Grayson was looking at Polto thoughtfully. Throg had said his characteristic gesture was that twirling finger at the forehead and a shrugging "You're nuts!" One thing morons were extremely clever at, as Throg had shown: mimicry. That shrug, even with the massive, humped shoulders of the hairy natives, had been pure Latin, a gesture so wholly, typically familiar it had been unquestionable perfection of mimicry. Equally, that twirling finger had been mimicry.

"Polto," Grayson asked suddenly, "Throg said your characteristic gesture was this, accompanied by 'You're nuts!' What did he mean?"

Polto grimaced, shrugged his shoulders with a little gesture that seemed rather an imitation of Throg's than the original of Throg's mimicry. "You'll find out, if you can't leave. They are crazy—queer—in a most peculiar way. They have no sense, no brains, but they learn Italian quicker than I learn their language. And they learn to understand very quick. Too quick."

MATTHEWS jumped down from the lock and strolled over toward a chalky cliff that thrust up an island of drier land in the swamp. The natives had dragged their xyll over there, and were beginning to hack through the horny armor. Matthews watched them a moment, then sat down wearily and began figuring with pad and pencil. Several of the hairy natives came and stared over his shoulder. Matthews moved uneasily, then finally relaxed in resignation and continued.

"Polto," Grayson asked suddenly, "do they have any written language or understand writing? Do they know anything?"

The little Italian shrugged characteristically. "I don't know. I lose my mind trying to figure them out. Today they know everything; they fell a tree accurately so it falls across a stream and they cross. They move a boulder with a lever and ingenious fulcrum. They do things with mechanical things—stones and trees and sticks of wood—that even I would not think of. Tomorrow—they are dumb, witless. You have seen their crystal sticks?"

"Those slender sticks with crystals embedded as saw teeth?" Grayson questioned.

"Ho! Saw teeth, eh? You have not seen. But you will—and you will ask me if they know anything."

"What are the crystal sticks then?" asked Grayson, watching Polto narrowly. Twenty years among moronic natives, apparently with a native wife—

Matthews' voice echoed sharply. "Hey, let go, Throg! You don't want—Ouch!"

Grayson started toward him at a run, Nelson close behind. Throg had yanked pad and pencil from Matthews with a friendly, broad-toothed grin. "Throg look—not hurt—show picture."

Matthews yielded, nursing a wrist bruised by enormously strong fingers. Grayson joined him, Polto and Nelson close behind, and said: "He won't hurt it, he only wants to look, I guess. What's the matter with the ship?"

Matthews nursed his wrist and grunted. "Everything. We hoped to make it with the newly developed antigravity engines Dr. Grayson here helped develop. They were too new. They got us off Earth all right, and the rockets brought us over, but when we started lowering through Venus mist, it meant hours of continuous run. Not more than ten miles an hour for one hundred and fifty miles—fifteen hours of steady pull. They didn't stand up. The port radite

engine simply failed, and with the other one then under a 180-percent capacity load—

"And to complete the picture, the rotor shaft stabbed a hole in the butt of the port main rocket tube. I was trying to figure a patch. We might get out to space and signal help if we could do that."

Throg touched Matthews' hand, and the Earthman jerked away uneasily. The native merely wanted to return the notebook and pencil, which the pilot accepted.

Matthews looked at the page Throg had been working on and stared. "Hey. Hey, Grayson, look."

GRAYSON looked. On one page was the rough sketch Matthews had done. On the other was Throg's effort. The lines were jerky and wavered like a child's work; the powerful native didn't have the delicate neuro-muscular co-ordination of a Terrestrian. But the drawing was recognizable—or almost.

"Why, it's a representation of a cross-section of a radite engine! Where—" Hastily Grayson turned through the other pages of the notebook to find the original Throg had copied. There was none.

"They do those things." Polto shrugged. "They're nuts."

Grayson looked at the sketch more closely. "Matthews," he whispered softly, "this is not quite a radite engine. That's in a new aspect to the rotor there . . . and . . . by all that's holy, that's a design I didn't think of, but should have—because it's *better!*"

Throg grunted suddenly and snatched the book. Crude lines built a square box about part of the engine, then he turned a page and sketched rapidly. Below the sketch he marked in scrawled, shaky symbols a mathematical expression of some kind. With a self-satisfied grunt he returned it to Grayson. Grayson stared bewilderedly at the sketch. Softly he heard Polto's "They're nuts," and heard him wander off toward the xyll. Nelson was wandering off, too.

Grayson felt his mind was wandering off. The new sketch was another version of the radite engine, with yet another difference. The mathematical symbols below didn't make sense at all, because he'd never seen any like them. He stared at them in puzzlement, because he knew perfectly well that morons didn't do mathematics.

Throg grabbed the pencil and pad, and sketched some more. When he returned it, Grayson stared again. There was another line of crude mathematical symbols, only this time the symbols made sense because they were familiar. But the equation wasn't. He thought a long time, changing, rearranging, reducing, before he understood. Then he looked at the radite engine sketch.

"Matt, they may be nuts, or I may be nuts, but that thing isn't. You see that coil? Look at this expression here. It's a wholly new development from the gravity line repulser theory, and it shows that this coil will act as a self-exciter. With that modification, we could run one radite engine at half speed and get all the effect we wanted, once we'd built up the field, and we'd build up a lot faster."

Matthews stared. "But we haven't got one engine—or part of one—and I can't pilot the ship with only one tube in action, either. That's worth another fortune to you if you can get back to Earth—but not a damn thing here."

Regretfully, Grayson recognized the truth of it. Throg's friendly, self-satisfied grin had gone to a doleful expression that curiously matched Grayson's feelings. The scientist looked at the brute man with a deeper puzzlement, a deeper wonderment as to the source of that queer and highly technical information. These natives were not human; perhaps their laws of inheritance were different, perhaps they could inherit buried tech-

nical knowledge, the knowledge that, ages before, perhaps, their ancestors had developed and forgotten somehow, in between. It might be that only when two halves of the necessary information came together in some scattered genes of inheritance did that inherited memory survive.

Somewhere there, in the more tropical parts of Venus perhaps, there might be mighty ruined cities, relics of a vast, forgotten civilization. Grayson stared southward, toward the slightly more brilliant southward and sunward horizon.

"GRAY!"

Grayson started out of his reverie as Matthews snapped his name. "Eh?'

"Listen! Do you hear what I hear?"

Grayson cocked his ears. There was a sound, a queer wailing and rising and falling of flutelike notes that he could associate with nothing he had heard on Earth or Mars—nor anywhere in the Solar System. With a start, he saw that the natives were all prostrated. Nelson, stolid old Nelson even, seemed to be startled into immobility.

Throg, alone of all the morons, was on his feet. "Comes Queen," he intoned.

"You speak English?" Grayson asked, amazed.

Only gutturals answered him. There was no sense to it at all.

Polto came over from where he had been crouching. "Theresa," he croaked. "She come."

"What in—" Grayson commenced, then checked himself. It was no time to lose his temper. Nelson was standing near a huge chunk of the carcass of the xyll.

The wailing notes rose and fell weirdly. A procession was on its way. The natives, face down in the soggy marshland, did not move. Nelson walked over to where Grayson and Matthews was standing. The air of the place was filled with the sound which could not be associated with anything in any of their experiences or minds. It was a hypnotizing, unnatural, and mystifying rhythm.

The word "nuts" was once more on Grayson's lips, but he couldn't say it. To be honest with himself he had to admit in his mind that he did not like the sound of this wail.

Nearer and nearer came the unearthly music, if music it was. In the distance there were jungles and vistas such as the men had never seen.

Giant natives appeared, hairy of chest and with rippling muscles, but with the same vacant eyes the first had exhibited. The wail of the instruments they carried was like a dirge; it rose and fell in a cadence which could be compared with nothing before heard by any of the Earthmen. In the midst of the procession was a sedan chair, or what might be likened to one, had it been on Earth. Four natives had the thing in their hands, carrying its seemingly precious occupant.

Theresa! Queen of the planet Venus. Grayson wondered what she would be. Some half-breed daughter of Polto—They were about to see her.

The palanquin, or whatever it might be called, was set down with great ceremony by its bearers. A tall, sinuous brunette stepped out. Grayson distinctly heard Matthews gasp. She was beautiful, this self-styled queen of a race of morons. She was only a young girl, but unquestionably of purely Earth parents.

"Down!" the girl snapped. "Before Theresa all prostrate."

But Matthews did not go to his knees before her at that. He only gazed at her raptly—like a sick calf, Grayson thought.

"So—I said, 'Down,'" repeated the black-eyed queen.

Servitors of the native assemblage waved fans and tall rods with bubblelike appendages before her flushed face.

Prostrating themselves, all of them, including Throg now.

THEN, so suddenly it startled Grayson, the regal Theresa changed. A sudden wave of joy seemed to sweep her, the regal anger evaporated, the stiff carriage was gone and in an instant she was flying to him, clutching his arm passionately, speaking to him in breathless Italian so swift he could scarce catch her meaning.

"Oh, father was right—Polto told truth. You are from Earth, you are from the home-beyond-the-mist! Always, papa said that when men did not bow at my command, then those men were of Earth! You are of Earth, you will take Theresa back . . . you will, please—"

Polto came up suddenly, an apologetic little smile crinkling his unkempt beard. "So, my little one, so. They are from Earth, and now you will understand." He turned to the Terrestrians as the girl now clung to him, looking with wide, curious eyes at the lean, quiet little Grayson and the erect, commanding stance of Matthews, strange to her eyes used only to the shambling, stupid, but amiable morons.

"I taught her thus," Polto explained with a little shrug," for several reasons. She must command the morons—and God alone knew when I must die. And she would not know quickly the men of Earth; she could not understand what is meant by intelligence in the eye, the face. I . . . I am not what I was, and offered poor comparison to her." He shrugged. "This was the only way to serve her thus in both ways. And—I knew men would never cease their attempts."

"I thought you said you alone reached the planet alive," Matthews questioned suddenly.

Polto's face was suddenly haggard and haunted. He gulped and held the girl tighter. "I . . . I was. The ship crumpled—the men screamed and died. I . . . I fell on the three others in the control room, and lived. My wife, my other Theresa, was in her berth, pillowed and protected in every way, for I was mad and she was mad, and she had accompanied us.

"I was the ship's doctor, and when we had landed and the ship split like a rotten fruit, I went to her. She—was dead, and I was alone, so I had to perform very quickly the operation that saved little Theresa. My arm was broken, but it was done. The natives came then, and they were friendly and witless, but one of their women took Theresa. Somehow, one of them set my arm, for I was unconscious for many days—nearly a season, here.

"I taught them then, and raised Theresa to know that she was the Queen from the Skies." The queerly pompous little gray-bearded Italian seemed more majestic and strangely representative of Man, then, as he held his daughter. She looked at the strange, erect and confident men of Earth. Grayson felt a new respect for this marooned scientist of two decades ago. "We lived," the little man shrugged. "I knew men would not cease to try."

A terrific roar from the fern jungle brought everyone to their feet, Earthman and native alike. Native spears were poised.

"It's the biggest xyll in the wilds!" screeched Polto. "He heard that other!"

There was a crashing of jungle fronds, soft and clinging and wet as they were, as they gave way to the plungings of the enormous beast. Theresa whimpered with a little purring whine. Grayson drew his Bronson gun, as did the other two Earthmen.

The monster which broke into the marshy clearing was maddened by insects of a sort that could evidently pierce

its thick hide and scales. Its snouted head weaved madly; its small eyes were bloodshot.

Nelson was the first to break on sight of the thing. His Bronson spat forth its message of death. White flame split the gloom of Venus and there was a kicking, screaming monster wallowing in the bog.

"Good work!" shouted Grayson.

"Pooh!" said the queen. "Theresa has a better weapon than that."

"Good," grunted the moron. "Good weapon. We have better though."

THE SCIENTIST rubbed his fingers through what remained of his hair. Here were things to think about; things, not to worry about, but most puzzling to the mind. These primals: what could they know of science or mathematics? Yet they did—or they remembered fragments of knowledge from an ancient source. That was it—yes—words and figures came to them unbidden, unsearched-for—or maybe there was a search that Grayson couldn't figure out. As beings

with life and movement, they didn't know what it was all about. Still the intelligence was there, somehow unavailably within themselves.

"Matt!" he called.

Matthews was absorbed in Theresa.

"You come with me!" Grayson insisted. "I want to talk with you seriously."

The spaceman came, and Theresa was borne away, pouting. A strange, but likable, almost wild, creature. What had she meant when she spoke of a better weapon? An old one of Polto's from Earth, Grayson concluded.

Matthews grinned sheepishly. "What's so serious?" he asked.

No one could long remain impatient with Matt. Grayson grinned back at him. "Everything, Matt," he said. "Have you thought much of what we've seen here? Have you realized what has happened to Polto and his daughter here? Any idea what it's all about?"

The younger man sobered. "I sure have—more than you think. I even did a lot of thinking before we got here that I didn't tell you about."

"So you knew the fuel was low before we landed? How'll you get us away?" asked Grayson.

Matthews looked away. "Frankly I'm stumped. Sorry. But the *Dragon* is no use without the radite engine, and that could be brought only by a rescue ship—if we could radio for one. Even then, I doubt whether they would come either from Mars or Earth—you know what the space lords think of *this* planet. We're stuck . . . unless"—Matthews hesitated—"unless a miracle occurs. And I don't believe in miracles."

Well enough for the younger man to take it so calmly. Grayson did not want to be marooned here forever like Polto. But he shrugged resignedly, then brightened: "At least we can learn what power it is that brings such intelligence to Throg's poor mind. We'll have something to occupy us."

"Maybe he'll be able to help us," Matthews suggested jokingly.

Grayson wondered. Might be something in this, at that. He decided to do a great deal of investigating. He was suddenly hungry. The odor of xyll steaks broiling over the open fire was strong in his nostrils.

"Suppose we could eat a chunk off that beast?" he asked Matt.

"Why not? Polto and Theresa eat it and are healthy. Let's go."

Forgetting their problems for the time, they set forth to where the natives were massed about the glowing coals of the fire. Nelson and Polto already were gorging themselves.

"Move over," said Grayson.

Nelson and the Italian obligingly made room, and he and Matt squatted near them. Nelson poked into the coals and drew out a large chunk of the meat of the xyll, handing it to Grayson on the stick he had speared it with. It was wrapped in wide, charred fronds and gave forth a most appetizing aroma.

"Have a bite," grinned Nelson.

Grayson bit; he ate ravenously of the sweetest meat he had ever in his life tasted. Who could dream, even wildly, that a monster like the xyll could produce so succulent a mouthful? The scientist relaxed with his satiation. Venus wasn't so bad after all.

He looked over at Polto, who was leaning back on his elbows, fully and sleepily stuffed with food. The terror of that long-gone landing had slipped from him again. And the daughter, poor kid—all these years of bringing up on this planet of morons.

Grayson's eyes wandered around the circle of reposing Venusians. They were laughing, happy, obviously bantering one another in their own guttural speech. Occasional loud bursts of laughter would greet a sally from one of their number. Grayson reflected that morons are frequently possessed of an unusual amount of wit and good humor.

He wished he was able to understand their jargon. Why, some of the most famous court jesters of ancient Earth history had been morons. Perhaps it was not so bad a state of mind to be in. At least they seemed to have no worries.

His eyes again lighted on Polto. He moved over to talk with him.

"You want to speak to me?" the Italian asked drowsily.

"What do you know about these ideas the natives get? How can they make these drawings and put down figures they do not know?"

The Italian shrugged helplessly. "In twenty years I have not thought it out."

"I have an idea they have memories, racial memories perhaps. Inherited scraps of knowledge from a higher civilization they've lost. Are there any more intelligent races on Venus? You must have explored it some," said Grayson.

Polto shook his head. "Not much. The natives will not go—and I cannot go alone. They say there are no cities; that it is everywhere the same."

Grayson was more than ever puzzled. Polto couldn't help him any, he could see that. Scraps of knowledge . . . from where?

HIS COGITATIONS were interrupted by a wild scream which rang out through the swampy fern jungle.

"Theresa!" yelped Polto. "She is in danger." He leaped to his feet.

"Easy," counseled Matthews. "It's her voice, but I don't think she's in any real danger." But Polto was already on the run.

Alarmed, Grayson, Matthews, Nelson, and most of the natives streaked after him. There were other screams, now close at hand.

They crashed through the tall tree-like fronds, and then were in a large clearing in which was a sizable but which obviously was the "palace" of the queen. A xyll-like beast with carnivorous fangs of such tremendous size that Grayson could hardly believe his eyes had the girl Theresa cornered. The beast had trampled her courtiers under its massive feet and was bellowing in rage. A dozen heavy spears hung from it. The girl was silent now, desperately edging her way toward the door of her palace.

The Bronsons spat forth flame, but it spattered almost harmlessly against the scaly hide of his super-xyll, burning him deeply but with insufficient energy to reach a vital spot. Polto had an ancient Barratini that shot its stinging charges with no more effect than a popgun. But the stings of the Bronson charges were merely further maddening the monster with pain. It wheeled to face its new enemies.

Grayson's two guns had almost exhausted their loads when Theresa had gotten inside the hut and was out again with one of the native crystal-studded weapons, a futile thing against that hide. She raised it quickly, sighted along the rough crystals, and there was a screaming hiss. No flame, no singing dart or other missile, nothing that could be seen came from the bit of crystal at the front end of the queer arm. The mountainous xyll collapsed into a smoldering, twitching mass. The great beast was dead.

Theresa, beyond doubt, had a superior weapon. But what was it?

Polto had his daughter in his arms and was assuring himself of her safety. "You all right, bambino?" he asked anxiously. "Sure you're all right?"

"Yes," she laughed tremulously. "But I had a bad scare."

The Earthmen crowded to the flagged porchlike entrance. Matthews, of course, nearest to the girl. Grayson, seeing that she was unhurt, turned his attention to the weapon she had used. It appeared to be made in the crudest manner possible, from a piece of a tree limb, a large jagged bit of crystal, a metal endpiece

that might once have been a portion of a tin can, and a few odd-colored bits of rock and crystal, roughly shaped.

Theresa saw him eying it and smiled past Matthews. "You see?" she exulted. "Did not Theresa tell you she had a better weapon?"

"You win," chuckled the scientist. "But what is it and where did you get it?"

"It's a—what do you say—heat ray. Throg made it."

"Throg!" Dazedly he reached for the crude thing as the girl gave it into his hands. "Throg! It isn't possible."

"Careful," warned Theresa. "This catch releases the ray." She indicated a small strip of crudely hammered metal attached to the rough unfinished stock.

Grayson turned the thing over in his hands, unbelieving. From the weight of it, he judged that the largest bit of crystal had in some way been hollowed, and that it contained the generating force of the heat ray. The tin forward end was just what he had judged it to be; a cylinder rolled up from a piece of tin can. Evidently these, the only visible metal parts, had come from the wreckage of Polto's ship many years before.

"Want to try it?" Theresa asked him, seeing his great interest.

"Try it? On what?"

"That tree." The girl indicated an enormous, fronded trunk at the edge of the clearing. "Try it," she repeated, seeing his hesitation.

Matthews and Nelson watched with great interest as he raised the weapon to his shoulder and aimed at the base of the huge trunk.

He pressed the catch. There was only the screaming hiss, no recoil, no visible ray. But the great tree trunk was neatly and soundlessly cut down, the stump and the severed end of the already crashing trunk smoldering with little tongues of flame licking here and there. At the moment of impact there had been a blinding flash over there where the ray contacted—nothing more. The heat generated must be terrific.

And yet the stone power bowl of this weapon was not even warm.

"I'll be damned!" was all Grayson could say, returning the weapon to the girl. "Thanks."

He stared at Matthews, who was agape. "You heard her, Matt," he said. "A heat ray. You saw it. And *Throg* made it—from nothing. We're going to have a talk with him."

GRAYSON and Matthews collared Polto. "We want to talk with this Throg," the scientist told him. "Will you interpret for us? You know his language, don't you?"

"But I don't think I'll help much." Polto shrugged in the characteristic, hopeless gesture. He doesn't speak any English—but he understands you."

"What?" Matthews exclaimed.

"It is so . . . you'll see," the Italian affirmed.

Grayson looked significantly at the young pilot of the *Dragon*.

Matthews nodded solemnly. "Let's get Throg."

They found the smiling, vacant-eyed Venusian at the base of the white cliff.

"Ugh," was all he said.

"You understand what I say?" Grayson asked him, in English.

Again the native nodded, smiling foolishly but engagingly. He uttered a string of harsh gutturals this time.

"What did he say?" the scientist asked Polto.

"He says as usual—that he understands. They always say—and do." The old Italian shrugged.

"Not so nuts as Polto thinks, maybe," Matthews said under his breath.

Then, turning to Throg, Grayson asked: "Can you tell us how you made the weapon used by the queen?"

This time Throg shook his head in the negative.

"But you made it!" protested the scientist.

Throg grinned amiably, and with a characteristic Poltonian shrug, said: "You're hopeless . . . you're nuts. You'll drive me crazy."

"You get that knowledge from somewhere," insisted Grayson.

Again Throg nodded amiably, with a funny little concentration of bushy brows that were never meant for thought.

"Where do you get it?" Grayson was becoming patient and interested. The problem, the mystery of this queer creature's half-glimpsed wisdom was baffling—and intriguing.

Throg sputtered and mouthed difficult Italian, then, surprisingly, mouthed a clearly English word, "Dunno," and burst into guttural cluckings and clickings. One laboriously mouthed word intruded, something like "benzul."

Polto shook his head slowly and translated. "I've tried for twenty years, signori, and it is hopeless. It does not make sense. He is crazy with an astounding craziness, I tell you. He says he's cold, but he likes it, and he's going in the house—the big house—because the ashes fire is going out and the flame fire will, too, and he wants the 'benzul'—whatever that is."

Matthews swore gently. "That," said he, "is this thing." From his pocket he drew his notebook and pencil. Throg nodded amiably and grabbed them. He flopped onto the ground for this composition, and labored mightily. Long strings of weird mathematical symbols followed, traced in sloppy, jerky lines, staggering across one page onto another. Throg turned a page, and other straggling symbols followed.

Then he stopped, and the queer little frown of terribly labored thought wrinkled his placid, shaggy brows. A straggling line of poorly formed, but recognizable symbols followed, then another and another, till finally Throg grunted in annoyance, handed both notebook and pencil to Grayson, and grinned amiably. He walked off with a clacking grunt, leaving the party where they were.

Old Nelson shifted his wooden leg out of the hole it had sunk into. "He got disgusted, I guess."

Polto looked after him in resignation. "He simply said, 'I'm tired. Good night,' as usual. He worked unusually long that time."

Grayson looked after him, then at the book. There were fully a dozen lines of formulas in unknown characters, and perhaps three and a half in familiar form. But the formulas weren't familiar. "If these are translations, we can finish the translation. If they aren't—well, he may be willing to try in the 'morning.' I suppose there is no night here?"

"Once in about forty-five hours Venus revolvers. It gets a twilight dullness, but the refractive atmosphere prevents real dark. They all sleep when the light gets reddish." Polto explained. "Nothing will make them give up their sleep."

Grayson and Matthews noticed for the first time that a duller, redder tinge had crept into the gray mist layer. "I suppose we may as well go back to the ship and work on this for a while. Do you and Theresa want to come?"

Polto smiled and shook his head. "Theresa wouldn't like the ship, and I will stay with my little one. She is used to Venus."

GRAYSON labored over the mathematical formulas stubbornly. The symbols were exceedingly hard to translate, even after Matthews, a competent draftsman, had turned them into more or less regularly formed characters. But gradually, he was pinning down a long series of formulas, laboriously translating. Some, he found, didn't translate, so he had to use the original characters.

Old Nelson made coffee, and fried some eggs and potatoes, and they ate. "You know," he said in disgust as he saw Grayson's labors, "I'd be damned before I'd put in that much work on a crazy man's scratching."

Grayson sighed. "I wouldn't. Not when he's this crazy. That equation there, is, I've at last determined, a variant of Hartman's seventh-power field. That, they're beginning to think, may have something to do with the stability of the atom. And *this* equation arbitrarily introduces a function—this one I've called $F(\pi)$—which, from the action of the equation, is arbitrarily designated as the function which disrupts the equation."

"And," said Matthews softly, "the atom. That is a beautiful idea. Find the equation of the atom—arbitrarily define $F(\pi)$ such that it disrupts the equation—solve for $F(\pi)$—and you have the atom disrupter. *If* you can do it."

"Throg is a moron. He couldn't possibly think of that!" Grayson wailed. "He can't concentrate, he hasn't the knowledge."

"What's the next equation?"

"Solution for $F(\pi)$," groaned Grayson. "It checks, but I can't see how it's solved."

"And what," asked Matthews, "would the rest be?"

"That's what I'm trying to find out. The first one looks like an explanation of what the atom breaks into."

Two hours later Grayson knew. The next one was a solution for a different $F(\pi)$, with other conditions defined. Somehow, impossibly, Throg had given him twelve different solutions for $F(\pi)$ such that $F(\pi)$ was a function capable of disrupting the atom. Each was, apparently, a sound solution. Each defined a different method. Each method defined different products. There was another half-completed solution for yet another type of disruptive function.

"Hartman," said Grayson in weary disgust, "would be interested. A moron on Venus not only knows his prize accomplishment—he got the Nobel prize this year—but knows at least thirteen different ways of breaking it down. Polto is quite right. They're crazy. I'm going to bed."

Matthews looked at the formulas. As a space pilot, he knew mathematics fairly well. He recognized, by a few simple checks, that each of the different solutions was classic, sound, and beautiful. But he couldn't derive the solutions, because the mathematical steps had been left out, and he didn't think that brand of mathematics existed. He went to bed.

There was a dull, angry gray mist curtain hanging over them when they awoke. A little exploration revealed all of the natives and Polto and Theresa as well, sleeping soundly. Grayson irritably went back to his mathematics.

He had an advantage. Working both ends against the middle, the solution and the original against the unknown steps, using the power of all Earth's highest mathematics and three calculators installed in the pilot room of the ship, he broke it down. Then, because Throg and his source of information remained asleep, he and Matthews readjusted the calculator machines with some new drive systems that took advantage of perfectly magnificent and unheard-of mathematical methods he had found. Two more he developed himself from hints in the others.

He fed the incomplete solution into the machine, started it, and waited. It clittered and snapped and chuckled to itself for ten minutes, then thunked heavily as it printed a solution. Matthews darted forward, but Grayson stopped him.

"Wait," said the scientist. "That isn't the machine it used to be. It now has a brain as capable as our moronic friends; no longer handicapped like yours or mine," he explained bitterly.

The machine continued to chitter and clink. In half an hour it thudded heavily eleven times, then finally stopped. The final solution was $F(\pi)=0$. "That," explained Grayson, "means that that's all the solutions it can find. That makes a total of twenty-three different solutions that moron friend of ours could have written out if he'd taken the trouble. Incidentally, any one of the twenty-three would have made us billionaires on Earth."

"I wonder if we can't harness one of them?" remarked Matthews.

"No," said Grayson. "We haven't the needed material. Eighteen of these things are explosive, and the other five produce electric potentials so high we couldn't insulate them in this little ship."

"With good insulation—" began Matthews, perplexedly.

"You still need thirty feet of air gap to stop a fifty-million-volt potential," snapped Grayson. "But that's all right. Wait till that damned moron wakes up and we'll find out how."

THEY TACKLED Throg eventually, when Polto had finally induced the native to sit down near the ship for a while. Nelson finally turned the trick; he had some of his favorite rock candy stowed away somewhere aboard the *Dragon,* crystallized sugar as hard as stone. The moron sat down and sucked it with beaming joy on his broad, stupid face. He growled something.

Polto made a wry face. "It was a so-brilliant idea, your engineer's. But now he can't click his tongue, and nobody, not even I, can understand him. He will not stop. I still do not believe what you say. These people are wholly crazy. That insanity of ashes in the sky and being too cold and liking it when the temperature here never varies ten degrees."

"Hm-m-m," said Matthews suddenly, and sat down.

"Throg, what do you mean about the ashes and the flames and going into the big house?" Grayson asked patiently.

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Throg grinned amiably. "Dunno. Crazy, I guess."

Polto shrugged his shoulders and turned away.

For a solid hour they questioned Throg, while his answers became gradually more intelligible as the lump of rock candy dissolved. Finally, Grayson had worked a complete circle back to the ashes and flame.

This time Throg grinned amiably and shook his head. "No." The guttural clacking of his native language sputtered out in a broken stream.

"He's changed his mind," sighed Polto resignedly, rather annoyedly. "He says the ashes and flame aren't there at all. And it isn't cold, it's too hot; all the trees and grass are burning like ashes in a fire, and he likes it. They are," he announced determinedly, "crazy."

"No," said Matthews softly. "Not at all. Ask Throg if this is right." He thrust the series of formulas at the moronic giant.

Throg grinned, looked at it blankly for a moment, and shook his head. With a pencil he scrawled over it, crossing it out, and turned the page. He set down a dozen mathematical symbols of an entirely new type, then two more lines. Grayson groaned.

"Throg . . . Throg, draw the engine," snapped Matthews. "Candy, and we leave you alone . . . draw the machine."

Grayson stared at Matthews in amazement. Polto turned on him a gaze of whimsical questioning that made Matthews answer in self-defense. "No, I'm not crazy, Polto. I think . . . I think I get it. If I'm right, it's crazier than you ever thought."

Throg was scrawling lines and drawings on the sheet, holding the pencil like a dagger in his huge, brawny fist. Sudden crackling gutturals came forth as he looked up in amiable understanding, and then bent over his work.

"Now," said Polto, "he says there aren't any big houses any more. They were long ago and not good."

"Inherited memory!" Grayson gasped, grasping Matthews' arm savagely. "Memories from a long-forgotten civilization!"

"Memories hell!" snapped Matthews.

Throg looked up again for a moment. Again the harsh syllables of his own language came forth, then once more he was laboring over the drawing.

"He said he'd show you how the crystal stick works now," Polto explained. "He 'has the knowingness now," as he puts it."

Throg handed Grayson the notebook, looked toward Nelson eagerly, and mouthed, "Candy?" laboriously.

Grayson shook his head in bewilderment. "This isn't anything I can imagine. It must be that crystal-stick thing, but it doesn't look like it. It's simple enough—a few tubes of metal and glass—a couple of coils and a crystal oscillator of some sort—"

"Throg, what is that machine for?" asked Matthews sharply.

"He said 'You go away,' I think," Polto reported.

"Give him the candy, Nels," said Matthews. "I think we go home!"

"What do you mean, Matt? What is this?" Grayson asked.

Matthews was hurriedly examining the drawing. A few very simple little parts, a curiously designed oscillator, and a series of coils, and some queerly designed controls. "Gray, look at that. That's a control lever obviously, isn't it?"

"Yes . . . Si—" Polto answered as well.

"All right. Now, pray tell, what kind of a hand would grip that controller, please?"

Grayson stared. The grip indicated—very clearly indicated—could obviously be held by no human hand! It was a quadruple control, with obvious placement for *eight* independent digits!

"Throg," asked Matthews, "what color is the fire in the sky?"

HE GRUNTED a single syllable, then three more. Polto turned and looked sharply at old Nels, then gasped. "He says—like Nelson's shirt!"

Nelson looked down at his chest in surprise, rather stupidly lifted eyebrows startled at the idea. His shirt was a very bright blue, almost violet.

Matthews grinned. "Get it?" he asked at length.

"No! In the name of Heaven what is the answer?" demanded Grayson.

"That gadget he drew—I'm beginning to see what it is," Matthews explained. "He crossed out all the work he did last night, and wrote those new formulas. The last two he translated to our mathematical system. I can recognize two parts of them—one from last night's efforts, and one from your equations of the gravity repulser. That gadget turns the energy of atoms directly into gravity repulsion, or, if you change the setting just a little—a repulsion beam. Throg said 'You go away' because he meant that's what we'd do. He likes candy, but for two days we've been pestering blazes out of him. He'll be glad to see the last of us. That's our new drive system —three sheets of tin, and a homemade oscillator, or I'm a Dutchman."

"But how . . . how . . . how does he know?" stammered Grayson.

"Look. Last 'night' he talked about going in the big house because it was cold, but he liked cold, and about the ashes in the sky going out and the flame going out. Then he wrote down those atomic equations we never would have guessed at.

"Now, my friends, watch." Matthews continued, and stood silently looking at Throg. Throg turned leisurely and crackled his queer language to Polto.

"He says now that he has two hands on one hand and four feet and two feet on one foot. I know he is crazy," said Polto hopelessly.

"And I," said Matthews, "thought the question 'How many fingers and toes has the one who told you this machine you drew? He's a moron—but, like many Terrestrial morons, he's a telepath. Many of his race are, seemingly. And telepathy is queer—it doesn't weaken over any distance, so far as is known. You know the earliest Terrestrial experiments . . . the later Mars-Earth experiments. All faulty, all utterly unreliable—but all equally good. Distance doesn't matter.

"Somewhere in space, there's a planet circling a double-sun system, one of which stars is red—like dying ashes, and one of which is yellow—like flames, and the people live in huge buildings. And . . . those people know a great deal about atomic power. Last night our moronic telepath was picking up the thoughts of some scientist unguessable billions of miles away. Perhaps even in another galaxy.

"That crystal weapon?" Matthews went on to explain. "They picked up the thoughts of the race that doesn't live in great buildings any more—all that was long ago to them—and lives under a sun as blue as Nels' shirt. And they know tremendously more, even, than the race of the twin suns. Throg crossed out their elementary equations. You'll find, I'll bet, that these are a thousand times further advanced. And this machine gets us home. . . . Polto, do they have any other gadgets like the crystal weapon?"

Polto was thinking deeply, with constant waves of surprise and comprehension chasing over his mobile face. He burst into Italian at a speed the two Americans could scarcely follow: "They have, they have, they have! I . . . I am the crazy one. I am crazier than I even thought they were! They have a thing made out of crystals and stones and scraps of metal from my ship and bits of bark. They put a crystal stick in

one part of it, press the catch, and the ray is absorbed by a crystal without burning. But if they strap the contraption onto the carcass of a xyll, it floats so that a few men can tow it through the jungle!"

"Simple, eh," said Matthews. "They are morons, with the poor neuromuscular co-ordination of the moron, and the low concentrative powers. But they have at their command the knowledge of the greatest minds of the Universe. The simple things, they make. A bow and arrow are simple. They make them. But a transformer is simple too—just wrap wire around a chunk of iron—no matter how complex the electromagnetic theory is.

"The theory of their crystal-stick weapon is beyond us. but the mechanics of the actual gadget is well within their simple limits."

Grayson groaned. "We can do—but they can know. Matt . . . Matt, you take Polto and Theresa and Nels back to Earth—you can easily enough with that drive—and bring back an expedition with psychologists. I'll study here. But hurry. I want the psychologists to help—"

Polto roared in anger. "Take me back! You ship me from my Venus! I wait here twenty years, me, alone with my Theresa waiting, and now . . . now when something interesting is found, then you . . . you Americans who have just come, you try to drive me out! No! No, by ten thousand devils no! I stay. I will not go whatever! You shall go. I shall study. I shall learn, learn, learn again at last like a true scientist should!"

Matthews grinned. "Nels, you don't want to stay?"

Old Nelson grinned. "Not if I can help it. If that thing works—"

"It'll work. Probably the best engineers within this galaxy—and perhaps the next one, for all we know—designed it. And—"

Theresa came over toward them. Throg, sucking a block of candy, was leading her. "Gooobugh," said Throg. He turned back into the jungle, a half dozen other natives disappearing with him.

Theresa looked up at the Americans. "Throg said you wanted me," she said in a half-timid tone.

"You want to go to Earth?" asked Matthews.

"Theresa looked up at him doubtfully. "Maybe you tell me about it first, eh?"

Grayson snorted softly. Theresa would go all right, and Matthews would do a job of telling her about Earth. He looked at Polto. Polto stuck out his straggly gray beard and solemnly nodded.

"She go," he said softly.

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PRESSURE

BY ROSS ROCKLYNNE

PRESSURE

Rocklynne proposes a near-mutant thought in a story of a gambler who lost on the final gamble because—the sky's the limit!

By Ross Rocklynne

THIS was Silk Dubois' last class at the University of Cincinnati, senior year, and perhaps it was for that reason that seventy words which Professor Alec Stabel—Chemisty IV—uttered during one of his many divergences from actual textbook matter stuck in his mind, chronologically, word for word; and though Bob Dubois—he got the moniker "Silk" later—did not know it then, they proved to be the tragic introduction to his death seven years later.

"Yes, pressure affects chemical reaction velocities. Roentgen, in 1892, made the first successful attempt to detect an effect of pressure on a reaction velocity. He found that a pressure of 500 kg./cm.^{2} decreases the velocity of inversion of cane sugar by dilute HCl in aqueous solution.

"Later, Rothmund verified that experiment and also made another in which a chemical reaction was found to increase in velocity instead of decrease."

A month afterward when he graduated, the senseless bit of information persisted in sticking in his head, but it never did bother him particularly, though it recurred to him often as a rhythmic jingle.

Directly after his graduation it occurred to him that he must find a position. And he would have made a good chemical engineer if he'd have stuck at it, but somehow he drifted in with a crowd of night owls who played bridge all night at a restaurant called Hanley's, a college hangout on McMillan Street. They played for a tenth of a cent a point, and they generally managed to put in a few stiff hours of tennis at the university courts the next day.

This sort of life Silk found agreeable—chiefly because he found that he had astonishing genius with the cards. He began to find a tenth of a cent too low, so he got in with a crowd that preferred a good old-fashioned game of draw poker, with the skies the limit. But Silk shortly found that the sky stayed under a sawbuck, generally, and since his long, slim fingers—which had nerves very sensitive to the difference between, say, an ace of spades and a deuce of hearts—always managed to draw in every other pot, he began to ache for higher skies.

This quest led him through all the gambling spots of New York, Reno, Miami; and he went across the Mexican border to Tia Juana. Although he found small difficulty extracting his quota of winnings here, Tia Juana shortly saw him depart for cleaner realms. He could not stand filth and squalor, and he had trouble finding manicurists.

"Hell's bells," he muttered as he set foot to American soil just after having prevented a Mexican customs official from confiscating his wallet, "I'm going to take a bath in cyanide."

He went to California. He played a gambling ship or two, most profitably, out beyond the three-mile limit, and a

little bit tired of softies, he headed for New York City, and on the way discovered Saratoga and horse-racing. He put his whole roll on a twenty-to-one shot in the fifth and the nag came in.

"Hell," he thought, "everything I touch turns to gold, by Heaven, but there's something about horse-racing."

People began to call him Silk.

After a few years he kept his own stables. He'd run a horse a losing race a few times until the odds were pretty high, then he'd put a goodly roll on it, and bring in a winner.

He was riding easy and high, this dapper, black-haired little man whom everybody liked and called Silk.

But he lost occasionally, sometimes deliberately, for he thought that in this manner he could propitiate the goddess of luck. Often he thought, with a slight inward convulsion, that the laws of chance had not just kindly consented to let him get by. He felt that they were laughing behind his back, and just waiting.

"Hell's bells," he muttered cynically, when these thoughts came along, "I need a darning needle, slippers, and a rocking chair, by Heaven. Yes, pressure affects chemical reaction veloc— Damn!" There was that senseless jingle again.

"HELLO, BUD," he said to Andy Clayton. Silk had been leaning against the track railing, green felt hat pushed back over his sleek head, cigarette dangling from his pleasant lips as if it, too, was tired of all the people around and the hot sun. Silk had seen Andy Clayton—he didn't know him by that name yet—standing on the curb, frowning at a bookie's card. This Clayton wore tortoise-shell glasses, and he didn't have any physique. He had high cheekbones and firm though sensitive lips. But there was something about the fellow that struck a lost chord in Silk.

Andy Clayton looked up from the card when the stranger addressed him. He smiled hesitantly. "Oh, h-hello."

Silk looked over his shoulder. "That punk's selections ain't no good, bud. You take Rain In Warsaw in the second to win."

The young fellow's pale face showed instantaneous trust. "I have ten dollars, you know, and I decided to wager it and try to run it up."

"That's right," Silk approved. "Ain't must sense in the hard money, hey?"

"Oh, I've never bet before," the other protested. "But I've got a workshop the other side of Victorville in the San Bernardino Mountains out in California, and I had to have money to get back and I've only got ten. I decided to make the gamble, and if I lose—I hitch-hike."

"Yeah?" Silk was a little startled. Fancy that! "What work you in, bud?"

By this time they'd reached the betting booth and Andy Clayton reached a thin white hand through the grating and made his bet. Silk waited for him, and they walked back and sat down on a bench under a tree.

Silk repeated his question.

Andy Clayton coughed a little embarrassedly. "This will probably seem fantastic to you, Mr.—"

"Aw, just call me Silk."

"Silk? Oh." Then he went on, fumbling, as if he had tried to explain things before to other curious but ignorant questioners.

"Well, you know that up above the Earth there are other planets—you understand what a planet is?" he inquired doubtfully.

A whimsical smile touched Silk's lips. "Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto."

Andy Clayton's pale eyes shone, half in amazement, half in joy at having found a kindred soul. "You know astronomy?"

"Sure," said Silk laconically. "Mercury, hot; Venus, cloudy; Earth, green; Mars, ferrous oxide; asteroids, several thousand; Jupiter, ammonia; Saturn,

rings; Uranus, methane; Neptune, faint; Pluto, coal."

A delighted grin spread over Andy Clayton's face, but he said: "Why coal?"

"Aw, ain't Pluto the god of the infernal regions, and—oh, I read somewhere it had a low albedo."

Clayton stared at him, and then, as if he had made an amazing discovery he hunched closer to Silk, peering at him through his shell-rimmed glasses, and began to talk to Silk as one scientist to another.

"I'm building a space ship," he said impressively.

"Hell's bells," said Silk, "a young squirt like you?"

"I'm twenty-five," protested the other, "and I've devoted several years to it. Now look." He hunched forward. "You know, there's never been any doubt that man could go to the planets. That is, for the most part they know all the dangers—except one, of course, which I alone know. But there's the problem of fuel! They haven't been able to find a satisfactory fuel. But what would you say if I told you I'd found a fuel that would work?"

"I'd just about give a million dollars for the formula," said Silk.

"Certainly you would. Because it's the greatest discovery ever made. Think of it. Man can actually go to the planets!"

"Hey," said Silk, "you got this ship made yet?"

The pale, enthused face fell. "I haven't got the money."

"Aw, ain't that too bad," said Silk thoughtfully. He switched his head toward the track. People were yelling their heads off.

"What . . . uh . . . nag they yelling for, Silk?" asked Andy Clayton anxiously.

Silk came to his feet, yawning and stretching. "Gosh, it's hot. Oh, I didn't ketch the filly's name, but it's Rain In Warsaw all right. C'mon, bud, let's go collect our dough."

FIFTEEN MINUTES later Andy Clayton's weak eyes were beaming. His blunt fingers were counting out his two hundred dollars over and over. He was oblivious to the fact that he and Silk were standing right in the middle of the walk, and that people were hurrying past, with gloomy or happy faces, as the occasion demanded.

"Easy money," he beamed. He stuck the money in a seldom used wallet. He took off his glasses and wiped them; somebody angrily elbowed past him and jarred the glasses out of his hand.

They fell with a tinkle, bounced once, and then lay there dejectedly, lenses broken.

Silk turned a sickly white. "Aw!" he said huskily.

"What's the matter?" asked Andy, curiously. He didn't mind the glasses being broken, because he had money. Then he looked sharply at Silk and grinned. "Oh, a superstition of yours, Silk? Nonsense!"

Silk looked miserable. "Nonsense, hell," he said bleakly, and then he hurriedly took his winnings, which totaled a hundred thousand dollars, out of his wallet and thrust the wad into Andy Clayton's hands.

Andy looked at it stupidly. He drew away. "That isn't mine," he expostulated.

"Sure it is," Silk insisted. "It is now, anyway. I was going to give it to you anyway, Andy. You need money for a space ship, don't you?"

"Certainly, yes, of course, but—"

"But me no 'but,'" said Silk. "This is my burnt offering to the goddess."

He thrust the money into Andy Clayton's hands and rushed away, losing himself in the swirling holiday crowd.

SILK was walking down Broadway one day about a year later, appreciatively

breathing of the fine clean air that had happened along. It was a lovely day. He pulled his belt in a notch, and uneasily rubbed his disturbing overnight beard. He looked at his fingernails with distaste.

He ran into a man, but it was Silk who almost fell over, since the other was big and hefty and had diamonds on his fingers. This man reached out and grabbed Silk.

"Whoa!" he exclaimed. "Gods! I almost knocked—Silk!" he yelled.

Silk stood back a little, straightening out his coat. He grinned.

"Aw, if it ain't Peaches Dugan!"

"Silk!" Peaches Dugan yelled again, grabbing both of Silk's shoulders. "Where you been? You forgot the horses? You living honest?"

Silk uneasily wished his carefully knotted tie wasn't wrinkled.

"Naw," he said. "I got a few things going."

"Yeah?" Now that Peaches Dugan had a better look at him, his tone became sympathetic in a roundabout way. "Yeah? Well, more power to you, Silk! It's been a great year, a great year. Do-re-mi coming in like clockwork, hey?" he said with forced joviality.

"Cut the kidding," said Silk. "You ain't fooling nobody. Sure, I'm broke. Sucker, me? Took me three years to learn you don't lend people money during a poker game. But I never did learn not to give a sucker inside dope on a horse, and the goddess turned."

Peaches' heavy face fell. "Yeah, I know. It took Robert Benchley three years in college to learn you can't fill an inside straight. We never learn." Then his sweating, heavily jowled face got a stealthy look. He leaned close to Silk. "Put every cent you can scrape up on Lady of the Mask, the first at Belmont! It's in the bag!" He winked a sparkling eye, and the next minute he was gone on down the street.

"Sucker!" said Silk, staring after him sadly.

But he pulled out all his money—three nickels, four pennies, a quarter, and a Canadian dime.

Fifteen minutes later he was in his attic room in an apartment house on the East Side, and was looking at a squat black Smith & Wesson .38-caliber revolver.

"I'm a sucker for the pen," he muttered, "but Lady of the Mask, I can't resist you."

A MONTH LATER a little man, nattily dressed in old clothes, if you can imagine that, entered the revolving door of the Iroquois National Liberal Loan & Trust Co., in Palettesburg, took a pine wedge out of his pocket, kicked it tight under one panel of the revolving door, slipped a mask from under his hat down over his eyes, casually went over to the single tiller's cage and said:

"Step back from the window, bud, and don't touch anything. This is a stick-up."

This was a small bank, serving as it did a small town. People came in infrequently. It was one of those blessed times for bank robbers when nobody's got anything to put in, but still enough so they don't have to draw.

The cashier had a mustache, a tanned face, and eyes that didn't blink when they saw the gun. But all he did was to raise his hands like a highly intelligent man, and step back from the window.

Silk smiled approvingly. "Very, very good. You will now proceed to hand me those thousand-dollar bills in the till."

The man swept his hard eyes up and down over Silk, as if he were impressing Silk in his memory. Silk began to perspire under the collar. He moved the Smith & Wesson suggestively. The man turned and began drawing bills from the till; so slowly that Silk, who was not ac-

customed to robbing banks, began to get jittery.

"Hand 'em over, you," he snapped nervously.

The cashier obligingly stopped counting and handed the wad over. Silk, feeling as if he wanted to yell out loud, his nerves were so bad, started to back away. The cashier moved a step forward, and suddenly his hand streaked down, toward the burglar alarm.

"Don't do that," yelled Silk, and his gun went up blindly. It was just an instinctive reaction, he had done it with the senseless feeling that he could ward off the sound of the alarm.

No alarm sounded, but the gun went off deafeningly. The tiller got a surprised, supremely curious expression on his face. His hand went toward his heart, where some blood started to gush out. He fell.

Silk looked at where he had stood, stupidly. Then he walked over and looked through the bars at the huddled figure.

"Aw," he said foolishly, "I've killed a man."

The gun, dropped from his fingers. He moved toward the spinning door and pulled the chock out. He swung the door. It had been about seven seconds since the gun went off.

So when he got out on the street, people were just turning to look. They saw Silk walking out of the bank, and several men started toward him.

But Silk ran across the street, got into the tonneau of a car whose shabbiness concealed its high-powered motor, and said to the indescribably evil-looking man in the driver's seat: "All right, you'll get your cut," and the car roared away, leaving a man in the bank who was able to give an astoundingly minute description of Silk before he died.

"KNOW anything about a guy name of Andy Clayton?" asked a little tramp about two months later.

The storekeeper wiped his hands on a stained apron, and thought to himself that he had seen a picture of that face somewhere, but he finally spoke, because the little tramp was getting nervous.

He said, "Andy Clayton. Sure. Got a place five miles up the road on Horsehead Bluff. A nutty-looking fellow with glasses, you mean, what's got his eyes in the clouds all the time? Sure, sure, he buys things here."

"Thanks," said Silk, and ambled hurriedly out of the store, and got into a disreputable Ford he had found on a side street a hundred miles back in Victorville.

"Hell's bells," he swore as he let out the clutch, "that guy's got a fishy eye. And a picture of me pasted up outside his two-bit shack. Hope his phone don't work."

The Ford ambled along disparagingly slow. Silk's face was haggard, and there were pouches under his eyes. He felt louse infested, but in the last two months he'd got so he didn't care. It had been touch and go, in every State he'd been in.

"What the hell makes me look up Andy Clayton?" he muttered as he put the car in low and it chugged painfully up the ever-steepening grade. "That kid wasn't nothing but bad luck. Maybe his place'll make a swell hideaway," but then he remembered the storekeeper and grimaced.

He felt sickened at the pit of his stomach at the mess he had made of things. Him, Silk Dubois, who used to plank down fifty thousand at odds that'd make a strong man weep. He almost felt like crying.

"Aw, Silk," he said angrily, "what you need is a rocking chair and some slippers and a crocheting needle, that's what you need."

The car bumped over the road. Every time it bumped, Silk's special jingle came back to him. "Yes, pressure affects chemical reaction velocities— Hell's

bells. I'll never forget that!"

He remembered that once he had been discussing this jingle of his with a stranger. The stranger had grinned and said that every time he was on a train, and the train wheels clicked, he had the same experience, only different: "Behold, there goes a moron. He is a happy man. I'm glad I'm not a moron. My God! Perhaps I am!" So Silk knew it was just something psychological.

He was about three thousand feet up, and the sky was a wonderful blue, and there were a few clouds stuck in the right places. The sun wasn't hot. He stopped the car once. He could see the winding road and the store way down there. No cops yet.

He passed under the shadow of an overhanging bluff, and then made a right-angle turn and went up a steep grade that left the car panting.

On a level space was a single bungalow, with a few chickens chuckling in the yard, and off to the left there was a long, low, solid-looking building.

SILK got tiredly out of the car and ambled across the grass toward the peaceful-looking bungalow. The chickens fluttered out of his way.

The door was flung open, then, and a spare man with glasses barked in a high-pitched voice:

"Well, what do *you* want?"

"I guess you don't recognize me, kid," said Silk, stopping respectfully, and futilely trying to brush some of the worn spots off his coat. He fidgeted. "I . . . uh . . . I'm Silk . . . you know, Silk."

Andy Clayton's mouth fell open, and he came forward.

"Silk!" he breathed. Then he choked a little. "The little fellow that— Why, this is terrible! Something awful must have happened!"

"Yeah, kid," said Silk. "Things been breaking pretty tough with me. I was happening along and thought I'd give you a buzz. O. K.?"

"You know it's . . . uh . . . O. K.," said Andy with real fervor. "Why, Silk, you're my benefactor. If it hadn't been for you—"

"Aw," said Silk, sheepishly, "forget it. How about some Mocha and a sandwich or so?"

Twenty minutes later Silk finished his third sandwich and gulped a cup of coffee, and he leaned back, sighing gratefully.

Andy Clayton sat across from him, vicariously enjoying the meal. He handed Silk a toothpick, and then said impressively, "Silk, I've finished the ship!"

"Yeah?" said Silk, moodily intent on his own problems, and then decided to show the kid some interest. "Got all the gadgets and things in, oxygen, water, food and cooling things?"

"And not only that, I've got her stocked up for a trip to Venus!"

Silk saw that his eyes were shining, and he wistfully thought to himself: "Hell's bells, wonder if there's cops on Venus?"

Andy poured him some more coffee. It was about six o'clock, and the sun would set shortly, and there was a chill in the air. He sat down again, hunched forward. "And I want you to go with me."

"Me?" said Silk, and then he jumped and his eyes widened. "Hey," he said, "how soon can we start?"

"What?" said Andy, puzzled. "Oh, not for two-three weeks, yet, I suppose."

Silk fidgeted. Suddenly he got up from the table. S'pose you let me have a look at her? Naw, I don't want any more coffee."

"Sure is a beauty," said Silk appreciatively, when they got to the other side of the low building which was Andy's workshop. "Looks as if she might work, at that."

"She will," said Andy Clayton in a definite tone of voice. "Now look, Silk, you see the stem is pretty capacious and it slopes down to a taper at the stern. We'll go inside after a while and you'll see that living quarters, controls, and the . . . uh . . . gadgets are in front. The combustion chamber and mechanisms take up the rear. You know, I spent as little as possible—"

"Hm-m-m," Silk interrupted him, "you got a runway," and his eyes followed a trestle built perilously close along the bluff. It sloped down at a slight angle first, and then, after about four hundred feet, it executed a swift curve upward. The ship, which was made of berylaluminum steel, he figured, was about forty feet in length, and had four ports along its length.

"It took a lot of work," said Andy complacently.

"Sure, yeah," and Silk stepped around the side of the ship. Now he could see the whole valley spread out beneath. He craned his eyes anxiously, and his small hand suddenly gripped the arm of his companion. "What's them down on the road?" he said tensely. "Stopping there at that store?"

"Why, they don't look like anything more than State troopers, on motorcycles, to me."

"Hell's bells," gasped Silk. "There's a whole half dozen."

He wiped his hand across his forehead and it came away wet with sweat. He took another look at the ship and a slow chill started working its way up his spine as he realized what he had to do.

"Andy," he said casually, "show me how you work this boat, what gadgets you pull, how you set your orbit."

ANDY WILLINGLY took him toward the ship, saying, "Oh, setting an orbit isn't hard. You keep your planet on a cross hair, and a mechanism automatically charts out the simplest, safest and only orbit. When the planet begins to shift away from the cross hairs you edge it back in."

He took Silk inside, touching little plungers and knobs on the instrument board, showing their uses. He pointed out other features.

So far, he was supremely unconscious that any duplicity might be lurking in Silk's head. "And about fuel—" he began.

"Yeah, how about fuel?" said Silk worriedly.

For the first time Andy Clayton looked at him doubtfully, but then he went on: "I have the ship provisioned to go to Venus, of course, and that means a third of the fuel will be used getting free of Earth's gravity; another third to be used while coasting, for orbit corrections; another third for landing. And of course there's a reserve tank for the return trip."

He sat down in the chrome metal pilot chair.

Silk avidly watched his fingers. "Yeah, yeah, yeah," he said. "I get it. Now you say that in half an hour an orbit will set, and Venus will show up in the cross hairs of that glass plate. Hey, Andy. Could you live on Venus? Is there life there?"

Clayton's face first turned resentful and then hard. Silk suddenly had the feeling there wasn't as much kiddishness in that face as he'd supposed. "I have no doubt a man could live on Venus," said Andy quietly.

"Yeah? Well, O. K., then. Let's get out. I want to get a breath of fresh air."

The sun was setting.

Once outside the ship, Andy Clayton turned somber eyes on Silk, and Silk averted his eyes. "Silk, there's something in the air. What is it?"

"Huh? Aw, kid, that must be the daisies you smell? Ain't they sweet? Tough there ain't any daisies on Venus."

He gave the unsmiling youth a punch on the arm, but inwardly he was quaking. His eyes followed the road to the

bend, where the grade began. His teeth began to chatter as he saw six motorcycles turning up the grade.

With shaking fingers he lit a cigarette. He looked at his fingers with awe. Hell's bells, he thought, what's the odds whether I let them punks manacle me, or live out a chump's life on Venus? All he had to do was wait a half-hour or so and gamble that the cops wouldn't get here before his orbit set.

He smoked another cigarette while they stood there, the bespectacled youth saying nothing, but staring at him in some kind of fascination. The sun set. It began to grow dark.

Silk suddenly started walking back toward the house. He looked toward the road and saw his battered car outlined against the sky. Andy moved up out of the darkness and touched his arm. "Look, Silk." His eyes met Silk's full. "You know, of course, that the *Interplanetary*—that's what I call it—isn't exactly complete. There's one item—rifling vanes—"

Silk stiffened. "Quiet!" he hissed, and stood in a listening attitude. Drearily, ominous through the dusk came the *chuckt-chuckt* of motorcycles.

Silk lit another cigarette, and puffed on it slowly, thoughtfully. The sound grew clearer. Then he took Andy by the arm, and they sauntered toward the ship, Andy pulling back a little uncertainly.

"Sure is a lovely evening!" exclaimed Silk.

They reached the ship. It was a teardrop against the sky, and Silk tragically began to feel that that was appropriate. His grip on the other's arm tightened. The *chuckt-chuckt* of the troopers' vehicles swelled, then stopped altogether chokingly.

Andy Clayton shook off Silk's arm. "The troopers," he said distinctly, "are coming toward us now. What happened, Silk? Did you commit homicide?"

"Yeah," said Silk.

"You might as well take your medicine down here," said Andy Clayton in a firm voice. He clenched his thin hand around Silk's arm. It was surprisingly strong. "What do you know about the horrible dangers in space?" he hissed. "You can't go. I've got to put on rifling vanes, because there's one danger in space nobody except myself has ever discovered. High pressures, you know, affect chemical—"

"—chemical reaction velocities!" Silk screamed, aghast, and his small arm shot out and landed hard against the side of Andy's head. Silk leaped back from him as if he were a deadly snake, or a murderous phantom.

Andy fell to the ground, muttering stupidly. "Oh, then you know."

At the same time a commanding voice yelled, "Stop or I'll fire!"

"Nuts to you!" Silk Dubois yelled back, as he swung open the outer valve and leaped into the ship and clanged the valve shut behind him.

STILL TREMBLING from some nameless horror, he switched on the ship lights and sat down at the control board. He knew his face was dead-white, at what he had heard Andy Clayton say. He sobbed to himself. He would have felt better if the dead cashier himself had come back to haunt him.

His mind was numb. He heard a brassy clangor—the troopers. He studied the board, trying to remember; he finally decided on the middle plunger. It was graduated. He pushed it down to twenty.

A hiss, as of some outlandish chemical action, filled the room. Silk was thrown back against his chair. He knew the ship was moving, propelling itself ever more swiftly down the runway. He waited a full ten seconds, and then pushed in the plunger all the way. The hiss rose to a scream and passed away beyond the limit of audition.

He felt, rather than knew, that the

ship had vaulted off the runway at tremendous speed, and was now cutting up through the atmosphere at a sharp angle.

"Hell's bells," he thought as he lost consciousness.

When he came to, the first thing he did was to warily raise his arms.

"They move!" he exulted. He took a soul-satisfying breath. "And lucky Silk lives! Ah, Venus," he said scoldingly, "there you are, all right, but you have moved over two hairbreadths," and he pushed in the starboard plunger a tenth of a point, and he looked at the plunger and thought, suddenly, of how he had started out at a tenth of a cent a point; and how the sky actually was the limit. He watched Venus obligingly change position, but slowly. Then he got up and found with satisfaction that his legs worked as well as ever. The ship was constructed in such a manner, too, that his body lay in the direction of the flight, so he could walk just about as easy as on Earth.

He crossed the aluminum floor and with little chills racing up and down his back, pulled metal blinds away from a starboard port.

"Aw!" he muttered. The Moon, a great, white, pockmarked circle, larger by ten times than he had ever seen it, hung just below the prow of the ship. And serving as a brilliant background was a solid sheet of stars, and some of the stars were green and red and blue and yellow.

They held Silk for five minutes. Then, shaking his head, he hurriedly pulled down the blind.

He went across to the port side and saw a monstrous sun.

He dropped that blind. Then he sat down in the chrome pilot chair.

"Aw," he said to an instrument on the board admiringly, "a speedometer and a mileage gadget." He decided that there must be complex integrators under the board which registered the amounts of fuel going into the combustion chamber, and from that computed velocity and mileage.

The speedometer read 12.009/sec. The mileage indicator read 211411.

Silk gulped. That meant he was just about to pass the Moon. He saw the speedometer click over to the whole number 13. The *Interplanetary* was steadily accelerating.

IT MADE him a little scared to look at the figures. He got up and noticed that the air was stuffy and hot. He walked aft and saw a cabinet that looked like a heatrola set into the wall. He looked through a glass panel and saw a network of pipes coated with frost. He opened a door in the bottom and saw a large compartment filled with raw vegetables, three chickens, picked, at least twenty pounds of steak, and quantities of bacon, eggs, celery, lettuce—

He turned a knob on the refrigerator and waited apprehensively. From a funnel above the refrigerator he felt a breath of cold air.

He went farther aft, and saw a large black metal cube, supported by a network of asbestos-lined pipes which spidered out in all directions, toward the stern for the most part, though many ended in starboard and port bulkheads. He put his hand on the combustion chamber and drew it away respectfully. The affair was hot.

Off to his left, he saw a big, ominous-looking tank. He approached it cautiously. "Aw," he said foolishly, "oxygen." He turned a knob just slightly.

On his way back to the instrument board, a mirror caught his attention.

"Hell's bells!" he muttered, aghast. He found a medicine chest over a tank of water, and found a razor, shaving cream, and alcohol rub.

After he finished shaving he took a bath and put the excess water in the water refiner. He picked his clothes up in two fingers and dropped them into a

waste container. He found a clothes closet with light clothing, such as explorers wear, in it. The shorts he picked were too big, but he wore them anyway, and he went back to the instrument board whistling off tune.

He sat down, and cocked an eye at Venus. He pulled the starboard plunger out and pushed it back in a tenth of a point. Venus slowly swung over until it cut the cross hairs.

Silk leaned back in his chair, sighing.

"Hell's bells," he said happily.

SILK LOOKED at the speedometer fourteen days later and noted that it read 40, and the mileage indicator read 4000000. He looked at the fuel gauge and frowned. It was perilously close to one-third empty.

"Hey, Silk," he said to himself sharply, "you can't accelerate forever, y'know. I guess we've accelerated enough. We can't see the Earth or the Moon, and the Sun's getting smaller." He pulled up all the plungers, and waited for what he knew was to happen. All these two weeks, acceleration had given him its own imitation of gravity.

He waited two minutes, his eyes blinking apprehensively. He knew there was still fuel in the combustion chambers, and it was just working itself out.

Nothing happened for a while, and then he shifted a little in the pilot chair. He started to float upward from the chair, supported by nothing, and with muffled yelp he reached down and pulled himself into the chair again, where he sat shivering a little.

"Yessir," he said to himself a while later, "this no-gravity business ain't so bad." He was bouncing himself from bulkhead to bulkhead like a rubber ball, grinning delightedly. He bounced over to a port, and pulled aside the blind.

His face fell. It's kind of lonesome," he said regretfully. "But, Silk, you asked for it. The sky's the limit."

About fourteen hours later, having gone to sleep in midair, he awoke, and for some reason felt stiff and groggy. But he waved his arms and legs around and felt a little better.

Then he sat down for his daily manicure. "Aw," he gasped, looking at his fingernails, which were a half inch longer than they had been the 'day' before, "how did that happen, anyway?"

His face tightened and his skin turned a little gray. He very slowly turned his eyes on his toes, and then stared at them in fascination. Then, his fingers shaking, he quickly pared toe and fingernails down to a clear curve.

A frightening chill ran through him as he looked in the mirror, but he suddenly clamped his lips. "Now ain't that funny," he said in mildly curious tones. "I cut my hair last week, and it looks a little gray. Time sure does fly," and with determination he cut off about three inches of excess hair that hadn't been there the day before.

When he shaved, he saw that his beard looked about four days old, which it wasn't. After he shaved, he studied himself in the mirror. There were taut lines around his eyes, and he thought his lips were slightly puffed. He turned away.

For no reason at all, he thought: "Wonder how Lady of the Mask turned out?"

He forgot to eat breakfast, but later in the day, he felt ravenous. He fried some chicken and opened a can of tomatoes and plums. It didn't taste very good, and when it got down in his stomach, his stomach began to burn.

He found himself staring into nothing, neglecting the food.

"Silk," he whispered, a frantic fear in his head, "this don't look so good.

"Silk," he said to himself in the mirror three days later, "every morning you get up you break your finger and toenails off. You cut your hair.

HURRICANE JOHN

He was a big, tough, horny-handed adventurer with no moral sense. Kicked out of his native land because he was too tough to handle.

He arrives in a city run by magicians, hypnotists, and telepathists. . . .

You'll get a kick out of reading how "Hurricane John" outwitted the magicians. Read Norvell W. Page's

FLAME WINDS

in

JUNE

UNKNOWN

NOW ON SALE

20c A COPY

You shave off an inch of beard. The food tastes rotten. Your stomach burns."

His voice was dry, and had the rasp of sandpaper. His lips had swollen in such a manner that his mouth stayed open idiotically. From the very first day since he had stopped accelerating, his fingers had begun to *grow* at the joints, until now they were so grown out that he couldn't bend them at all. The same strange occurrence had taken place at elbows and knees and wrists. His lips could hardly form words.

"Good thing there ain't any gravity," he muttered to his reflection. "You don't have to walk."

Later in the "day," after aimlessly wandering around in a sort of trance, he went back to the mirror, and stared in growing horror at himself.

"Silk," he whispered, "your eyes are growing right out of your skull. And look at your arms!" The figure in the mirror obediently looked at its arms, and also its bare legs. There were ridges of unnatural-looking flesh that had grown like bracelets around them.

He started to grin at his reflection, and suddenly uttered a cry, and put his hands up to his aching head.

"Aw," he groaned. "I'm going crazy, too."

With a sudden intake of breath he went away from the mirror and tried to take his mind off his horror by looking at the still images of stars and Sun. He got a book on horses from a chest of books, and tried to read. He discovered that his eyesight was bad. Suddenly he was shivering. He went aft and put power into the electric coils of the heater. The room became hot, but still he shivered, whether with fear or fever he did not know.

He found himself thinking very hard all of a sudden.

"Rifling vanes," he said aloud, "ridges in the barrel of a gun which make a bullet spin. But Andy wanted to put the rifling vanes on the ship.

Then as it went through the atmosphere, it would spin, and when you got out into space, and cut off acceleration of the ship, you'd still have angular acceleration along the sides, and you'd have weight."

He blinked his preternaturally large eyes. Suddenly his fists clenched, and a heartbroken sob jerked its way out of his throat.

"Silk," he sobbed, the tears running out of his eyes, "you're all washed up."

In midair, he drifted off to sleep.

WHEN HE AWOKE, he felt as if he were turning over and over in a white mist of fire. He felt, also, as if his body had grown enormously big. He tried to analyze the sensation. How could you feel enormously big, actually feel the massiveness of yourself, when you saw nothing relative to yourself?

He kept blinking his eyes, however, and the room came back into fair focus. He first put Venus into position, and watched it edge over.

"Hell's bells," he said stupidly, as his particular demonic jingle sounded in his mind.

Then he remembered that in the brief instant before he'd fallen asleep shortly before, the reason for everything, the reason for his coming death, had leaped into his mind in its entirety.

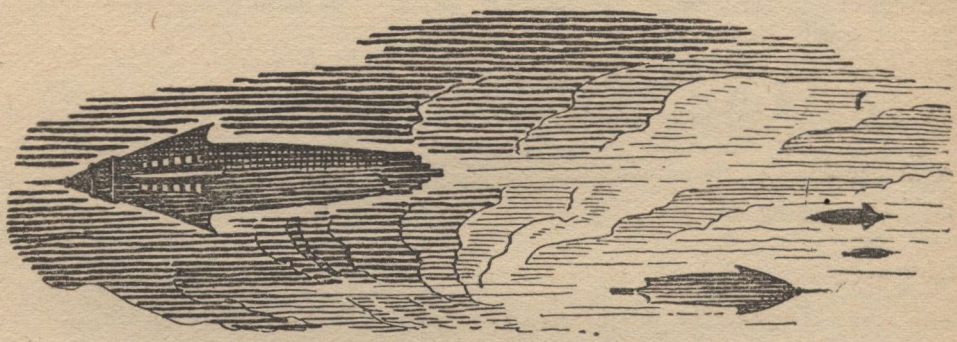
He propelled himself over to the mirror, and peered into it.

"Silk," he said regretfully to the man in the mirror, "you're going to enter the basalt columns of hell, that's what you're going to do. You remember Professor Stabel, Chemistry IV, four credits?"

He put a tyrannical look in his eye and tried to mimic Professor Stabel:

"Yes, pressure affects chemical reaction velocities. Roentgen, in 1892, made the first successful attempt to detect an effect of pressure on a reaction velocity. He found that a pressure of 500 kg./cm.^{2} decreases the velocity of inversion of cane sugar by dilute HCl in aqueous solution.

"Later, Rothmund verified that experiment and also made another in which a chemical reaction was found to increase in velocity instead of decrease.



"Ain't it the truth!" said Silk, blinking his swollen eyes.

He went on, solemnly telling himself that the human body, itself, is nothing less than a complex chemical works, with hundreds of reactions taking place constantly. He inquired of the man in the mirror if he knew what would happen if there were a total *decrease* in pressure?

The human caricature in the mirror, after taking deep thought on this poser, answered with a flash of brilliance:

"Why, things would be the same as when there was high pressures, Silk, only a decrease of velocity would become an increase, and vice versa. There'd be a total disruption of chemical routine in your body. See, Silk, chemical reactions in the human body depend on each other, and if the speed of some increased, and others decreased, why hell's bells, it'd be worse than a Kentucky feud. You'd begin to grow wrong and fast, wouldn't you?"

Silk nodded solemnly.

"Now ain't gravitation really a pressure, Silk, hey?" the image asked.

Silk thought a while, magnificently intent on the problem. "Aw, that's right. People always account for the unknown cause of an attraction by calling it a pull. A horse doesn't pull a wagon, he pushes against the collar. You don't pull a door open, your fingers push against the inside of the knob. A vacuum doesn't really suck, it's atmospheric pressure. That gives the effect.

"And even if gravity is a pull, like a rubber band, it's still got the effect of pressure. If you were on Jupiter, Silk, you'd have a pressure of two and a half G's acting on you. If you were on that little companion star of Sirius—"

The face of the man in the mirror, Silk saw, was haggard and horror struck, and tears were starting out of its horrible eyes.

"What you need," said Silk angrily, "is a rocking chair and darning needles and slippers, that's what *you* need. Where would you be if it wasn't for me?"

The image said, "Where was I? Oh. The effect of gravity is pressure. The human race evolved under a pressure of one G. Chemical reaction velocities were balanced to a very fine point. And now for the first time in history a man has gotten out of Earth's gravitation, and he hasn't got that balancing pressure any more. All clear?"

"Clear," said Silk, cocking his head from side to side. The figure in the mirror did the same. He started back in horror.

"Gosh!" he gasped, as he saw that he'd been talking to himself. He staggered away, putting a hand to his aching head.

"Gosh!" he repeated, as he realized there were chemical reactions in his brain, too. He sat down in the pilot chair, crying uncaringly now, as he stared at Venus.

"Get back in place, you," he said, putting a heavy hand on the starboard plunger and pushing it down a tenth of a point.

"Wonder how Lady of the Mask got along?" he said stupidly.

He looked again at his bare arms and legs. There were bracelets of unnaturally grown flesh around them. His toe and fingernails were over an inch long. His hair was gray and fell to his shoulders. Both his lips were puffy and pendulous. His skin was wrinkled. His eyes were starting from their sockets. There were scalding sensations in his brain and stomach and over his heart.

"Hell's bells," he said, as he saw he was losing consciousness, "the sky's the limit."

After fourteen hours, Venus was hopelessly out of place, but there was no living soul to set it right.

DONE IN OIL

A JOSH MCNAB STORY

BY ARTHUR J. BURKS

DONE IN OIL

The saga of molil, the magic, curing oil from Jupiter's moons—with a stench you could smell to the fourth dimension and back!

By Arthur J. Burks

I.

CRISIS.

JOSH McNAB, chief engineer of the *Arachne,* stood on her high landing platform and looked down at the ground, some eighty feet below, and wished he could hear a bit better; which he might have done if the wind hadn't been blowing so hard. For down there, well outside the bellying curve of the *Arachne's* middle, old Caperton, boss of the Caperton Interplanetary Lines, was giving Skipper Lee Parsons a good going over. One knew that, if one knew Caperton, by the way he waved his arms. His fists quite frequently came dangerously close to the nose of Lee Parsons, who was too dignified to dodge.

Josh McNab told himself that, if he were in Parsons' place, he would not only dodge, but would send a left deep into the paunch of Caperton. He never allowed anybody to swing fists in his face. Parsons, considering the provocation, was controlling himself very well indeed—far better than he usually did with McNab, his pet peeve among men. But then, Caperton was Parsons' boss, while Parsons was McNab's boss. Yet McNab never let Parsons, or anybody else, get away with too closely swung fists, nor with much of anything else. He was never insubordinate, but he was a master of "silent insolence." It invariably set Parsons raving—which was principally why McNab resorted to it.

"Th' auld mon," said McNab to himself, shaking inside with glee, "is givin' th' skipperr a bonnie dressin' doon. An' o' courrse, yon skipperrr will poss th' dressin' doon on t' wee McNab—if so be he can!"

The duster worn by Caperton, relic of the Dark Ages and another fashion, whirled in the wind. Times it stuck straight out behind Caperton, showing the bulge of his belly before him; sometimes it stuck out to either side, half twisting Caperton around. Other times it whipped to the front and enveloped Parsons.

"Dinna th' fools ken thot th' wind aroon th' starn o' th' *Arrrachnah* plays tricks th' noo wi' th' airr?"

How stiff and straight the skipper stood, like a ramrod on parade! Parsons had his pride, which had been sorely tried of late, because the *Arachne* had been turned into a freighter and Parsons, in spite of his known efficiency and long service, had not been relieved of her. He should have had one of the new streamlined jobs, the grand, speedy interplanetaries of the Bigger and Better Spider Fleet—which would never have come into being at all if Parsons and McNab hadn't made so much money for Caperton with the *Arachne* in the pioneering days of some few years before.

The *Arachne* rated a place in a museum, where people would pay high prices to see the pioneer, and Parsons rated one of the fine jobs. Neither got either, and McNab knew how Parsons

felt about it. Personally, he didn't mind. He was sort of old-fashioned. The *Arachne* had always been his pride and joy—and since he doubled in brass as second officer, at times even ran the ship, he knew that she could, properly guided through the uncountable gravitic lines of force, sail rings around any ship that traveled the space lanes. You simply had to know and love her, that was all. McNab did. He didn't love anything else or anybody else, since his Mary had died these many years ago, leaving him sad and lonely, so that he would have died if he hadn't had Parsons around to fuss with—always, of course, with due respect for his superior rank!

Yes, Caperton, at this moment, was shaking his fist in the face of Parsons. And Parsons was still taking it. Caperton suddenly turned away, and Parsons started for the door of the elevator which would take him up to McNab's level. As he came, Parsons looked up, and McNab saw that his face was red with wrath. He looked fit to bust a blood vessel.

"A lot o' fuss an' fury o'er a trip t' Juppiter!" thought McNab. "An' it's fair plain that yon skipperrr's irrked wi' Josh McNab! Whut ha' I done? Aw, weel, richt soon he'll be tellin' me!"

SKIPPER PARSONS stepped onto the landing platform. McNab looked at him curiously, about as he knew a chief engineer expecting to be told to make everything shipshape for the run to Jupiter would look at the skipper from whom he expected orders. McNab was all innocence of face. The hair tufts that stuck out of his ears were on the alert, but not trembling. His steely eyes were watchful, but not penetrating. His taut, middle-aged shape—which was really all muscle and whalebone—held just the right stance for a chief engineer in the presence of his master.

"McNab," said Parsons, his voice so low and controlled that Josh knew he would explode if you pointed a finger at him or made a sudden movement of any kind, "did you hear what that old devil snapped at me?"

"Na, skipper; only thot he snappit!"

"And you couldn't even be guessing what he 'snappit' about?"

"No, sirr!"

"It can all be summed up in one word, McNab. And I suppose you can't guess what the word is?"

"Nay, sir, thot I kinna!"

"The word is *moles*, McNab! M-o-l-e-s, moles! Are you still unenlightened?"

McNab began to have a queer feeling along his spine, something like an icy chill, for he did know something about moles. Not ordinary, everyday, run-of-the-mill moles, with a few coarse hairs sticking out of them, but moles of a strange and dismal sort which were a combination, if one could conceive of it, of warts, freckels and the markings on huge turkey eggs. They were moles of a sort that, prior to the landing of a party of pioneers on Jupiter and the return therefrom of the ship which had taken them thence, had been unheard of on Earth. They were moles to end all moles, and McNab began to think back—

"Are you beginning to get the drift, McNab? And to understand why I feel like taking somebody completely apart?"

"Dinna ken thot I do, sirrr!" said McNab, suddenly all formality, suddenly standing very stiff and straight. "But I kinna say—"

"You kinna say! Well, listen, what about moles from Jupiter? They're harmless, you say, and you're right! They attack only the female of the human species of Earth, and to you that does not matter, since you never look twice at women of any kind, class or planet. *But*—and a big 'but' it is, McNab—when our women of Earth begin to get covered with Jovian moles, their husbands begin to look askance at them.

Do you follow me so far?"

McNab did, though he didn't allow a hint of his thoughts to appear on his face. He knew something of women. Heaven knew he should, since for years whole clucking bevies of 'em had traveled on the *Arachne*. A few he had been able to endure. A few young ones he had married off to young men he thought they should be married to. But, for the most part, they were the least of his worries. Yes, he had a pretty good idea.

Women began to sprout the moles. They got frightened. They knew whence the moles came. They shrieked at their husbands about the injustice of things, and then, perhaps, hid their faces behind great white bandages or towels—lest view of their faces kill love on the instant. They shrieked of damage suits. They shrieked of injustice and of the greed of owners of interplanetary ships. The husbands, because self-preservation is the first law of nature—good or evil—covered their ears with their hands and rushed to Caperton.

"A thousand husbands, in two hours," said Parsons, "according to Caperton himself, have called on our master, McNab. They say that unless something is done to abate the Jovian moles they will take their trade away from him. They will boycott all his spaceships. They will see that no passengers ride on his lines, that no freight is consigned to any vessels whatsoever, even the *Arachne*. Does light begin to burst in your empty skull, McNab?"

"I wilna say yes, and I wilna say no!" said McNab.

"Well, I'll say both yes and no and spell it out for you, McNab! Who went on a scouting trip for good hard liquor on our last trip to Jupiter? Not you, McNab, because you already knew where to find it. You also knew how to avoid infection by the thickets of Orkad. But was that the end? It was not. As usual when you're liquored, you went hunting the bright young officers of one of the streamlined jobs. You commented on their masculinity. You told them they couldn't even hold the ordinary liquor of Jupiter, to say nothing of the stuff they brew in the Orkad section. When you got through riding them they'd have gone into a volcano and swallowed hot lava to prove their manhood—"

"Yon laddies were a' free, white, an' on th' lee side o' th' age o' weesdom!"

"But did you tell them to be careful where they walked, McNab? Did you tell them about the mole-cheek infection in the thickets of the Orkad section?"

"I dinna ken thot yon laddies be friends o' you an' me, skipperrr! Moreover, they ken a' aboot mole-cheek!"

"YES, they know, but once they'd imbibed of that brew they didn't know, or remember, anything. That, of course, was your idea of ragging the officers of the streamlined jobs, of showing your contempt! In ordinary circumstances I'd be with you. But, McNab, when those guys came back to Earth, filled with Orkad brew, their clothing was filled with the spores of the Orkad plants—and those spores scattered from hell to breakfast with the first wind that hit the drunks, and New York at the moment suffers an epidemic of mole-cheek!"

"I am no th' guardeens o' yon laddies!"

"No, but look what's happened? An epidemic of mole-cheek!"

"Ye reely dinna say th' noo!"

"But I *do* say! A thousand cases of mole-cheek already, and every last one of them contagious. Those moles are homebreakers, too—for while men don't get mole-cheek they are carriers, and they take them to their secretaries and their girl friends, and when the secretaries and the girl friends get moles on their cheeks it only goes to prove what

the wives have known all along anyhow! Do you see?"

"Aye, sirrr!"

"Now, McNab, have you thought ahead a few moments? Do you realize that the pioneer women who went to Jupiter didn't stop until their husbands developed a cure for their moles? And do you remember what it was?"

McNab, for once in his life, was utterly speechless. Yes, he knew what the pioneer ladies had forced their husbands to develop. Not that they'd needed much forcing, for they didn't like the moles any more than their wives did. It was difficult, nay, impossible, to shower with fervent kisses a cheek all covered with hairy splotches. The husbands of those far-off ladies had worked with a will—aided by the first friendly inhabitants of Jupiter—to find a panacea for the moles. They'd found it, too. They gave it a name, even: Molil. A lot of it was required to effect a cure. The ladies had to bathe in it, deeply and often—nor could the same bath be used twice, due to certainty of reinfection.

"Aye, sirrr!" said McNab. "I ken th' noo! *Molil!*"

"Right! And every victim of mole-cheek has to have a ton or more of the stuff for a starter! Moreover, it's expensive, and Caperton has to furnish it free of charge, because his spaceships brought the infection to New York City. And by the time we've returned from Jupiter the epidemic will have spread to Chicago or farther! Know what that means?

"The *Arachne* will have to return with a capacity load of tanks, carboys, cans, canisters, drums, vessels, tins and every other conceivable kind of container—each to be in its place, each needing to fill its proper place. That means that between now and then engineers on Jupiter will have to study the measurements of the *Arachne*, build containers to fit every available bit of space, and have them filled and ready to load when we arrive. Moreover, McNab, Interplanetary Communications has already transmitted Caperton's orders, and we're on our way. Do you get the full picture now?"

"Aye, sirrr!" said McNab, his voice dead, hollow, funereal.

"You, you numskull, indirectly, have turned our *Arachne* into an oil tanker—and why I didn't lay the blame where it belongs when Caperton was dressing me down, I don't know! But I'm telling you right now, McNab, with the *Arachne* filled with vats, drums and tanks of Molil, it'll be deuced strange if I can't find one to drown you in so it'll look like an accident. And if it *doesn't* look like an accident, the husbands of the women infected with mole-cheek will insist that it was justifiable homicide on my part."

"If," said McNab, "ye returrrn the noo!"

"If I return! What the devil do you mean?"

"How far would ye git, skipperrr, withoot Josh McNab? Dinna ye ken thot I ken ye dinna tell Caperton th' truth because thin ye wouldna ha' na chief enginerrr wi' capabilities ye lack yer ain sel?"

II.

NOSTALGIA.

SKIPPER PARSONS seemed in a hurry to get away, to experience the worst before he could change his mind. He was, McNab thought, like a suicide who gets the idea and jumps, stabs, shoots or poisons himself before he can have a chance to change his mind. Parsons was half off his nut, and McNab couldn't say that he blamed him. Yet when McNab thought of the delicious brew of the Orkad section, he didn't blame himself much, either. The stuff was worth infecting every woman on earth with mole-cheek—and McNab

couldn't see why they need make such a terrible fuss about it. Think of all the attention they would get from husbands and servants while they were taking the Molil cure!

Molil! McNab, while preparing to get away, could actually smell the stuff—which had an odor somewhere between burning castor oil and slightly spoiled eggs. Heavens, what women would stand in the name of beauty! That ghastly stuff. Why, if McNab were covered with moles from truck to keelson he wouldn't even stick around to take a second whiff of the stuff.

But *wouldn't* he? How, now, could he help it? He'd be bathed in the stuff on the return from Jupiter—by which time, too, second and third voyages would be called for, to take care of new cases. Why, the *Arachne* might be used from now on to transport the hellish stuff! For Caperton, no matter how husband and wives yelled, would never transport any of it on his other liners—because no liner, ever thereafterward, would be free of the odor. Moreover, every member of the crew, incldng Parsons and McNab, would smell of the stuff for weeks—even without visiting the *Arachne*—no matter how often they bathed and changed their clothes.

The women were different. Cured of mole-cheek, they rid themselves of it with a kind of perfume imported from Jupiter that did the trick. But what kind of a man would use that perfume, or *any* perfume? Not Josh McNab, nor even Parsons, unless they wanted everybody hooting at them. And not the crew, either, who were tough eggs, who'd rather smell like Molil the rest of their lives than be heckled as sissies by people who met them on the street.

McNab, it appeared, had certainly started something when that thirst had hit him on Jupiter, and someone had whispered to him that in the Orkad section there was liquor really fit for the calloused throat and magneso-beryl stomach of a Scotchman. And he'd do it all over again, he decided when he harked back, even to putting young officers wise to the source of supply.

Parsons ordered the crew to stations, the ports closed, and signaled for the helicopter tugs to warp the *Arachne* out of her berth. McNab, listening, felt that if the barbs on Parsons' commands had been tangible, every man aboard would have been riddled with them like a pincushion. Parsons was sore. Sore enough not to be entirely in his right mind. McNab was getting a bit worried about the skipper. The fellow had been brooding for years because the *Arachne* carried freight—and now this Molil and an eternal smell, and Parsons such a hand with the ladies!

There were elements of humor about it, McNab thought—before he really thought *too* deeply—and he whooped with delight. When he heard his laughter echoing through the tunnel he stared toward the bridge, fully expecting Parsons to appear and heave a bomb at him. The black gang peered into the tunnel, too, their faces frightened; for never in the years anybody had been with McNab had they seen him so much as smile.

The tunnel! It ran the length of the *Arachne,* the full two hundred and seventy-five feet of her, and it was traversed by a circular staircase which went round and round the main-line helix—which clanked as perfectly as it had when first installed—and the motor's rotor wound on the same shaft. There were elevators outside the staircase, in case anybody wanted to travel from end to end of the ship without having to walk, but McNab almost never used them. They were relics of the days of passenger travel, anyhow.

JOSH, starting at the top of the ship, began his usual inspection. He'd inspected the ship from end to end, in-

side and out, a dozen times while she'd been in port, but he always checked her again, thoroughly, before the helicopter tugs turned her loose.

He sighed as he started downward from the bridge, visualizing the ship as he went—as though he could see through the walls of the tunnel. From his own quarters, in the eye of his mind, he could see the great magneso-beryl girders which branched out from the key section under the bridge, to form a tracery through the ship, distributing the thrust of the monster main shaft. Those girders were McNab's delight, for they talked when the *Arachne* was in motion, and they always said to McNab:

"Never fear, Scotty! We'll make sure that the *Arachne* doesn't bust off her buttons!"

The crew, in passenger days, used to have their quarters among the girders, in rooms that were of the strangest shapes imaginable, since they had to fit the queer angles left by girders and hull. Now—he snorted when he thought of it—those sections would be filled with vats built to dimension. Where the crew had lived there would now be *Molil!* He licked his lips, almost able to taste the horrid stuff on them. Then he went hastily on down the circular stairway through the tunnel.

What a ship the *Arachne* was! Ten thousand tons of her, every ounce worth her weight in gold to McNab, because he knew her by heart and loved her beyond expression. Level after level he passed—and "saw"—en route down and around: What had once been the passengers' quarters and the belt promenade—but now would be filled with those damnable vats—main lounge, bar, dining room and social quarters; all of which had been turned into freight compartments some years back, and now were to be, virtually, vats filled with Molil. Even the elevator shafts would probably be fitted out to hold the blasted stuff!

He almost, for a moment, dived into the tunnel to end it all, until it occurred to him that he'd never had an experience in his life—save at his wife's funeral—that didn't have its element of fun, and that it might be well to wait and see how things turned out.

What a honey the whole ship was! Two hundred and seventy-five feet of her, two hundred and fifty feet in diameter amidships, magnesium-beryl hull plates. He tried not to think of her with too much love in his heart, realizing now as he did that Parsons considered him to blame for the disgrace that must inevitably come to her when she got her internal bath of Molil!

He was already homesick for the *Arachne* as he now knew her, as compared to what his imagination told him she would be like when she again set her bottom down on Earth—loaded from truck to keelson with that mole-cheek bath! He knew just how it would be with the *Arachne*. He remembered something he had done as a child. He'd found a nest of robins. They were baby robins with insatiable appetites. He'd thought they might like linseed oil, of which he happened to have a supply. So he had fed the robins all they would take, and robins never knew what they could take, even when he set them out of the nest and watched them try to go places—about as successfully as frogs who'd swallowed an overdose of buckshot.

Multiply the robins by the frogs until you got the size of the *Arachne*, and you had something!

FOR just one moment, after assuring himself that everything was shipshape, and that it was time he reported as much to Parsons on the bridge, he wished he had jumped from the end of the tunnel. He even thought of asking Parsons to shoot him, or to make good, on the re-

"You'll plug those leaks, McNab," Parsons roared, "not only if it kills you, but I hope it kills you!"

turn trip, his threat of drowning him in Molil. But none of it was any good. The *Arachne* must not be disgraced by failing to make her trips successfully, and she couldn't do it without McNab. So whether he liked it or not—now more than ever before—he had to stick by the *Arachne* and her skipper, while the officers of streamlined jobs roared their heads off with glee.

McNab had almost died with nostalgia, the first year or two after the *Arachne* stopped carrying passengers, for he'd enjoyed watching them, and there had been a few young women, a few young men, he'd really liked a great deal. It had taken a long time to become accustomed to freight. Now—good heavens! How, a few months hence, he would pine for good, solid freight! For what if medicos on earth discovered other uses for Molil, and the *Arachne* had to keep transporting the stuff to the end of her days?

Slowly, sadly, Josh McNab, after almost biting the heads off his black gang—they'd heard him laugh a few moments before, and hearing his bitter voice now in his commands, must have thought him completely daft!—went back up the stairway to the bridge.

The Earth was now just a ball behind them. Parsons had the old boat on her course. Now it was simply a matter of waiting to get there, and keeping everything in working order. It would probably be the fastest trip ever made between Earth and Jupiter, because everybody aboard the *Arachne* hated to reach there and take Molil tanks aboard. The crew, of course, knew. But they hadn't known, McNab guessed, until the *Arachne* had been freed by her helicopter tugs, or the crew might have deserted right then. They might desert on Jupiter and leave Parsons and McNab to come back by themselves. Come to think of it, Parsons might desert, too—for all his years of service and the pension to which they entitled him—and leave McNab to run the *Arachne* all by himself!

Parsons would think it served him right if it worked out like that!

Maybe he could offer that very thing! The very idea made him snort—for in imagination he could see the face of Parsons when he broached the subject!

On second thought he repaired to his quarters, to check positions on his own chart, lay out the course and estimate the time that would elapse before arrival at Jupiter. It might be a good idea to stay away from Parsons until he was sent for!

However, as the *Arachne* sped outward from the Earth, gathering speed as she went, rapidly working up to her maximum, and no word came from Parsons, McNab began to worry. Maybe he'd better find out if anything were wrong.

He hurried to the bridge, where he was bound to find Parsons, because Parsons was that kind of a skipper—wouldn't leave the bridge until they were well beyond all possibility of collision with anything.

Only—

PARSONS wasn't on the bridge! McNab, remembering the wild look in his eyes, last time he had seen him, began hunting the skipper, vague terror beginning to grow inside him. He couldn't find him anywhere, and his terror grew. Finally he slid down to the motor section, where the black gang was grousing heatedly and vehemently and loudly over the insult offered them by forcing them to run Molil, and asked his second:

"Ha' ye seen aught o' th' skipperrrr!"

"Yes, chief, I've seen him. He's duckin' in an' outa holes on the *Arachne* like a beetle in honeycomb rock. He don't look just right, chief, begging your pardon for saying so of the skipper. His eyes were wild, an' he was mutterin'."

"So? Whut?"

He was muttering words that didn't make sense. They ran something like this: 'Molil . . . McNab . . . I'll scuttle her first . . . McNab . . . Molil! Barratry answers! McNab . . . Molil,' and then, chief, there was a dash of 'that rat Caperton' in his raving. No sense to it, at all."

McNab wasn't sure. But he went all through the ship again, finding the skipper nowhere—until he tried the bridge a second time. And there was Parsons.

"Bin sarrchin' ye hither an' yon, skipperrr, durin' th' past hoo-er—"

"The place of the skipper of this ship, McNab," said Parsons savagely, "is on the bridge. Didn't it occur to you that I might be here? I haven't left since we cast the helicopters adrift!"

McNab gasped. Either Parsons was lying, or the crew was, or the ship was haunted by the ghost of her own skipper—or McNab himself was seeing things that weren't here now, or not seeing something on his first visit to the bridge that had actually been there.

That proved it. That was the end. The whole ship was already drunk—drunk with anticipation of the fumes of Molil! Josh vowed then and there to go to Orkad for a second helping before he came back to Earth. Why not? Wouldn't the *Arachne* be full of the stuff that would cure all the mole-cheek he could possibly bring back? Well, then, what harm would be done? And he'd lay in a supply. Hereafter, aboard the *Arachne*, he would need to bathe in the stuff as ladies bathed in Molil!

III.

STRANGE CARGO.

McNAB made his routine report to Parsons, then was peremptorily ordered off the bridge. Since Parsons wasn't fit company for a Venusian at this point, McNab was glad to go. Things, he decided, could scarcely be worse. Yet, when he came to think of it, he'd been in situations in the past when things couldn't have been worse, and he'd managed not only to pull through them, but to do right well for McNab. But always, hitherto, he'd had to think his way through, after making an estimate of the situation.

Now, let's see, just how did the situation stack up? He, McNab, on a recent visit to Jupiter, had gone to the Orkad section for a drap of forbidden brew. There he had taken several draps. Enough draps, i' fact, so that he had gone quite daft. Moreover, while daft, he had bragged of his drinking powers to some young officers who couldn't take dares. At the moment he hadn't cared, for the brew had kept him floating all the way back to Earth—at the time he'd thought himself quite capable of floating the entire distance without even bothering about the *Arachne* or any other mundane mode of travel—and when he'd snapped out of it the damage had been done. But he hadn't given it a thought until Parsons came with the bad news.

Now, back on Earth, he could visualize the havoc that had been wrought. Beautiful ladies, and ladies who only thought themselves beautiful, were developing mole-cheek splotches on noses, cheeks, foreheads, necks, lips! They were brownish, grayish, lemonish moles, out of which hairs invariably sprouted that were as varicolored as the moles from which they grew, and curved in as many different directions.

For all McNab knew, the moles might spread all over the ladies' bodies—else why did they have to bathe in Molil? McNab, thinking of ladies' bodies, blushed! Even in his mind he was too modest to look at ladies unclothed—though if they were covered with moles they probably wouldn't be very attractive!

And mole-cheek was so contagious

that the women could pass it on—almost—by talking to their friends over the visiphone. Men were carriers, though not susceptible to mole-cheek, or mole-body, depending on how far the moles extended on the human, feminine anatomy. So men carried it among women, and women did their own jobs of scattering it, and by this time there were probably four thousand cases, instead of the one thousand Parsons had mentioned.

That thousand, by the way, might be only a small fraction of the lot, because some women, if they died, would never let anybody know—even their husbands—that they were no longer beautiful. Say, then, four thousand cases of mole-cheek or body. That meant eight thousand hands, equipped with forty thousand finger- and thumbnails that would scratch McNab's face if all the women knew who, Parsons believed, was to blame. Parsons knew, and might tell—might throw him to the wolves.

So, behind McNab, was plenty of potential trouble.

And there was trouble here aboard the *Arachne,* all kinds of it. The *Arachne* would have to be altered somewhat to receive the vats. And he loved her the way she was. The crew was already close to mutiny—even out here in interplanetary space where they couldn't hope to accomplish anything except the death of everybody and the loss of the *Arachne*—because they knew about the Molil. The skipper was insane, or getting that way, and might go berserk at any moment. He'd been mumbling about scuttling the *Arachne,* where members of the crew could hear him. The *Arachne* was a powder magazine.

Then, ahead on Jupiter, vats and other containers were right now being welded and hammered, against the arrival of the *Arachne* and her inevitable, supreme insulting.

AND what protection did McNab have against personal destruction, disgrace, or whatever? Only the fact that the *Arachne* was, without him, like a man without a soul. It couldn't do anything without him. The crew knew that. Parsons knew it. Only McNab himself knew it a fiction. The *Arachne* could run herself for a dozen round trips, Earth to Jupiter, Jupiter to Earth. And members of the crew, some of them, must surely realize it.

If Parsons realized it, then he might well be sunk—for Parsons might do one of several things, not the least of which would be to turn him over to the mole-cheeked women, accusing him directly, rightly or wrongly.

McNab groaned. Better by far that he let himself out a port, midway between Earth and Jupiter, and let himself explode into infinitesimal pieces, or whatever it was that happened to a man between worlds, where pressure outside was as absolutely nothing compared to the pressure inside a human carcass.

Yes, he might well do that. It would all be over then. But his Scotch soul rebelled. Never before had he faced a situation that he hadn't been able to turn into a profit for Josh McNab. He couldn't have conceived of a situation any more nearly impossible than the one in which he now found himself. But, still, there might be a way to work out of it with advantage to himself.

But while he pondered the matter a parade of women passed the eye of his mind, his vivid imagination. An army of women with sharp fingernails and hairy-moled cheeks, and they were not only shaking their talons at Josh McNab, but they were yelling at their husbands: "There goes that McNab fellow! Why don't you pay him out for bringing this upon us?"

"Four thousand women had forty thousand finger- and thumbnails, whereas four thousand men had eight thousand hard fists—and eight thousand

harshly shod feet with sharp toes. He couldn't figure out which he *didn't* prefer. And both armies were constantly growing, because the mole-cheek fungus worked like that.

The more McNab thought about it, the deeper grew his daze, until he wasn't sure how many days and nights they'd been on the way—because in his dreams the splotched women kept right on threatening him themselves and telling their husbands to slug him and give him the boots—or whether they were headed for Jupiter or the Earth. There were times when he wished there were some excuse he could suggest to Parsons, whereby their return to Earth would be by way of Pluto and all the other planets within reach. He forgot that quickly when he realized that they'd be loaded with Molil all that time, unless they started a peregrination that would last the rest of their lives before picking up the unholy cargo.

But if they did this, what of the women on Earth with mole-cheek? Could he possibly desert them? McNab, giving the matter thought, answered himself firmly in the affirmative! He wasn't a humanitarian. As long as he didn't have to live with the women, they could be *covered* with moles for all he cared!

There just wasn't any answer to anything. Except that he had to go through it, and manage to keep on living—and somehow come out of it with flying colors.

The *Arachne* didn't explode; Parsons didn't, either, and McNab supposed they must have talked together a bit, though he couldn't remember anything except the incubus composed of Molil and mole-cheeked women that hung over all his hours.

Inevitably the *Arachne* was warped into her Jovian berth by helicopter tugs, and McNab looked out a port to see what was going on. He could see the faces of Earth sojourners, and bulbous-faced Jovians, staring at the ship. Every last one of them seemed to be dying of laughter! And no wonder. All around the landing stage were the monsters! Yes, monsters!

Vats in segments that, when fastened together, would exactly fit the belt promenade and fill its every nook and cranny! Vats that would fill all storage space; vats that would fill unused crew quarters. Vats that would fit into what had once been the lounge, the bar, the social hall.

And stretched out in other segments were square sections which, when fitted together, could fit only one part of the *Arachne*—the elevator shafts that paralleled the tunnel!

There wasn't going to be as much as a single inch of unused space aboard the *Arachne* on her return journey! Molil would possess it all. It wouldn't even have room enough to gurgle in, though he knew it would find a way, naturally, to gurgle—and that its gurgling would be a kind of hellish, endless laughter at Josh McNab himself.

HIS EYES played over the shapes of the monsters. Rhomboids of metal, rectangles, triangles, circles, cubes, pyramids, spheres—all the shapes the mind of man could think of, and McNab recognized every one, knew just where each particular Molil container would fit. Yonder was a pyramid that would fit into that space through which the magneso-beryl girders started to splay out to distribute themselves through the upper part of the *Arachne*. Hell, it made him dizzy just to look at those shapes. There were spaces of all shapes and all sizes aboard the *Arachne*. Out there beyond the port he could see a shape and size of Molil container for every piece of space aboard the *Arachne*, and instantly, in the eye of his mind, he fitted each container into its place, because he knew every place by heart as

nobody aboard the *Arachne*—even Parsons—could.

"Rather imposing, eh, McNab?" said a kindly, soft voice that McNab, for a moment, couldn't place at all. But before he whirled he placed it, and his spine got cold from tail to pituitary. However, he did turn.

Parsons was grinning at him. But what a grin it was! It looked to be painted on Parsons, or to be a mask. The eyes above the grin were the wildest McNab had ever seen on a human being. If McNab had ever faced a madman, he faced one now. Parsons, grinning like a lunatic, or a Cheshire cat.

"Since you know the *Arachne* by heart, McNab," said Parsons, managing to talk without changing the shape or expressionlessness of his grin, "you will be good enough to supervise the stowing of those containers, securing them against shifting! You will also supervise the piping into them of Molil. No container must go back to Earth empty. Each must be filled—every drop it will take. Also, McNab, you will exercise every care to see that not a drop is spilled on the *Arachne!*"

"Aye, sirrrr!" said McNab. Almost bolting for the door to the tunnel, he looked back over his shoulder—twisting his head like an owl—at Parsons, who was still grinning. McNab grabbed at the railing of the staircase to keep from falling the length of the tunnel.

No sooner had Josh grabbed than he wished fervently that man's reactions to danger of death were not so automatic. If they had not been, he would now be draped about the motor, far below, with never another worry—or a brain—in his head. An accident like that, now, would be a blessing—though, of course, a man couldn't bring it about deliberately.

He stepped back, peered at Parsons again. Parsons, apparently expecting him to look back, hadn't moved. He met McNab's eyes—still grinning.

It occurred to McNab, however, that Parsons might not be as crazy as he seemed to be. For if he were, how could he possibly think of the one thing best calculated to lower the morale of McNab? That job of loading Molil, packing the *Arachne* solid with it!

No, there was nothing wrong with the skipper, however much he might pretend. McNab's eyes narrowed as he assured himself of this. Then his teeth locked together, and his jaws ridged with determination. So, the skipper would ride Josh McNab, eh?

Now, more than at any time previously, McNab was resolved that he would come out of this Molil business with colors flying—with the bagpipes blatting their best, and the sun shining victoriously on Loch Lomond.

He donned his Jupiter duds, let himself out onto the loading platform and yelled:

"Coom alang! Coom alang, ye scuts! Get aboord wi' yon bonnie vats, an' start ye're poomps t' wurrrkin' th' moment th' furrrst vat is boltit doon! Starrrt at th' bottom, o' cooorse!"

A mixed crew of Jovians and naturalized ex-Earthmen jumped to obey. The first container fitted into the egg-shell end of the *Arachne's* bilge. It slid into place as neatly as a hand into a glove. Secured in place, the pumps started working, and Molil began to gurgle into the first container. As it did so, the gentle aroma of the stuff began delicately to permeate the *Arachne*.

The *Arachne's* crew fled to the nearest liquor store, led by Parsons himself. McNab couldn't stand it, either, but in view of the circumstances he wouldn't let anybody know how he felt. His grayish face was a dignified mask as the job of loading speeded up—and the aroma thickened.

As far as the aroma went, he would have the last laugh. Nothing Parsons and the crew could find to drink in the regular places would render them im-

mune to Molil smell. McNab, knowing this, grinned. *He* knew the perfect antidote! He'd make one sneak to Orkad before Parsons came back aboard —after which he, McNab, wouldn't be able to smell *anything*, for days and nights, especially if he brought a bottle or two back with him. Hell, with such a prospect he could even endure the smell now!

Faster and louder gurgled the Molil, en route to milady's bath!

IV.

INSPIRATION.

JOSH McNAB had done a good job of loading the *Arachne*. He had got every container aboard her, secured it, filled it with nice, odorous Molil—all except the very topmost vat, which was shaped like one of those wooden "heads" he had seen, on which certain artists block the hats of men. It wasn't a very big vat, and it was strategically located, though for just what he didn't at the moment know. He simply had a hunch to keep that last vat empty to the last minute. It might be useful for something besides Molil. It might, in some fashion or other, represent the margin of profit McNab always allotted himself in a deal of this kind—although nothing under heaven of this kind had ever happened before to anybody, anywhere.

Parsons had not yet returned—neither had a member of the crew. There were many places in West Orkad where a man could drink, so when Parsons came back and missed McNab, he would conclude that McNab had gone to some place Parsons hadn't. So, at least, McNab hoped—for he headed as straight for Orkad as he could. He would, he promised himself, drink a lot, very fast, and get away from Orkad before he passed out and got to rolling in those big mushroomlike things that caused women to get mole-cheek. Maybe, if he were careful, he wouldn't brush against any of them, and so would return immaculate from the drinking places of the hoodlums.

Yes, and he would place various bottles in his clothing before he took a single drink, for fear, *after* drinking, he might forget the bottles, or fall into the fungus stuff before he could stow them. He knew the way very well, and wasted little time. The Jovian who ran the place grinned at him, listened, took his money, gave him a bottle for each pocket, and said:

"I'm grateful for your trade, Chief McNab. Therefore, drink what you care to pay for first, and the last drinks'll be on the house."

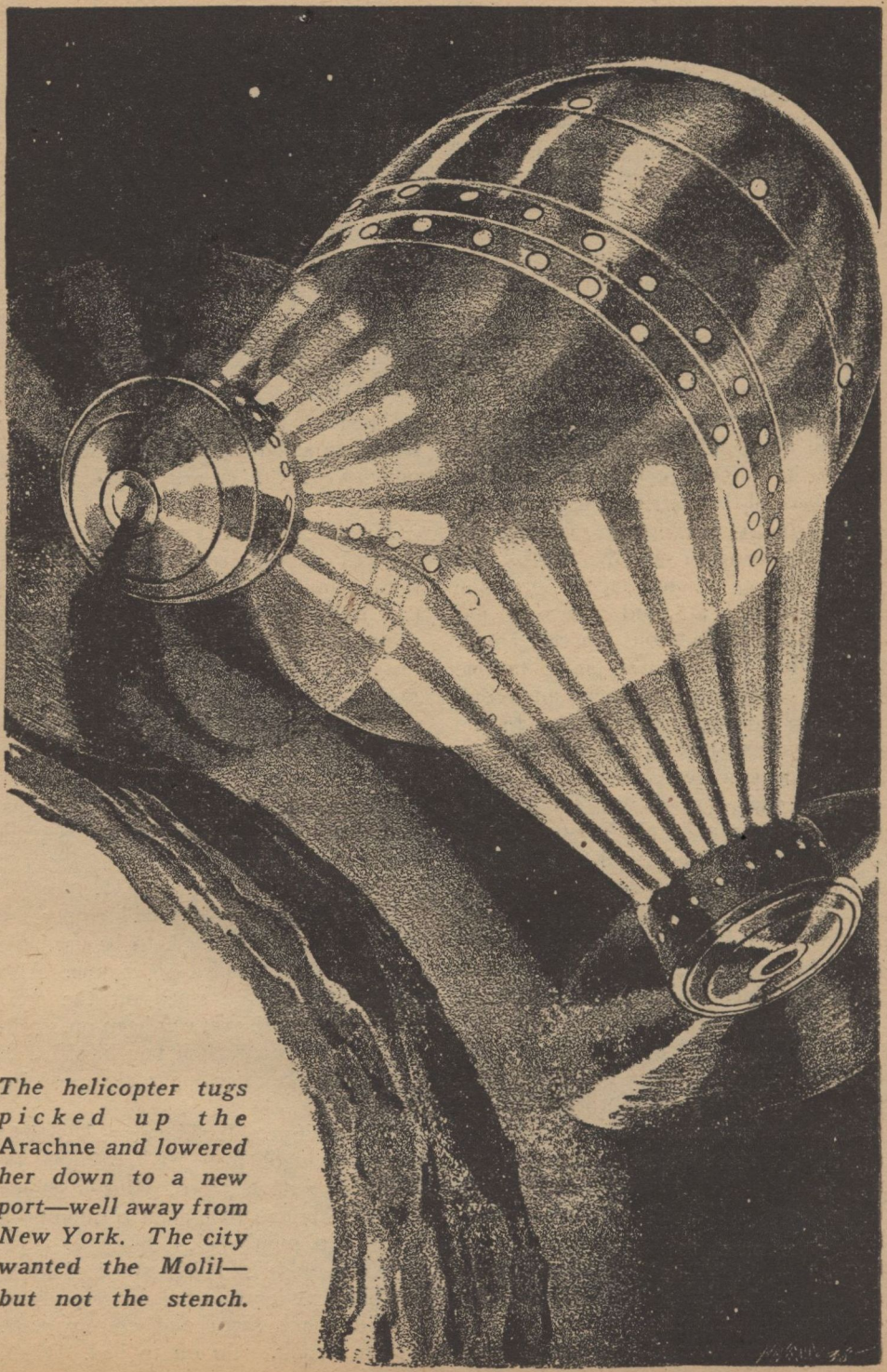
McNab's eyes narrowed. He knew exactly how the Orkad liquor worked. So, placing a finger alongside his nose, and looking very wise—for between the odor of Molil and anticipation of the delights of Orkad brew he was already weaving on his pins—McNab said:

"Aye, an' thank ye! If ye dinna mind, Josh McNab will drrrink th' *free* liquor first."

"But if you do," said the Jovian, aghast, "you'll be knocked out before you can buy a drink, and where does my profit go?"

"It's plain t' see," said McNab, "thot there be nae Hielands i' Juppiter! Nor brawny Scuts wi' teet feests wi' mony!"

The Jovian grinned doubtfully. His grin faded as Josh McNab started drinking the drink "on the house." In all probability it was the tallest and broadest single drink that anybody had ever imbibed in Orkad. Certainly Josh had never *paid* for a drink that big. It was, in fact, all the drinks rolled into one that he had estimated his capacity to be, anyhow—before he had to start back through the mole-cheek mushrooms. He grinned at the Jovian distiller, patted the bottles here and there, and started back. His walk was a stagger before he even got started.



The helicopter tugs picked up the Arachne *and lowered her down to a new port—well away from New York. The city wanted the Molil—but not the stench.*

With great care, and at great speed, he avoided the monstrous growths along the way. He laughed triumphantly when he passed the last one of them—resisting with admirable strength of will the urge to roll in it as a sort of gesture of defiance—and settled down to float, as he had raced right through the mushrooms into that delightful stage. It was fine business, this floating. His feet never touched the ground at all. Everything was made clear in his mind. Nothing he asked himself went without an answer, for he knew all things when this particular Jovian brew was in him. He knew he probably smelled to high heaven of Molil, but, as he had anticipated, he himself could not smell it. That was all that mattered to that point.

He shut one eye and searched the heavens, trying to find the Earth. He finally located it, and talked for some little time with a friend or two of his; he didn't have to shout scarcely at all, and hadn't the slightest bit of trouble hearing every word his friend answered. He tried to hop from Jupiter to the Earth, but was just on the point of making it when he remembered that without him the *Arachne* was sunk, so he decided not to make the jump after all, though quite sure it would have been nothing—nothing at all.

Instead, he walked on, or rather, floated on. He wasn't tired any more, and his life was utterly empty of worries, of problems of any sort whatever.

OUT OF nowhere something popped into his mind. Things had been popping into it ever since the drink had hit bottom—popping right in and right out again, but everything absolutely clear all the time—but they hadn't been things that mattered. Now, here was something that did: that top container aboard the *Arachne*. He hadn't filled it with Molil. Now, all at once, he knew why—and shrieked with laughter. Not to fill it, of course, would be disobedience of Parsons' orders, and he had never actually disobeyed a superior's order in his life. McNab had found his margin of profit.

He knew exactly what he had to do, what he had to get, and where to find it. He knew Orkad and West Orkad as he knew the palms of his own hands. Moreover, he'd saved enough money on that one drink to pay for what he wanted—with which to fill that top tank in the *Arachne*.

"All th' liquor th' skipperrr maun drink," McNab told the Universe, "won't keep him fra smellin' Molil; but sin' he'll try ta drrrink West Orkad dry, he willna smell anither thing at a'. Na muir weel th' crew! 'Tis pairfect! Pairfect!"

He did it without help—at least, he thought he did, which was the same thing—and when he had finished filling that top tank he went to the skipper's cabin, knocked until the skipper let him in, and said: "Skipperrr, ask o' Josh McNab whute'er ye will!"

"You're drunk, McNab!"

"So am I!" said McNab, clutching the door jamb. "Ask, skipperrr, *ask!*"

"Anything, McNab?" said Parsons, just drunk enough to humor his chief engineer.

"Aye, sir!"

"Get something that will empty the *Arachne* of Molil smell, to be used the second we've unloaded back home. Also that will take the smell off the crew and me—though you can keep on smelling of Molil yourself if you like!"

McNab placed a finger alongside his nose.

"Laugh if ye will, skipperrr! Tonicht there is naught Josh McNab kinna do. It shall be done, sirrr! But it cooms to Josh McNab thot a bit o' mon'y—a *braw* bit o' mon'y—"

"You couldn't kill the smell of Molil on this boat if you tried for five years. It's in every seam and cranny now. You're drunk. Go on to bed. We'll

be getting out of here when Jupiter and the Earth are in the right juxtaposition—"

"Juxta . . . juxta . . . an' ye're sayin' that it's McNab thot's drunkit? Dinna ye mind, skipperrr. Th' day'll coom when ye'll pay me mony's th' dollar t' de-smell th' *Arachne*. An' mony's th' dollar it will cost ye if ye haggle wi' Josh McNab!"

Josh McNab floated to bed, where he immediately slept. And his dreams must have been delightful, for he kept chuckling and chuckling. The wind rose in the night, and the *Arachne* swayed in her stage. The Molil gurgled with the swaying, and the gurgling of the Molil seemed somehow to be an accompaniment to the dreamy chuckling of Josh McNab—until near morning, when the chuckling ceased and a frown creased the brow of the chief engineer. Where chuckling gave way to frown, was where the headache began.

Unaffected by the beginning of a headache for McNab, the Molil kept on gurgling to the swaying of the *Arachne*.

History of a strange and fearful sort was about to be made in the Caperton Interplanetary Lines. The *Arachne* was to become a marked vessel as even turning her into an oil tanker could not mark her.

McNab's margin of profit was destined to make the mark, write the bit of history, and prove the efficacy of Orkad brew when imbibed by a Scotch engineer with an esophagus and stomach of magnesium-beryl.

V.

NIGHTMARE.

THE RETURN voyage to Earth was a nightmare if Josh McNab had ever lived through one. Blaming McNab for the low state into which the *Arachne* had fallen, Parsons treated him as he wouldn't have treated a dog. The more the skipper thought of everything, the worse he got; and his feeling for McNab was instantly guessed by the crew, which felt it could afford at various times to disregard the natural authority of the chief engineer.

Josh McNab could stand being ridden by the skipper. To be ridden by the master was the privilege of a chief engineer, anyhow. And even if it were not, there was little to be done about it. And as for the crew—well, Josh harked back to the days when he'd done duty on ships of the sea which had sailed here and there, when hard fists had served as all the authority a man needed. He was delighted to discover that, backed by a drap now and again of Orkad brew from one of the bottles which he nursed as a mother cat nurses a sick kitten, his fists were just as hard as ever. They were harder than any chin among the black gang or any other of the crew.

Scarcely out of Jupiter, Parsons yelled along the tunnel for McNab, who straightway presented himself.

"Aye, sirr?" he said, weaving a little, a fact which *could* be blamed on the swaying of the ship, or on Parsons' own eyesight, which, from the way his eyes were inflamed, might be judged to be on the poor side.

"McNab," barked Parsons, "you and I have been together for many years. I've never liked you. That you're a good chief engineer I confess, as long as you have me to do your thinking for you. Besides, no other chief engineer would sign on the *Arachne* if he never got a job in his life. That leaves us together and gives me a hell to live in all my waking hours, and in the nightmares those waking hours inspire."

"Aye, sirrr!" said Josh McNab.

"But there comes a time, McNab, when even my vast tolerance is due to burst a blood vessel. There is just so much a man can stand, even though his life may depend on his standing things. I have not only reached that point; I

have passed it utterly."

"Aye, sirrr!"

"Can't you say anything but 'aye, sirrr'?"

"Aye, sirrr!" said Josh.

"Then say it!"

"Aye, sirrr!"

"All right, have it your own way! But I'm warning you, McNab. For years you've bedeviled me and I've taken it. There have been times when you at least *thought* you were putting something over on me—making me your silent partner in some deception because if I talked it might get me into a jam. There never was such a time, or such a situation, actually. I could have beaten you hands down at any game you tried."

"Aye, sirrr!" said Josh McNab.

"Now, McNab, I'm going to make you wish you'd never been born! When this trip is over, and the *Arachne* becomes an oil tanker until she is ready for the boneyard, I'm quitting the service. I've been in long enough to get a small pension. Then, of course, I'll no longer need depend, ever so slightly, on Josh McNab. Get the picture?"

"Aye, sirrrr!" said McNab, his gray eyes narrowed, watchful, fixed on the red-rimmed ones of Skipper Lee Parsons.

"So, from now until we land, I'm going to do my best to make you jump out a port. If that fails—and I doubt you're tough enough to stand it all the way—I'll make you jump ship when we get back."

"Aye, sirrr!"

"I therefore, McNab, relieve you of the routine business of looking after the motor, as chief engineer of the *Arachne*, and make you nursemaid of the Molil tanks. You're to be touring among them constantly, taking care that they don't rub holes through the hull, that they aren't rubbed by girders until they spring leaks. And when they do spring leaks, you're to see that they're calked at once!"

McNAB'S face went red and white by turns. Right in front of Parsons, then, he took a drap from one of his bottles. Without thinking, he wiped the mouth of the bottle with the palm of his hand, and passed the bottle to the skipper. Liquor on duty was forbidden, but Parsons had grabbed and taken a drink before he remembered—after which he didn't remember a great deal. McNab grabbed the bottle back before Parsons could drink again. He wasn't furnishing free liquor to a master who was making him nursemaid to an *Arachne*ful of Molil tanks.

McNab, seeing no relenting in the eyes of Parsons, even after that potent drink, turned away and started his tour —which would be endless if Parsons had his way—of inspection. Parsons called him back.

"You will report to me every hour on the hour, McNab. And get this straight. There will be leaks in the tanks if I have to make the proper arrangements. If, when you get back to Earth, you're not so saturated with Molil that you'll never get it out of your system, then I don't know anything about the stuff."

"Aye, sirrrr!" said Josh McNab. "But whut do I care, sirrr, aboot th' smell o' Molil? Sin' I ne'er sup wi' anither lass or laddie, th' smell is no important!"

"Then I'll have you so saturated you can't stand your *own* smell."

"Then ye lose, skipperrr! For Josh McNab is not one to be beat so easy. He has a way to de-smell himself, as he ha' indicatit yesterda'."

"A way to rid yourself of Molil smell? Yourself and the ship, I believe you said."

"Aye, sirrr, for a bit o' mon'y—a *braw* bit o' mon'y!"

"Trying to hold me up, eh? Well, I know better. Nothing will rid anything or anybody of Molil smell, except that Jovian perfume which is all right

for ladies but would make pariahs of men—pariahs worse than Molil makes them. But, of course, you wouldn't mind even perfume, since you're a pariah already!"

"Aye, sirrrr!" said McNab. And this time he was allowed to go on with his nursemaiding, with anger in his heart, but with immense satisfaction, too. For now he knew how he would beat the game and make Parsons wish he were not so tempestuous in his judgments. He had known the answer since the second drap o' Orkad brew last night. Now he had a bit more of the answer, perfect though it was already. Parsons and the crew were rapidly becoming accustomed to the smell of Molil. McNab didn't mind it, solely because he couldn't smell it—due to a smell of his own deriving from his contraband bottles.

He began at the bilge of the *Arachne*. He put his ear against the side of the big tank that filled the bilge. Inside the tank the Molil gurgled happily. There shouldn't be room for gurgling, but the stuff gurgled anyhow. It couldn't have been more contented if it were in milady's bathtub, caressing the body and the moles of milady herself. McNab went over the tank carefully, looking for telltale streaks of oil which would indicate leaks. It wasn't impossible, he knew, that those who had made these tanks might have had a sense of humor and left weak spots, so that the stuff could come forth and really permeate the *Arachne*.

But there were no spots at all. If all the tanks were as sound as this one, his job would be easy. So McNab, himself immune to Molil as aforesaid, left the bottom tank, hunted out the torch he used when anything went wrong with the rotor—a torch whose power was enough to blast out one of the *Arachne's* magnesium-beryl hull plates, yet with which a master of its use, like McNab, could burn off a man's eyelashes without making the man blink—and returned to the bilge tank.

He flicked a wee bit of flame onto one of the plates of the tank, right close to the top, and the plate got thin—just thin enough for the Molil to begin seeping through. It didn't have to seep much, just enough to assure that the smell of Molil remain in *status quo ante*. McNab couldn't tell himself, but, knowing Molil, he didn't have to.

By the time the *Arachne* returned to Earth, the fumes from this one tank would have saturated her with the smell as Parsons had sworn to saturate the carcass of Josh McNab himself. McNab told himself grimly that this was so, thanks to the wisdom of McNab in crises involving his own personal integrity.

HE WALKED up to the next level, where there were four tanks instead of just one, the four fitting neatly into every nook and crevice of the second level from the bilge. There, strategically, he thinned the hulls of the tanks until a telltale dark streak showed that the Molil had grasped the Scotchman's idea and was ready to co-operate. McNab could not smell the result of his labors, even yet; but so keen was his eyesight, due to Orkad brew, he could actually see the smell waft itself forth and wrap its gentle tentacles about that part of the *Arachne* otherwise not dedicated to Molil, because it had to house the crew and the black gang.

Patiently, carefully, Josh McNab went from level to level. He didn't do any hull thinning at the belt promenade, for enough was enough, and those tanks were whoppers. He had no desire for a serious accident, such as would result if one of the big tanks burst its sides. There was enough oil in each of them to flood the lower levels, drown out the motor, raise hell in general, and McNab was not prepared to go that far. Or *was* he? Might it not be a good idea?

Since they were already bathed in the stuff, why not stay bathed in it to the end of time, while the *Arachne*, her motor useless, rolled and rocked in interplanetary space to the end of eternity? For just a second he dallied with the idea of burning a hole in the biggest tank, down near the bottom, and allowing nature and Molil to take their course. It would solve all problems, maybe not in the right way, but solve them. And Parsons would never have to go back to explain things to Caperton, and members of the crew to explain themselves to their wives and sweethearts. Pretty tough for Parsons and the crew, at that.

Two alternatives—Molil smell that wouldn't come out except after months of bathing in lye water, and the necessity of making new trips for more Molil before the old smell could be washed away; or the use of Jovian perfume, which was almost as bad. Oh, the smell was all right, and nearly as permanent as Molil, but it was distinctly a feminine perfume, totally unsuited to tough, hard-bitten, broad-shouldered, strutting men. Put perfume on the black gang, and the skinniest kids in a given city block would wipe up the ground with them!

McNab decided against rupturing one of those big tanks. And during the rest of that day he executed no additional sabotage. His work was already of the very best. He could tell it when he saw the crew and black gang gasping for breath or holding their noses. He could tell it when he saw the white face of Skipper Lee Parsons.

But for the rest of it, life was a nightmare of monsters. The tanks had become gurgling creatures from some unknown and hideous planet, who had stowed away aboard the *Arachne*, automatically fitting themselves to whatever space they found themselves in. And McNab himself, with his torch, had freed them, given them expression!

But by giving them expression, he had also set in motion the wheels of his own growing plan. There were certain holes in those plans, of course, which he had to plug with a bit of thinking. Parsons was not one to be taken in easily, for though McNab affected to hold the brains of Parsons in contempt, he actually did not. He respected Parsons as a foeman worthy of his steel.

Up above the belt promenade, he found, he didn't have to do anything to the tanks to give them expression. The thrust-bearing girders were already doing that. They were slowly but surely wearing thin the tops of the tanks! That frightened McNab, for if the *top* tanks were actually ruptured, not only the motor would be drowned with Molil—and perhaps the black gang with it—but the tunnel would be almost filled. And then, when the motorless *Arachne* started tumbling and rolling through space, the whole inside of the ship would be drowned in the stuff, and nothing alive left aboard her. He could see himself, Parsons and the crew, floating in Molil to the end of time—black, dead, bulbous and awful.

So now he did swift repair jobs instead of sabotage. Fresh plates to fit into the wearing places, with pads of whatever material he could find to ease the rubbing. Yes, the *Arachne* was becoming a nightmare.

PARSONS, a day or two later, after having received innumerable reports from McNab—in which McNab seemed unchanged, imperturbable as always—bellowed at him:

"Make your reports hereafter from the end of the tunnel most distant from the bridge, McNab! You smell worse than ten thousand ancient goats!"

Then Parsons chuckled. He wanted McNab to become saturated, and was succeeding in his wish. McNab ground his teeth.

"Aye, sirrr, though th' *Arrrrachnah* hersil isna lydy!"

Might as well keep the skipper's mind on the fact that nobody aboard was escaping the fate of Josh McNab—though nobody else had to practically sleep with Molil.

"Right, McNab," said Parsons, "but I can retire and eventually wash it off. You never can—for people will get a whiff of you and drive you back aboard, batten down the doors of the *Arachne*."

That did not seem too bad to McNab, as he wouldn't mind spending his days on the spaceship he loved. Parsons, he could see, was not satisfied with what he had done to McNab. The ex-chief engineer was still unregenerate. To all intents and purposes he throve on Molil.

Parsons would go even further, McNab knew, but how? Where? Three days away from Earth and McNab knew. He went down to the bilge tank again—to find that it had not only sprung a leak, but was pumping Molil into the bilge like a severed artery. McNab gasped, studied the breach in the wall of the tank. Nothing there to make the hole, that was plain. And just enough Molil would run out not to drown the motor, but to make a nice thin, sticky scum of it on the floor of the engine room, right up to the base of the motor. Parsons appeared soon—*too* soon—after McNab discovered the breach.

"If you'd been on the job, McNab," he roared, "it wouldn't have happened. Now, repair the tank, siphon all the oil back into it you can. Then sop up the rest with sponges and *squeeze* it in."

"Aye, sirrr!"

"And if it still leaks"—Parsons paused for breath with which to deliver his masterpiece of hazing—"then lean your body against the hole to keep it back until we make port!"

"Aye, sirrr!"

Two days out and the *Arachne* was again immaculate, with Molil again gurgling in the bilge tank, and Josh McNab apparently undisturbed by anything—including himself. Parsons was on the

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bridge, studying the Earth, preparatory to making the somersault which would bring the *Arachne* keelfirst instead of headfirst to her mundane stage. McNab, studying Parsons' face, knew just what the master was thinking. He'd rather die than show his face outside the *Arachne,* or carry the fumes of the *Arachne* onto the street upon his person. McNab chuckled.

The crew and black gang obviously shared the perturbation of the skipper. A nightmare was almost ended; a fresh, triple-distilled nightmare was about to begin. Parsons had ridden McNab, crew and black gang had reviled him, had offered disobedience to his proper commands. Now, if he pulled his strings rightly, his turn was coming.

He held his breath, listened to the gurgling of Molil, as the *Arachne* performed her interplanetary somersault and began going backward down her invisible rope toward the Earth and her landing stage. She carried with her a crew, black gang and skipper—especially a skipper—who were so thoughtful you could see their thought waves about the *Arachne* as easily as you—if you were McNab—could see the odor of Molil.

VI.

SOLUTION.

INSULT was added to injury when the helicopter tugs, fastening themselves on the *Arachne,* started guiding her down—not to her usual landing stage, but to a freshly built one far out in the wilds of Long Island, far from any human habitation. Nobody aboard her needed to be told why this was happening. Everybody, everywhere, knew the efficacy of Molil.

And the ladies were in a hurry for their baths, for great tanks on wheels, looking like monster beetles, were crawling out of the city toward the landing stage. Moreover, McNab noticed that the drivers of the big trucks were driving from inside transparent housings which kept them secure against the machinations of Molil. Earth was doing everything possible to escape contamination. McNab chuckled. He didn't blame anybody, for several times en route from Jupiter, during periods when he had concentrated on the nightmare to the exclusion of the bottle, he had forgotten to drink and so had got a whiff or two of the *Arachne* and her denizens. No, he didn't blame the truck drivers.

Moreover, as the *Arachne* was being warped in, Caperton telephoned Parsons, when McNab happened to be on the bridge, to the effect that the epidemic of mole-cheek had spread from Maine to the Mississippi, and that the *Arachne* would remain permanently on the Molil run. Parsons threw a fit which did no good. No chance of going ashore at all, for he'd never even have a chance to talk to anyone; nobody would allow him to come close enough.

"And stay aboard, with your crew, Parsons!" said Caperton. "You'll be going back as soon as you're unloaded. Come ashore only if you can find a way to relieve yourself of the blight of Jupiter!"

"And there are at least four women," said Parsons, his face white, "who have been as true to me as I have been to them. How can I ever explain?"

"They dinna require explanation, sirrr!" said McNab. "They *ken!*"

"And that means they'll find themselves other sweethearts, the four of them, McNab, unless—"

"Unless, sirrr?"

"Unless you can actually do what you hinted you could, disinfect the crew, the black gang and me—"

"An' th' *Arrrachnah,* sirrr?"

"The *Arachne,* too, McNab. That goes without saying, for disinfect us as much as you like, without disinfecting the *Arachne,* and you have accomplished

absolutely nothing. How much? Two thousand dollars?"

McNab shrugged, looked contemptuous.

"Three thousand?"

Again McNab shrugged.

"Blast it, McNab, for all that all of this is your fault, you're trying to blackmail me!"

"Aye, sirrr!"

"And, McNab—"

"An' fur lang an' lang, sirrr," said McNab softly, "I havena carit for th' name McNab fra th' lips o' th' skipperrr, sirrr! An' us so friendly, sirrr!"

PARSONS got it right away, and began to wheedle as well as raise his offer. McNab got a great bang out of being called "Josh" in the softest voice Parsons could command, which he usually reserved for the gushing silly lady of the moment. McNab didn't relent until Parsons actually went so far as to call him "Joshie," when he nodded. The price was right, but, he indicated, there were stipulations.

The doors of the *Arachne* must remain closed for ten minutes from the moment Josh McNab gave the word to start. Crew, black gang and skipper must remain inside until they could no longer smell the odor of Molil. Parsons, desperate—the *Arachne* was almost empty of Molil—agreed.

Furthermore, said McNab, Parsons was not to retire as skipper of the *Arachne,* but to stick to her, even though she remained on the Molil run. For if he could disinfect her now, he could disinfect her at the end of each run.

"You see, Joshie," said Parsons, agreeing to each stipulation as it was broached, "you yourself don't mind the smell of anything, because you've got nobody to love you. It's different with the rest of us."

"Aye, I ken thot, sirrr!"

"Well, what else are you waiting for, Joshie? An apology from me for riding you on the inward voyage?"

"Aye, sirrr!"

"Then rid me and the *Arachne* of the odor of Molil, and I'll apologize handsomely, and twice a day from now on. Is it a go?"

"Aye, sirrr!"

"Well, the tanks are all pulling out. We're empty as a chief engineer's head now, Joshie, so I'll muster the crew and black gang, explain to them what is what, give you your four thousand dollars, and here and now tender you the apology called for in that particular stipulation. Hey, where are you going?"

"Aloft, sirrr, to a sartain tank. Do ye shout to Josh when ye're ready! Ye'll also need gas masks o'er noses an' mouths!"

"All right, and while I'm mustering the crew, you can lock the doors from the bridge, just to make sure that we won't welsh on our agreement. Ten minutes, you said? That's long enough to saturate us with almost anything!"

"Aye, sirrr! I kenned thot!"

Josh hurried to the bridge, where he spun the lever that automatically locked the doors to outside. They could not be opened until the lever was spun again, which would take time if Parsons had to do it, because Parsons was as far from the bridge as the bilge could take him.

Then McNab, chuckling like a hyena, went to the topmost tank—the one which he had filled last, and to whose base he had, preparatory to filling, affixed a huge spigot which awaited only the hand of Josh McNab to give expression to the contents of the tank.

"All right, McNab!" shouted Parsons. "The crew agrees. So does the black gang. Whatever it is, let her go!"

JOSH McNAB twisted the spigot. A greenish sort of liquid began gur-

gling out of the spigot. It formed a rivulet which led into the top of the nearest elevator shaft. It began to splatter down the length of the *Arachne,* and no sooner had it started than shrieks of dismay rose from the engine room —and the loudest shriek of all rose from the lips of Parsons.

For into the elevator, thus to permeate the ship as Molil never had done, poured smothering, gaseous clouds of ozonyl chloride! There was no question in the mind of anybody that it would disinfect the *Arachne* and everything aboard her, and everybody; but it would also change the color of everything—the *Arachne,* the crew, Parsons, McNab, their hair, clothing, faces—to a particularly poisonous green by oxidizing the smell of Molil to dye; except in semicircular areas about the mouths and noses of the men, where their skin would remain white as snow! McNab didn't mind being green—it would last only thirty-six to forty-eight hours, or even less if plenty of scrubbing were done, which couldn't be done aboard the *Arachne* because even the water would be the same poisonous green!—but the others, due at the homes of their wives and sweethearts even now—well, they were in a mess. But none was in more of a mess than all had showered upon the luckless head of Josh McNab on the trip from Jupiter to Earth!

Josh laughed behind his own mask—a strange sound.

At exactly the end of the time stipulated, Josh McNab raced to the bridge, spun the lever that opened the doors, and yelled down the tunnel to the skipper:

"Ye'll ken th' noo, skipperrr, thot Josh McNab isna th' Piped Peeper o' th' streamline jobs! Josh McNab—Joshie to ye, skipperrr—isna responsible thot sartin laddies kin smell good brew an' follow Josh t' th' soource o' supply! An' since whin, skipperrr, has it bin a galley-slave crime for a chief enginerrr t' tell laddies whur t' find th' best draps o' cheer?"

There was no answer. Josh grinned. Since from head to toe he was the same hideous green as everybody else aboard the *Arachne*—or those who had *been* aboard her—except for a circle about nose and mouth, the grin was distinctly *other.* He grinned again. He even looked at the grin in his mirror, and approved of it. Then he thrust the neck of a bottle of Orkad brew right into the middle of the grin. He drank, removed the bottleneck, said to his amazing reflection:

"After a', how kin 'e say aught aboot a' this, when e'en Joshie himsel' is th' greenest o' th' lot? Richt, he kinna! But they be whuspers inside me thot say thot 'e wull!"

DESIGN FOR LIFE

Concluding an article on a highly interesting subject—why the Octopus Men from Mars won't look that way!

By L. Sprague de Camp

Illustrated by L. S. de Camp and Willy Ley.

If intelligent life did develop on another planet, it is very unlikely that it would look like a chrysanthemum, or a starfish, or a fire hydrant. There are good reasons for thinking that it would probably look something like a man.

I MADE that statement in a previous article. In the article I backed up the first part—about starfish and things—by showing why an intelligent life form would, given conditions like those on earth, more or less have to be an active multicellular land animal, with a chemical constitution and a metabolism much like those of earthly land animals, and with a weight of probably over thirty or forty pounds.

But that leaves a good deal of leeway in the design of our imaginary extra-terrestrial. The python and the prong-buck both fit the above description, and you wouldn't say that either was particularly manlike. So this time let's concentrate on the probable specific shape and structure of our e.-t.

In my former article I mentioned the resemblance of the evolutionary process to one of engineering design. A phylum —line of descent—of animals entering a given environment is faced with the problem of adopting a shape that will enable it to survive in competition with other phyla, in the face of climatic difficulties and the ceaseless attacks of bacteria and other parasites. This competition is, of course, not conscious: each individual animal, as far as it has consciousness of any kind, is aware only of the conflict between its instinctive urges to secure food, avoid danger, and reproduce its kind, and the difficulties in the way of realizing these ends. That the fate of its species may depend on its success in so doing is something of which it has not the remotest conception. The only exception is man, who, by the development of speech and writing, has become aware of things not under his nose and events that happened before yesterday.

Given the problem, the phylum normally has a choice of a limited number of *practical* solutions. For instance, among herbivorous mammals exposed to the attacks of predators, some depend mainly on speed—antelope; some on keen hearing—deer; some on high birth-rate—rabbit; some on armament—buffalo, and some on wits—primates—for their protection.

If two phyla adopt the same solution independently, the results will probably be quite similar regardless of how unrelated the animals are. But the resemblance applies only to the features actually involved in the solution of the problem. For example, the porpoise and the mackerel-shark resemble one another in the shape of their limbs and their general streamlined form. But one is still a warm-blooded air-breathing mammal and the other is still a cold-blooded

gilled subfish. No amount of evolution is likely to make the porpoise switch from lungs to gills; he has traveled too far along his particular branch of the tree of life to turn back to a fish's breathing system.

Still, in external form the shark and the porpoise have converged remarkably, both phyla having adopted the same solution to the problem of driving a heavy body through the water fast. (The porpoise is, in fact, about the fastest thing in the sea, speeds of seventy miles an hour having been claimed for him.)

ANOTHER CASE of convergent evolution, as it is called, is found among carnivorous mammals. Two possible methods of killing prey are biting, in which both jaws are used, and stabbing, in which a large tooth or teeth are thrust into the victim while the mouth is held wide open. Most carnivores bite. But in North America back toward the beginning of the Age of Mammals we find a branch of the cat family—they were all small animals then—going in for stabbing. They gradually lengthened their upper canine teeth to the point where they would be almost useless for true biting, and loosened the lower jaw so that it could be opened widely enough to free the ends of these tusks. The neck muscles that pulled the head down were strengthened to enable these near cats, called machaerodonts or saber-tooths, to deliver a powerful stabbing blow with their heads.

This method of using the tusks has been checked most interestingly. In the middle of the Oligocene Period in North America there were two felines, one a saber-tooth, *Eusmilus,* and the other a normal cat, *Nimravus,* both with about the size and proportions of the modern puma. The type skull of *Nimravus* is a fossil: There is a frightful gash in the forehead that to all appearances was made by one of the sabers of the *Eusmilus.* The wound is the right size and shape, and no other plausible explanation for it has been suggested. The stab went through the frontal sinus, but missed the brain. *Nimravus* evidently recovered and lived some time after, because the hole in the bone had partly healed up at the time of the animal's death.

The saber-tooths were, of course, placental mammals, like men and muskrats. During most of the Age of Mammals South America was separated from all the other continents, and the native mammals evolved along independent lines. Their herbivores all evolved from a few small unspecialized placental mammals into a variety of types, including horselike, rhinoceroslike, camellike, and rabbitlike forms, and some forms, such as the ground sloths, like nothing else on earth. But there were no placental carnivores. The flesh eaters were all marsupials, like kangaroos and opossums; they branched out into a variety of weaselike, catlike, and wolflike forms.

The placental and the marsupial branches of the *Mammalia* diverged back in the Age of Reptiles, and have been quite distinct for well over sixty million years. But, strangely enough, one of the phyla of South American predacious marsupials developed the same saber-teeth and the same method of using them as is found among the true saber-tooths. The Pliocene marsupial *Thylacosmilus* and the last of the true saber-tooths *Smilodon* were superficially very much alike, both being about the size of a modern lion. And there is not the remotest possibility of one's being descended from the other, or of intermixture. You could cross a dog with a horse at least as easily as you could produce a marsupial-placental hybrid.

Another example of convergent evolution is furnished by the South American hoofed animals called *Proterotheres,* who independently evolved the horse type of foot with its single toe. And there were the three separate phyla of

reptiles, the *Rhyncocephalia*, the *Phytosauria*, and the *Crocodilia*, each of whom, starting with lizardlike animals, evolved large short-legged, long-snouted river-dwellers that looked enough alike to fool anybody but a paleontologist as to their true relationships. Of these the *Phytosaurs* have long vanished; the *Rhyncocephalians* are represented by a single species, the tuatara "lizard" of New Zealand; the crocodiles were going strong until man started turning them into suitcases.

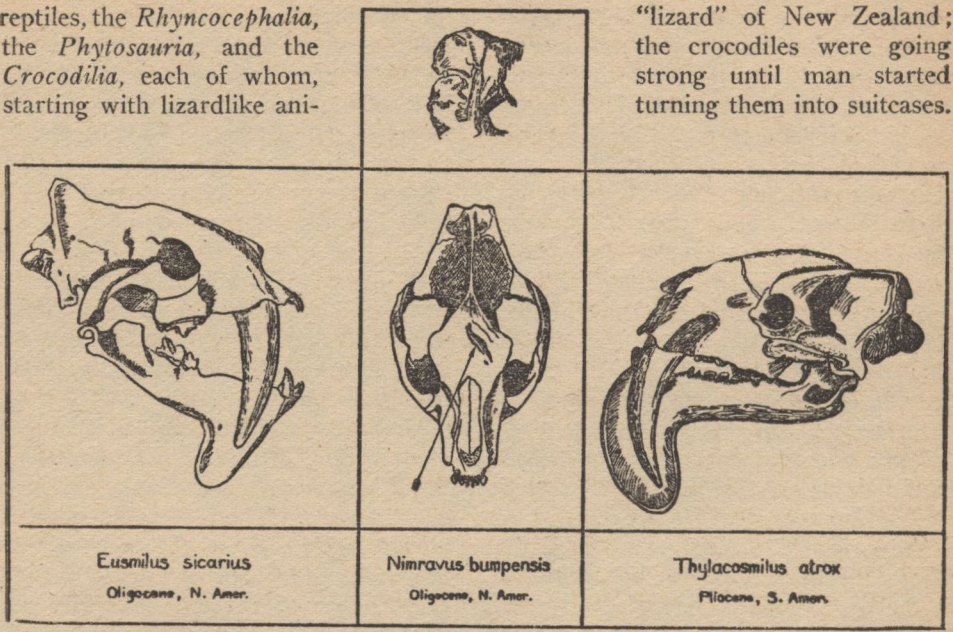

Fig. 1. Convergent evolution developed to perfect parallelism. Left, is the skull of Eusmilus sicarius, a true, North American saber-tooth, about the size of the modern puma. The massive, stabbing tusk is the cardinal feature, and around it and its functions the rest of the skull was "designed." To be effective, it must be free to stab, requiring that the lower jaw be so mounted as to be able to swing entirely out of the way. The hinge-joint is abnormally flexible, permitting the animal to drop the jaw back against the throat, entirely freeing the sabers for action. When not in use, the sabers should be protected against accidental damage by a scabbard arrangement—so Eusmilus developed a neat sheath. The Center skull is that of a specimen of Nimravus bumpensis, a normal great cat of the same period, included here because of the curious accident that this particular Nimravus got into a fight with a saber-tooth, and one of the great sabers was driven into his skull, preserving proof of how Eusmilus used his sabers. The smaller cut above indicates the probable attitudes of the two fighters when the wound was made. Incidentally, Nimravus was tough; he survived the frightful wound, as is shown by the fact that the bone is healed over. The Right skull is that of Thylacosmilus atrox, a South American marsupial. Cut off from North America, no large mammalian carnivores appeared in South America, so the marsupials took over the job. A powerful hunting carnivore developed, but a marsupial of the great division to which kangaroos and opossums belong. Meeting general conditions similar to those that Eusmilus faced, Thylacosmilus solved the problem in the same way—with sabers. Again the jaw is fixed to drop far back, freeing the weapons, again the protective sheath developed. The skulls seem those of two closely related members of a family—actually, divergent evolutions had carried them so far apart that the most basic function of life, reproduction, even, was entirely different in the two forms. But the problems of life each faced were identical, so they developed near-identical forms.

BUT SPEAKING of man's destruction of other forms of life reminds me of those people who sit in judgment on the animal kingdom, rating species according to their conformity to the judges' ideas of moral conduct. Usually they praise the herbivores and condemn the

predators, as though the rabbit's preference for grass instead of meat were nobler or more moral than the fox's preference for rabbit. Actually, of course, the rabbit eats plants, not because there is anything kindly or virtuous about him, but because that's all that his teeth and stomach and general physical make-up fit him to live on, and because he is equipped with instincts that make him go for plant food without any philosophizing about the wrong of taking life. He runs from danger not because of any belief in nonresistant pacifism, but because a rabbit that did anything else when a fox came along would never have a chance to pass his suicidal courage on to his descendants.

The point I wanted to make is that these people are particularly hard on those predators that, like the puma, kill more than they need for the fun of it, forgetting that the surplus carcasses are never wasted: they furnish square meals for hundreds of smaller beasties. But of all the animals that kill for sport, man is by far the killingest, yet I have never heard an anti-predator propose that man should on that account be exterminated.

To get down to the architecture of our extra-terrestrial: We've already decided that he will have to be good-sized and active. Will he be entirely soft-bodied, or will he have a skeleton of some sort?

Anybody who has seen a captive octopus squilching along on dry land can guess the answer to that. For legs, rubbery, boneless tentacles like those of an octopus are all right under water, but for getting around against the pull of gravity you need a framework of rigid parts for support and for the attachment of muscles. And you do need legs: belly-crawling like that of a snake or snail is much too slow. Even the fastest snakes can do only about four miles an hour.

Would the skeleton be inside like that of a chordate—a term used in place of the old "vertebrate," because it includes the primitive lancelet and the degenerate sea squirts, who are related to the animals with true backbones, although they lack them themselves, or outside like those of an arthropod—jointed-legged animal: insect, spider, centipede, crab, shrimp, et cetera? It has been truthfully remarked that if you expanded an ant to the size of an Airedale, it would be unable to raise its weight off the ground, because of the square-cube law. And it would presently die of suffocation, because its tracheal tubes would be unable to pass oxygen fast enough.

But this is not a fatal objection to giant insects. Much the same fate would befall a mouse that was enlarged in as great a ratio. There is no reason why a giant insect could not be designed with legs stout enough to support its weight, even if the weight were over five hundred pounds, or why it could not be equipped with a true lung in place of the inadequate tracheae. These are a series of tubes running through the insect's body and giving oxygen direct access to its tissues and carbon dioxide direct escape therefrom. This system, like the ameba's pseudopodal crawling, works very well, but in its proper size-range only. Some insects have a crude respiratory system. Watch a wasp—which, being a very active insect, needs more oxygen than most—and observe the rhythmic telescopic contractions of its abdomen. It is squeezing air into and out of its tracheae.

There is a much more potent objection to giant arthropoda, which has probably not occurred to many people: how are they going to grow that big? With a hard all-inclosing shell there isn't any direction in which you *can* grow. Living arthropods get around the difficulty in two ways. Most of them shed their shells periodically. The skin underneath is soft enough to permit growth for a few days until it hardens again. The animal usually holes up and hides while it is in this defenseless condition.

The familiar edible soft-shelled crab is merely a common blue crab that has been caught in this state.

THE OTHER method is to grow to a certain size in the form of a soft-bodied larva or grub, then to metamorphose in a chrysalis and finally emerge as an usually winged adult. The more advanced order of insects, such as beetles and butterflies, use this method. The adult never grows any bigger after it has emerged from the chrysalis.

If our e.-t. tries to grow big by the method of successive casts, it has to contend with the risk that it must periodically run during its soft state. Sooner or later some enemy is likely to catch up with it during one of the many molts necessary to bring it up to the desired size, for growth by this method is necessarily slow. And as it gets larger, it runs into the additional difficulty of gravity. Legs that would be adequate under normal conditions would buckle when stiffened with nothing but a chitinous skin soft enough to be stretchable.

This difficulty is not so serious under water. As with the chordates and mollusks, the largest arthropods are aquatic: the Japanese spider-crab, a slow-moving and highly edible creature with five-foot legs; the common lobster, which may reach a length of a yard and a weight of thirty pounds; the fossil sea scorpions, some of which were nine feet long, and whose nearest modern relative is the horseshoe crab. The biggest land arthropod is, in fact, not an insect, but the purse-crab of the Pacific islands. Its maximum weight, of about twenty pounds, is probably near the practical limit for land arthropods. And that's pretty small for intelligence.

The method of complete metamorphosis, like that of the butterfly, runs up against the difficulty of designing a large boneless larva that can, nevertheless, get around. There is also the fact that the animal's organization, including its nervous system, is so completely broken down and rebuilt in its pupal stage that it is hard to see how any memory of its life as a larva could be carried over to the adult stage. In that case it would do no good for the adults to teach it. Such contact between one generation and the next is probably necessary for the development of intelligence. It's probably the only way that acquired knowledge can be passed on; there is no evidence of the existence of a "racial memory."

Another conceivable method of growth would be to put enough growth cells in the exoskeleton to enable the whole thing to expand, the way a vertebrate skeleton does. But this would mean supply the cells with blood on both sides of the shell. The arthropod would have to have a skin outside his shell to protect the shell and the blood vessels nourishing it, something like the velvet on a deer's antlers. Such a scheme would seem to combine most of the disadvantages of the chordate and athropod patterns rather than their advantages. It *might* be possible to work out some trick combination of arthropod and chrodate characters that would enable a really large land arthropod to live and move and have its being. But altogether there seem to be so many practical difficulties that we are justified in saying that the adoption of the chordate pattern is more probable.

There is one other method of getting stiffness, which is that of hollow tubes filled with liquid under pressure. The stiffness is that of a fire hose rather than that of a beam. There is an example: the little lancelet, *Amphioxus,* has such a tube running his length, called the notochord, foreshadowing the true backbone of vertebrates. But to stiffen the legs of a large land animal this way you would have to run the pressure up pretty high, with attendant dangers of collapse if a tube sprang a leak or was punctured.

And why bother when there are so many things that a real skeleton can be made of?

THE CHEMICAL composition of the skeleton doesn't matter much from our point of view. Among earthly land animals we find a number of substances working more or less well. In the chordates we have cartilage—a protein—and calcium phosphate. In the arthopods we have chitin—a protein—with some calcium salts added in the aquatic forms. In the mollusks we have conchyolin—a protein—usually with a lot of calcium carbonate and smaller amounts of other salts.

In the same way, the composition of the blood could vary a lot without affecting the animal's possibilities very much. For carrying oxygen we chordates use an iron compound, hemoglobin, one kind of which has the formula $C_{758}H_{1203}FeN_{195}O_{218}S_3$. The arthropods use the copper compound hemocyanin. The sea squirts, just to be different, use a vanadium compound. It seems, however, that hemoglobin is more efficient in oxygen-carrying powers than hemocyanin, in a ratio of something like 10:4.

To get an idea of the physical struture of our e.-t. we might look at those displayed in the animal kingdom on earth. The animals have branched out into a dozen or so main subkingdoms. Only three, the chordates, the mollusks, and the arthropods, have produced forms that are at once large, active, and highly organized. The other subkingdoms, meaning such things as roundworms, lamp shells, starfish, and sponges, are mostly small, soft-bodied, aquatic, and simple.

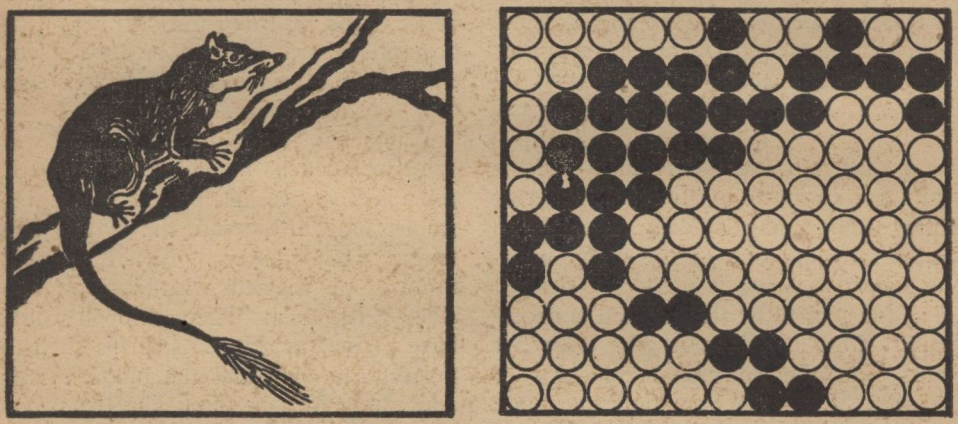

Fig. 2. Problem in television—the camera-type and compound eye. Sight is, essentially, a problem in television—the reception of an image and its transmission in the form of nerve-impulses rather than electrical impulses, to a receiving apparatus, in this case, the brain. On the right is the best effort of the primitive television of the insect's compound eye. Like primitve television sets men made, it receives only a comparatively small number of dots, where the highly evolved camera-eye, like the modern iconoscope, receives through one lens and focuses on an immense number of microscopic retinal nerves. Ptilocercus, the Feather-Tail, is a small, but highly efficient insectivore; local insects would be far better off if they saw him as at the left, instead of as at the right, a pattern that might be a branch with a twig and a leaf.

The three dominant subkingdoms show an extraordinary diversity of structure. Compare a chordate such as yourself with an arthropod such as a lobster. The lobster wears his skeleton outside, has his spinal chord running along his belly, his heart in the middle of his back, and his kidneys in his head. He has a set of teeth in his stomach. Instead of separate salivary, gastric, intestinal, and pancreatic glands, he has a single large

gland that takes the place of all these and in addition stores calcium salts for strengthening his shell after each molt. Or compare yourself with a mollusk such as an octopus, who has his head at what is normally his rear end and has his "legs" arranged in a circle around his mouth.

But the members of these three subkingdoms do show certain resemblances. As they differ so markedly in other respects, it seems likely that the features that they do have in common are more or less necessary to the construction of a highly organized animal.

For example, they are nearly all bilaterally symmetrical, at least outside. (The right and left sides do usually differ somewhat, but principally with respect to the location of the internal organs. Most of them have a definite head at the front end, in which is located the main nerve-ganglion or brain, the mouth, and the principal sense organs. Those that lack the head are principally immobile forms like the clam. The more active land forms have an even number of legs arranged along the sides or bottom of the body.

Our e.-t. might have any of a number of arrangements of his internal organs and still function adequately. A detailed discussion of the problem would take a whole article by itself, so we shall confine our attention to externals.

HOW MANY legs would he have? That depends on how many fins or other paired appendages the aquatic form he descended from had. With us, our fish ancestor had four paired fins, wherefore we have four limbs. There might have been only two. The mud-hooper *Periophthalmus,* a fish apparently in the process of coming out on land, hops around on his two strong pectoral fins only. And two-limbed land animals are quite practical. In *Tyrannosaurus* and several flightless birds, such as the kiwi, the forelimbs have become useless vestiges or have disappeared altogether.

But if our e.-t. is to develop intelligence, he will need some organ to manipulate things with. The most intelligent horse could not possibly build a house or write a letter, so it's not likely that he would develop the brain necessary to enable him to do either.

A tentacular extension like an elephant's trunk is useful, but for mechanical reasons not as satisfactory as a pair of grasping limbs like our arms. Not being stiffened by bone, it has little strength in compression; it can pull, but not push; that is, it can't push when fully extended, though it makes a fair pusher when rolled up into a ball. Likewise it has little resistance to bending stresses. The pointed liplike flaps on the nostril end are useful, but not quite as good as fingers. And one of these organs isn't enough for complicated work. The elephants might get somewhere if they had four trunks apiece (pleasant thought!) A two-legged animal with grasping feet, like many birds, can manipulate things a little, but the awkward business of having to balance on one foot while he uses the other leaves him no better off than the elephant. So our e.-t. would be more likely to go places if he had at least four limbs to begin with, two for walking and two—eventually—for manipulating.

The question might occur to you, why couldn't a two-limbed animal evolve a pair of arms out of nothing? I don't know, but the fact is that among land-vertebrates new limbs for some reason never have developed. A fish phylum has little difficulty in developing new structures. It can form new bones by evolving a cartilagenous structure and then calcifying the cartilage. But once the chordates came out on land they lost this power. They can still evolve cartilagenous structures out of nothing, or nearly nothing: witness the cartilage stiffening of the whale's flukes. But this kind of cartilage is never calcified.

Hence the number of bones in land vertebrates has never been increased, with a few rare exceptions, though it has often been decreased.

Compare the nine bones in the lower jaw of *Seymouria,* a small primitive reptile from the Perminian Period, with the one bone forming your own. The exceptions are cases of reduplication of bones, as in the snake's vertebrae and the whale's finger joints, which are not very important to us. There have been freaks produced by mutations: six-legged frogs and seven-fingered men. But these mutants have not as far as we know founded new species.

Our e.-t. then has a minimum of four limbs. He can use all four for running, or he can modify two into wings, or he can let two disappear. But if he intends to evolve into an intelligent form, he'd better modify the front pair into arms. When I speak of an animal's "intending" to evolve into this or that, I'm using a figure of speech. The individual animal—unless he's a man and a literate one—knows nothing about evolution, and could do nothing toward guiding his species' destiny if he did. Evolution resembles the conscious solution of an evolutionary problem only in its results. A competent engineer can find the best available answer to his problems with much less fumbling around and fewer false starts and repetition of old mistakes than are found in the evolutionary process. All of which does not support the idea of a conscious, orderly plan in back of evolution.

IT IS quite possible that our e.-t.'s phylum would have had six limbs to begin with. Plenty of sharks have six paired fins. Hence a design on the plan of a centaur or an angel would be quite practical. The idea of using one pair of limbs for walking, one for flying, and one for manipulating is an attractive one. There are some practical difficulties in the matter of weight. The reptiles, mammals, and birds have all produced fliers, and none of them much exceed twenty pounds in weight. (By "fliers" I don't mean human aviators.) You run into another application of the square-cube law here: With a given wing-loading, weight-carrying ability varies approximately as the area of the wings. The wing-loading is limited by the amount of oomph that ordinary protoplasmic muscles can impart to the down stroke. The size of the muscles is limited by considerations of weight, again. It has been estimated that a flying animal the size of a man would have to have a breastbone, to anchor the flying-muscles, projecting four feet in front of him.

We might stretch things a bit and say that if the minimum size of an intelligent animal is thirty pounds, and the maximum size of a flier is the same, intelligent fliers are possible. But that seems a rather marginal case, so let's call it "very doubtful" and leave it at that.

While six limbs are not to be ruled out, they seem rather less likely than four. If four enable a cheetah to run seventy miles an hour, they would seem sufficient for ordinary locomotion. Additional limbs might be simply in the way. In the hermit-crabs and the butterflies we see cases where the original eight and six legs respectively are being reduced to four. When our e.-t. attains intelligence, a third pair of limbs would be useful. But he would then have millions of years of nonintelligent evolution behind him, during which time the extras would be superfluous. The phylum could hardly be expected to hang onto them on the chance that they might come in handy some day; evolution doesn't work like that.

We now have an e.-t. with a head, two arms, and two legs. For the number of fingers, seven would seem to be the maximum needed for any practical purpose. The minimum would seem to be three, mutually opposed like those

of a Japanese dragon. (Japanese dragons have three claws per foot; Chinese five. If you don't believe that, go look at a vase some time.)

The legs could be used either for hopping or running. The only habitually bipedal large mammals are man, the gibbons, and the kangaroos. (The great apes are all normally quadrupedal.) Other large bipeds are the flightless birds and many dinosaurs. Of these the kangaroos alone hop; the rest run. An intelligent hopper is possible, but perhaps less likely than a runner. Hopping might be hard on a man-sized brain.

If our e.-t. is a hopper, he would practically have to have a long tail to balance himself. If he is a runner, he might have a balancing tail like the dinosaurs, or he might not, like men.

He would be more likely to develop intelligence if he were able to keep up a fairly constant rate of activity, and not be slowed down to a torpid state every time he got chilled, as happens to reptiles. At least his chances of surviving long enough to evolve his brain would be better. If he were warm-blooded, he would need a coat of hair or feathers to conserve his body heat, or the ability to make an artificial covering. The very large animals need such a covering less, because of their high mass-surface ratio and hence slower proportionate heat loss.

In speaking of hair, the case of man is a puzzling one. Why should we have discarded such a useful feature after we had once acquired it? An even, tropical climate presents one answer. The hair on the three great apes is often very sparse. But why man should have capriciously retained hair in a few meaningless spots while he lost it everywhere else, is one of those things we just don't know, at least not yet. It might be, as I once suggested in a story, that loss of hair was a factor in encouraging intelligence, by forcing people to create clothes and shelter and to learn to use fire. The extinct Tasmanians, by the way, are said to have gone completely naked at all times, although the climate of their island is pretty raw part of the year, and not minded it. They did use animal skins—but to sit on, not to wear! And they were not a particularly hairy people.

OUR e.-t. would need good keen senses. Without them his brain, however massive, could not gather enough facts about the world around him to enable him to develop the power of reason. The most important sense from this point of view is undoubtedly sight; it far surpasses the next two most important, hearing and smell, in the speed and accuracy with which it conveys information to the organism, and the distance over which it conveys it. Compared to other mammals, man's three remote-acting senses rate: sight excellent, hearing fair, smell poor. Concerning the possibilities of other remote-acting senses, such as clairvoyance and radio-wave sensitivity, we don't know enough to make worth-while speculations.

Of the several types of eye that have been evolved, only one, the lens-camera type, can form a really clear, strong retinal image. It has been evolved independently—convergent evolution again—by the cephalopods, which are merely mollusks with tentacles, and the chordates. Eyes of the lensless pinhole-camera type are found in one organism, the nautilus, which is a cephalopod with a spiral shell. This eye is unsatisfactory. While it can form a fairly clear image, to do so the aperture must be so small that only a little light can get in.

The compound eyes with which some writers have endowed their e.-t.'s is all right for insects, but would be quite inadequate for a large intelligent e.-t. Compound eyes are not much more than cases of reduplication of the simple photosensitive spots found in such creatures as worms. Each of the eyelets in a com-

MODELS FOR INTELLIGENT LIFE-FORMS.

Man, the biped walker without tail — the form that worked on Earth. Incidentally, the cave-drawings of the mammoth, such as indicated here, are our only way of knowing that the mammoth had the large hump on top of his skull. The hump is not bone, but appears to have been a fatty mass, perhaps of the nature of the camel's hump, and hence does not leave traces in the skeleton.

Iguanodon bernissartensis, the bipedal walker with tail. Note the interesting hand structure, the thumb becomes a stiff, horny spike that must have been a formidable weapon, the "little" finger becomes opposable to serve in place of a thumb.

The kangaroo, the bipedal hopper with a tail. His "hands" are free for use, but think what a subway crowd would be!

pound eye has a lens, but the purpose of the lens is merely to catch more light, not to form a retinal image. The eyelet has no true retina; it hardly could have for want of space. It has merely a single photosensitive cell at its bottom or inner end, which registers light and dark like a selenium cell. The insect locates objects according to which of the eyelets registers light and which dark. A glance at the illustration shows why a compound eye would be utterly useless for such fine work as reading a newspaper.

The number of eyes is uncertain but two seems at least as likely as any other number. For stereoscopic vision, that useful aid to intelligent behavior that has been developed only among the primates, two is all you need. For a life on the ground or in the water, where precise judgment of distance is not so important as it is in the trees, two eyes looking in different directions, like those of most vertebrates, can between them cover most of the possible directions of vision, and hence seem to be the ideal number again. Another eye or two might be useful for spares, except that the animal kingdom does not go in usually for carrying spare parts around.

There seems to be some principle, not fully understood yet, of economy of growth-energy, which may account for the fact that one single phylum's is unlikely to develop great size *and* great speed *and* a powerful armament of horns or tusks or both *and* keen senses *and* an intelligent brain all at once. Any two of these qualities may be found in living animals, but rarely three, and more rarely still more than three in one organism. It is probably more practical for a phylum to make up for the occasional death of a member as a result of losing an organ, such as an eye, by improving the over-all design and stepping up the birthrate, than to equip the whole species in spare eyes, limbs, et cetera.

SOME of the coal-age amphibians and Permian reptiles from whom we are probably descended had a third eye in the middle of the forehead, or, in some cases, a pair of supplementary eyes. But these extra eyes were discarded, though vestiges of them persist in several modern reptiles. The four-eyes, *Anableps,* does not really have four eyes. This little fish has two lenses, and each lens has two irises and two retinas. It swims with the upper irises out of water; light from above the surface passes through the upper irises, through the lenses, and onto the lower retinas. Light from below the surface goes through the lower irises to the upper retinas, and rays intersecting those from the air at right angles.

One suggestion has been made of an eye with an extensible lens, to use like a telescope. But this hardly seems necessary in view of the extraordinary long-range visual powers that the eagles and vultures achieve with eyes of moderate size and quite normal design. We might, however, note the possibility of two pairs of eyes, one for long-range work, like a buzzard's, and one for close-ups.

The e.-t.'s eyes might not cover exactly the same range of colors as ours, but would probably not be very different. Their range might, like that of a bee's eyes, start in the green and extend up about half an octave into the ultra-violet. But they are unlikely to work on X rays or short radio waves. The reason has to do with the nature of the photochemically active compounds by which the retina operates. The wave-length of visible light averages about eight hundred and sixty times the diameter of the orbits of the outer electrons of the atoms that make up these substances. That is just about right for these waves to affect these electrons, thereby making possible the orderly chemical changes in them that actuate the endings of the optic nerve.

X rays, on the other hand, work on

the innermost rings, and with such violence as to endanger the whole delicate structure of the molecules. Exposure of the face to X rays does, in fact, produce the sensation of flashes of light on the retina. But prolonged exposure is likely to do the retina serious damage. If we tried to design an eye to work on short radio waves, we should not only run into difficulties in finding photochemically sensitive compounds for the retinal cells, but we should be up against the fact that, to form a clear image, the eye's dimensions have to be enormously greater than the wave lengths of the radiations it is supposed to work on.

I don't know what the minimum size of an eye that would work on one-millimeter waves would be, but it might be something like that of Dr. Beebe's bathysphere. Also there is the fact that the phenomena of absorption and reflectivity are most active in the neighborhood of our own visible spectrum, so that eyes designed to work in this range will be the most useful to their owner.

OUR e.-t. would probably have his ears in his head, instead of in his knees or other parts as in some insects. The strong tendency among the more complex animals toward pairing of external sense organs implies that there would probably be two ears. They might or might not have external flaps around the ear openings like a mammal. And it would be a most odd coincidence if the flaps had the very peculiar shape of the human external ear.

A variety of jaw and tooth structures would be possible. Our e.-t. might have a beak, or a lower jaw in separate independently movably halves like a snake. He might even have a pair of jaws moving sideways, like an arthropod, though the greater mechanical complexity of this type of jaw structure in proportion to the work accomplished is an argument against it.

His nasal opening or openings might be somewhere other than between his eyes and mouth: above his eyes, for instance, or at the sides of his neck. But if he or his ancestors used the sense of smell for hunting food, they would probably not be very far from his mouth. He might, like a whale, have his breathing apparatus permanently closed off from his eating mechanism.

So we can say that our intelligent extra-terrestrial would probably be an active biped between a siamang—a large species of gibbon—and a grizzly bear in size, with or without a balancing tail, with or without hair, possibly a hopper, but more probably a runner, with arms ending in from three to seven fingers, with a head bearing mouth, nostril or nostrils, a pair of ears, and two or possibly more eyes.

But before we push his resemblance to man too far, we must remember that we have some advantitious characteristics, such as the peculiar shape of the human nose and the peculiar distribution of human hair, which may be more a matter of luck than of useful adaptation. Our e.-t. might have one of these, but the chances are greatly against his having all of them. Our bodies are walking museums of vestigial organs, momentoes of our past evolution. If our e.-t. followed a different line in his development, he would lack some or all of our vestigial organs, but would have others of his own. And he might have features of doubtful utility, such as an ornamental comb on top of his head.

Most bodily features of animals can be accounted for on a basis of practical use, either now or in bygone times. But some are not so easily disposed of as that. They may be the secondary results of mutations that were useful in other respects. A given feature is likely to be controlled jointly by several genes, and one gene may influence more than one feature. Suppose an animal is living a life in which its color is of little

importance to its survival, but in which large size does confer an advantage. And suppose that a possible gene-mutation results not only in large size, but in darker color. When this type displaces its predecessor, the species will have become larger and darker, though the darkening is of no use. It might even be slightly harmful and still prevail, if the harm was more than balanced by the advantage of the increased size. So a certain amount of frills in the way of color, hair-distribution, flaps of skin, and so forth are allowable to our e.-t.

Changes in the nature and location of his planet would correspond to changes in his structure. For instance, a greater gravity would mean smaller animals and animals of more robust build, with a greater probability of six or more limbs. A slighter gravity would result in larger animals and animals of slender, storklike build. It would make an intelligent arthropod a little more plausible. Thus we have the paradox that the size of the animals varies inversely with that of the planet. Dimmer light would mean larger eyes, et cetera.

ONE final word. Some writers give their e.-t.'s a form practically identical with that of man, which is very unlikely, if not impossible. But then they go on to have a male e.-t. threaten the virtue of their human heroine, or even interbreed with human beings. That, to my mind, is just plain silly.

The possibility of interfertility depends on the number and arrangement of the chromosomes in the germ cells, and the number and arrangement of the genes in the chromosomes. Chromosomes are sausage-shaped compartments in the germ cell, arranged just so. Man has forty-eight per cell; the vinegar fly has four. Each contains thousands of genes, arranged just so. Genes are probably overgrown protein molecules, like filterable viruses. Each is made up of hundreds of thousands of atoms, arranged just so. Minor variations in the arrangements of atoms in the genes allow for the amount of variation within a species that we see in *H. sapiens,* for example. Greater differences mean that the offspring, if any, are sterile; still greater, that the two would-be parents will not be interfertile at all. There will be no interfertility unless the plans of these genetic mechanisms are very much alike indeed. Talk of interfertility between widely separated species is like talking of interchangeability of parts between a Diesel engine and a type-casting machine.

No matter how manlike our e.-t.'s are, they will—unless you assume that they and we are really descendants of recent common ancestors—be the results of millions of years of independent evolution. During this time the arrangements of their enormously complicated hereditary machinery will have varied all over the lot. Consider the number of possible arrangements of the millions of atoms in the genes of one germ cell. The chance of these two life forms' ending up with almost identical arrangements of their atoms, genes, and chromosomes would be one in—I don't know, nor does anybody else, but it would be one of those numbers like the diameter of the visible universe in microns. Earth-Mars hybrids! Phoey!

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THE END.

SCIENCE DISCUSSIONS and BRASS TACKS

There's always a catch somewhere! But say—Harvard has a 50,000-volt lead-acid storage battery!

Dear Mr. Campbell:

Speaking of electron microscopes—would it be out of place to do a little boasting on behalf of Canadian physicists? One of the few such instruments in the world is at present in operation at the University of Toronto, constructed by two young graduate physicists, Albert Prebus and James Hillier. And I do mean young: Prebus is twenty-six, Hillier twenty-three.

The microscope—micro-camera might be a better name; while a fluorescent screen is part of the set-up, it is used only for focusing, being replaced by a photographic plate as soon as the desired part of the field is brought into accurate focus—at present gives magnifications up to 40,000 diameters, using 45,000 volts between filament and anode. There, incidentally, is the main stumbling block in the way of still higher power—the difficulty of maintaining high voltages constant to within less than one volt. The reason why the voltage must be constant is, I think, fairly obvious: Varying voltage means varying electron velocity, and hence a fluctuating electron wave length, which would yield fuzzy images. Focusing is by means of three magnetic "lenses": thin copper solenoids placed around the electron beam. The possibilities of the instrument are, as you yourself pointed out, beyond imagination.

A few brief comments on the magazine. The new make-up is excellent; I've been hoping for something like this for years. And the Saturn color plate is really a gem. However, I can't quite go for that box around the editor's page. It's superfluous, and, somehow, cheap-looking.

That brings me to my main kick—the interior illustrations. Why, in the name of the Green Hall, did you have to hand Jack Williamson's really excellent "One Against The Legion" over to the untender mercies of Orban, when there are artists such as Wesso and Schneeman—and Dold, if he hasn't escaped into the fourth dimension. Frankly, while the covers have improved immensely, the inside illustrations have gone just as far the other way. I hope you haven't begun to subscribe to the fallacy that appearances don't matter; they do, really; and, after all, a good story deserves good illustrations.

The stories, except for Van Lorne's misadventure with the blue men, have been consistently good. I can't give any definite rating to Simak's "Cosmic Engineers"; I enjoyed it, but somehow his style doesn't seem quite adapted to such wholesale universe shiftings. Maybe you and Dr. Smith are the only ones who can handle the necessary forces, and still make the thing seem plausible.—A. Arthur Smith, Queen's University, Kingston, Ontario, Canada.

Coal formation—by Willy Ley.

Dear Mr. Campbell:

I just read Mr. Buddhue's letter in the "Science Discussions" columns of the April issue, and I am very glad to answer his question. Naturally, it will be quite impossible to go into details in a letter—not even a full-length article would do—but I think that I'll be able to explain the most important facts.

Mr. Buddhue's perplexity is caused by a very simple fact, the fact that there are not enough distinctive words in everyday language to distinguish between the many varieties of coal. "Coal" is actually a word that embraces as many different things as the word "metal." Of course, we can speak about metals in general as being distinct from silicates and carbonates, or from organic growths like wood or bone. But if it comes to special features, we have to name iron or aluminum, copper or lead. The same applies to "coal." Every variety of coal is organic matter fossilized and changed in certain ways. But there are many varieties of coal, and most of them had different origins.

It is, therefore, not true that "coal began as peat." Some varieties did, others did not. It is also not true that remains of wood in coal "when sufficiently well preserved to be recognizable" are "often similar to the present-day coniferous trees." This statement applies truthfully to certain—but not all—beds of lignite or brown coal from the Tertiary Age, but it is absolutely wrong when applied to "coal" from the Carboniferous Period.

Unfortunately, coal has often a very misleading appearance. Practically everybody is convinced that he could at least tell Tertiary coal from Carboniferous coal just by looking at it. Usually it can be done, but there are a few coal beds from the Tertiary that were subjected to usually high pressure for most of the time of

their existence since they formed. The coal from these beds looks so much like coal from the Carboniferous Period—which is, in round figures, a hundred times as old as that from the Tertiary Age—that a clue as to its true age can only be found in the surrounding sedimental rocks and in occasional fossils.

If we ask where coal is being formed at present the answer might well be: "almost everywhere." But the deposits will, in all probability, be so small that it would not pay to mine them. There are only a very few places where apparently larger deposits are being formed, and among them is the most typical example of a living "brown-coal forest" known to science: the Everglades in Florida. These Everglades constitute a surprisingly true picture of Tertiary brown-coal forests as they flourished in central Europe just before the advent of Man. Not only do they superficially represent a brown-coal forest, they are also composed of most of the plants that composed the forests of the Tertiary Age. Only a few varieties are missing here that were represented there and vice versa.

It can be regarded as a fact that most coal in existence once grew in forests looking more or less like the Everglades. But these not-famous-enough swamps do not exactly belong to the temperate zone. Florida is not really tropical, to be sure, but a nice warm spot. And its climate mirrors almost to perfection the normal climate of Earth that prevailed for most of geologic history in most parts of our planet.—Willy Ley, 35-33 29th Street, Long Island City, N. Y.

BRASS TACKS

The details on that transmutation aren't known yet.

Dear Mr. Campbell:

My favorite Friday of each month—the fourth—arrives at long last and I break all records hying to my favorite newsstand to procure the latest issue of Astounding. I pause bewildered and rub my eyes in astonishment! "What!" I gasp. "Has some secret spaceship made a flight to Japetus and brought back a color photograph of Saturn?" But no, I find that it is but a mere painting. "Mere," indeed! It looks to me just like a color photograph might look, than which no greater compliment can I render. It's not only the best Astounding cover I've seen, but it is *the* best cover, regardless of where or when. In fact, as far as I'm concerned, it's the best painting I've ever seen! However, I am afraid that this does not necessarily mean much, as I'm a singularly inexperienced youth. Anyway, it is my humble opinion that Schneeman is *your* best cover artist; in fact, he is *the* best cover artist. I can only wish that he would do twelve covers a year for you. Am I wrong, or is this cover done on new paper? It feels heavier and slicker than usual.

So to the stories: I find that "Cosmic Engineers" ends in a blaze of glory, taking an easy first! It is Simak's greatest story by all means; the first really good serial since "Galactic Patrol," and one of my ten favorites! A marvelous job of writing; strong characters; interesting plot; and what more can a fella want? "Galaxy prying" indeed! Simak destroyed a whole universe and, what is more, he made me believe it!

Second place goes to the best humor story you have given us since "The Dangerous Dimension"—"Rope Trick," by Eando Binder. I nearly laughed myself sick over Breck Wacker's antics. Really, I didn't think the Binders had it in them, judging by some of their recent work. The ending gives us hope that we may get to hear more about Breck Wacker and Doc Meade. How about it?

Third and fourth go to the respective yarns by Schachner and Phillips. The former did slightly the more engrossing piece of writing to take the edge over Phillips' story. Also, it is not the usual Schachner world-beater. The only thing that kept "Revolt" from a higher bracket is the fact that it dragged just a wee bit. A good bit above average, though, by virtue of good characterization and a nifty plot. I hope to read more about Roger Vance and his revolt.

Now we come to earth with a couple of average yarns, although they are by no means poor. "The Cache" had a swell ending to give it the edge over Jameson's fantasy. Sir, this piece belonged in *Unknown*, but obviously that fact passed unknown. Wow! Gerald Clarke isn't the only one who can pull bad puns!

As per my usual custom, I refuse to comment officially on Williamson's new serial, but I will say that it looks darn good. I hope he doesn't let us down as he did in a certain previous serial of his which I refuse to name, but I have hopes!

Do you realize that the last three issues have successively been the best I ever read? Now you just can't keep that up! I wonder. Incidentally, competition in the science-fiction field is getting keener all the time, but so far you have withstood the onslaught wonderfully. I believe that your greatest single lead is the covers. Yours are distinctive, dignified and neat. Let me once again commend Schneeman for this month's cover painting.

Sir, you can't do this to me! No Dold for three issues! At his best, he is *your* best. Track him to his lair, sick Breck Wacker or some tough brute on him, set him forcibly in front of a drawing board and get him busy under threat of a thorough going-over! I care not what measure you use, just so we get Dold back!

Wesso and Orban do the best illustrating this time, the former's for "The Cache" being marvelous. I don't know why I like Orban so well, but I do. His book jacket for "One Against The Legion" is terrific. By the way, I've come to the conclusion that the same book jacket for each serial installment is all right with me.

The reader's departments are more of reasonable length this time. Eighteen letters all told, most of them long ones, at that, make it just fine. By the way, what led you to put that heading to Robert Swisher's letter? The heck that rocket doesn't move! Maybe 'twould be wise were you to reread his letter. Another thing, I thoroughly agree with Gerald Clarke's remarks about names. The one he invented is no worse than the others.

For convenience in figuring the Analytical Laboratory, the stories rate thusly:

1. "Cosmic Engineers," by Clifford D. Simak.
2. "Rope Trick," by Eando Binder.
3. "Worlds Don't Care," by Nat Schachner.
4. "Revolt," by A. M. Phillips..
5. "The Cache," by Harry Walton.
6. "Catalyst Poison," by Malcolm Jameson.

I note with great glee that we may soon get a sequel to "Galactic Patrol" from Dr. Smith. Could it possibly be made to follow the present serial? The forecast of an article by L. Sprague de Camp and Willy Ley is also very promising. Something tells me it's going to be good!

The best story of 1938 was "Who Goes There?" by Don Stuart. Next comes "Galactic Patrol," by E. E. Smith, Ph. D., and "The Dangerous Dimension," by L. Ron Hubbard. The three best so far this year, in order, are "Cloak of Aesir," by Don Stuart, "Cosmic Engineers," by Clifford Simak, and "Maiden Voyage," by Vic Phillips. Let's have more Karn Jones!

Your editorial this month is very good, as per usual. One thing I am curious about, however, is this. How much actual power, measured in watts, or ergs per second, or milliergs per second if you must have it that way, has been released as yet? I think that this subject would make a very good article, if written up in great detail.

Boy, what a cover this month! Or did I say that before?—Robert Jackson, 239 W. State Street, Barberton, Ohio.

Split personality, I guess.

Dear Mr. Campbell:

While writing this "epistle" I have beside me a collection of books about one foot high. They represent every science-fiction magazine sold in town for the last three months that I could borrow or buy.

After reading them all and submitting them to a popular vote of three persons—me, myself and I—we find Astounding tops by a wide margin.

Your April issue—which, incidentally, kept me up to three in the morning—is swell. Personally, I think all the stories were good, but here's my idea of how they rank:

1. "Cosmic Engineers"—excellent. Pat Cliff on the back for me.
2. "Catalyst Poison"—good. I like humor in my reading.
3. "The Cache"—good, but not long enough.
4. "Rope Trick"—could be much better.
5. "One Against The Legion"—rates fifth so far. Next two parts will tell.
6. "Worlds Don't Care"—sounds a little ripe and raw.
7. "Revolt"—ruined the issue. If his next story isn't better, consign it to the ash can.

Cover very good. Let's have more pictures of the planets. If you lose Schneeman, you lose me.—Charles Wilson, 1001 Shelby Street, Sandusky, Ohio.

Sorry about that lettering—it slipped by on a mix-up. Suggest you cut out cover, mount on whiteboard, and India ink a black background.

Dear Mr. Campbell:

After lighting our pipe, rumpling our hair, and rolling our sleeves, we are all set to give out with the regular monthly blurt on our pet magazine. Now you may begin to suspect something from our editor's style of writing. And right you are. We have just finished part four in the course—"How To Become An Editor In Ten Easy Lessons," for it's only fair to state that we are gunning for your job. And, we are gunning for you.

Now, Mr. Campbell, as an editor you are pretty near tops in the field; as a writer you are tops; but there is something lacking. Tell me, Mr. Campbell, why, *why*, WHY, *WHY* did you have to go and splatter lettering all over what is probably the best cover illustration to ever adorn a magazine? I am referring to the plate of Saturn on the April issue of Astounding. When I opened the bundle of magazines from the distributors—I work on a newsstand—I pawed out Astounding, as I always do, first thing. When I first saw the cover I felt my heart leap with surprise, it was that stunning! But when I took a good look at it, and saw the lettering right across it and all around it, why I just sat right down in the middle of the floor and cried! Even now when I catch a glimpse of it, I feel the stinging, hot tears start trickling down my nose. I can't think of it now without shuddering with disappointment, so let's get on to the rest of the story.

But disregarding the devastating ruin, I will rate the cover as a cover. I poked all through the house and dug out all the plums I could find, and even face-lifted a half dozen prunes, and still there's not enough to give it the rating I want to. Suffice to say that it gets the highest possible rating—ten plums; given only to oustanding once-in-a-blue-moon hits.

Williamson's "One Against The Legion" gets four plums for the first part. Let's hope the rest follow suit. The conclusion of "Cosmic Engineers" I'll be good to and give three. It fell kind of flat at the end. "Worlds Don't Care" gets three, also. I don't know why. Phillips came through with a neat story in "Revolt" that could be better, but good enough to get another three.

Again, Jameson comes through with another weak one. "Catalyst Poison" gets one. His imagination is good, but I like my stories somewhere near plausible. This one should have been in *Unknown*. "Rope Trick" was kind of cute, but my own personal desire doesn't run to stories told in the first person, so I'll only give it two. But, oh! The last one sure is last! "The Cache" is no doubt the punkest piece of peregrinating penmanship I ever ran across. I thought "Children of the Betsy B" was bad, but that wasn't science. This one is science-fiction and it's still bad. It read like one of those climax-ending detective stories you run across in the daily paper. The ending is good; I'll have to give it credit for that, but the way it's written is its doom. Rating—zero.

The issue as a whole gets an average of 2.3 plums. Remember, I'm a hard ranker. But, rated comparatively with all the other science-fiction magazines on the market it gets *ten*.

Just a couple of more words before I put this typewriter to bed. I got my *Unknown* and absorbed it. SWELL! Thanks, Mr. Campbell, for giving us this magazine. It is like salt to good food; it flavors up our regular diet of science-fiction with the savory spice of far-fetched fantasy—and, for once, really good fantasy. More!

Next month's issue makes my twelfth copy of Astounding, so I'll refrain from any comments over a period of time until then, except to mention briefly that it has improved with each issue. I wonder just how high up it can go? Don't let it drop, though. It would hit with an awful bang! My fingertips are too battered to say any more. See you next month.—Gerald B. Clark, 272 Main Street, Waterville, Maine.

Arrangements will be made when our next astronomical cover comes up.

Dear Mr. Campbell:

I waited patiently for a month for the April issue of Astounding Science-Fiction with the astronomical cover of Saturn, and what do I get? A wonderful cover, the best of the series. *But—what is that! Printing over the astronomical cover? Gr-r-r-r-r-r-r-r!* Expect a time bomb in the next mail. Here I've been framing the astronomical covers and then this! I am going to sue you for a nervous breakdown.

Your stories, however, were all excellent—a perfect issue. But where is the rest of "Revolt"? I read to page 109, and from there on could not find hair nor hide of it.

Concerning that much-battered love-interest question: In a well-written story, love interest is not necessary, but it is not objectionable if it is well written and not overdone.

Miss M. E. Rogers is perfectly correct in saying that women affect history—many wars were fought because of women, especially in ancient times. What Mr. Asimov no doubt means is that the great conquests, the great inventions, the great scientific advances were made by men. Don't holler, Madame Curie, or Joan of Arc. I am quite aware of those exceptions. However, I am not saying that many men were not encouraged by their wives, but then again many were hindered.

I hope Rogers will do another cover. His cover for the February issue is the best I have ever seen, excepting the astronomical covers.—Fred Hurter, Red Rock, Ontario, Canada.

The cover got votes enough to give it second place in the issue!

Dear Mr. Campbell:

The most outstanding feature of the April issue was, of course, the cover. It's the best I've ever seen on any s. f. magazine; and it's

certainly a relief from the gaudy covers showing misproportioned people in contorted attitudes intended to express some strong emotion, that are so frequent on the newsstands today. Another thing about the covers: Graves Gladney has done very good jobs, both on the March issue and on the cover of the April *Unknown*. I hope for more of him.

"More votes for the best story of 1938 wanted," eh? That's easy: "Who Goes There?" walks away with first place. And while I'm at it, I may as well deliver myself of a few more opinions on the 1938 issues. Best illustrations: done by Scheenman for "Flight of the Dawn Star," March. Best all-round issue: that same number, March, by reason of the cover, the illustrations, the excellent stories. Hasn't been surpassed since. Best artist—according to consistently good work and imagination—Schneeman. Best author, on the same basis, as well as style, et cetera: Stuart. Best cover: It would be the one for November, if it weren't for that error in the shadow on Jupiter; as it is, the best is the one for July. Might put Wellman up there next to Stuart—and De Camp next to him.

There's a little tendency in the stories that's been worrying me lately. Not that they're not well written; oh, no. But they've been getting—many of them—quite light, and, I might add, almost shallow. Perhaps the chief purpose of science-fiction is to entertain; I don't know; but I read it because it makes me think, and speculate upon all sorts of possibilities. Take the last issue: "Catalyst Poison" and "Rope Trick." What did they have in them? Mainly a quarter hour or so of light, enjoyable entertainment; and that's all. I won't have the urge to reread them as I do such yarns as "Maiden Voyage"; all they mean to me is a couple of chuckles—and that's that. A story like that once in a while is a good thing—don't mistake my meaning; but please leave the mass production of them to the short story or adventure magazines. But a breezy style of writing doesn't necessarily mean that a story has no especial depth; look at "Divide and Rule" in the current *Unknown*. Now there's a story for you—or it looks as if it would be, at any rate. So one last plea: Please don't overdo the light stuff.

Mr. Hansen's suggestions in Brass Tacks are of value; but there is a certain danger in following them. Many authors would—and do—use the plan of mentioning in a vague way a general principle, to foist upon the readers the wildest, most scatterbrained ideas. But by all means let us have no detailed descriptions of wonder-working apparatus; one might then ask the author: "How come ya don't make the durn thing if ya know so much about it?" But if an author *does* enter into detail, it is surely the readers' right to criticize; so I find no fault with Mr. Burks' critics.

"Would you ask a portrait artist to paint landscapes?" catches my eye farther on in Brass Tacks. No; but if he tried to, and made a mess of it, I'd sure jump on him. Frew *does* do good work with spaceships, et cetera; all I ask is that he confine himself to them, and leave people out of his pictures. If a poor illustration appears, something's wrong, and I don't care who did it.

"Cosmic Engineers" was a great story; its main fault seemed to be that so much was compressed into so little space. As a result, it read something like a synopsis. It really needed the length of "Galactic Patrol" to do it justice.

"Worlds Don't Care" was good, too; but where, oh, where was the science? Often an editor will reply to a query of that kind: "If you will look on page so-and-so you will see there a statement— This is good physics, and—et cetera." But hang it, who wants to grub around to the entrails of a yarn to find something that might be construed as science? That's what science-fiction's for; that is, to give us stories that have an evident scientific background; and I think we've gone beyond the stage where the mention of the fact that Saturn has so many moons, that one of them revolves so-and-so, et cetera, constitutes such a background. No? But it still was a good story. And on second thought, I believe that some of the remarks about the surfaces of Titan and Japetus provided some scientific information.

I take back the harsh words about "Worlds Don't Care" not containing science; I forgot Schachner's explanation of the sub-virus disease. Reminds me of Stuart's "Dead Knowledge." But the rest of the above paragraph still goes.—Ralph C. Hamilton, 920 College Ave., Wooster, Ohio.

For "angels" read "ideas."

Dear Mr. Campbell:

Hansen, of Tennessee, Michigan, Indiana, wots not, seemingly, that were not the sfn fancy keeping the authors in line with the irrefragable facts, the stories would soon degenerate into witchcraft and black magic. Thus, "Who Goes There?" increased its stature by solving the problem within the limits given.

His example of fruitless discussion, the angels and the pin—point, not head—may be restated as a scientific question. If ideas have separate reality, only a limited number of them can occupy a space approximating zero; if they are not real, an infinite number can. How do your ideas stack up, Mr. Hansen?

Peter van Dresser's declaration that rockets cannot use gaseous fuel ruined the invention using radioactive material to dissociate water into its component fuels I had been considering—too bad, really. The shell and other metal parts might have been made by spraying molecular thicknesses of metal on forms, saving weight, since metal built up so is much stronger than usual.

Such is life. Perhaps, following Burks' hunch, it may be possible to combine several screw motions to produce a cylindroid of nearly infinite pitch and consequent high translation effect, in which case rockets would only be needed to give a starting velocity.

Pierog's salvo of heavy artillery ought to have sunk me; but it merely carried the conviction that analogy has danger as a method of reasoning. Since light is invisible, it's hard to investigate. It might be possible to reconcile the corpuscular and wave theories by considering it as fourth-dimensional particles impinging on a three-dimensional understanding. Incidentally, since opposite charges attract, why do not planetary negative electrons seek the positive nucleus of an atom?

Personally—returning to Mr. Hansen—I like to have a hint of how something works—or is supposed to work. Otherwise, there is always a lurking doubt that somebody's been running a sandy on us. Willy Ley's recent remarks anent Cavorite come to the same point. If it became necessary to design an "anti-gravity" motor in a spare quarter-hour, the authors might do well to start with the cylindroid aforementioned, and assume that, with an incredible number of rpm's, the plane of gravitational attraction would be shifted out of the most direct line between centers of mass into an extremely tenuous curve, or even to a plane at right angles to the earth's nearest radius, following the phenomena of precession.

Anyway, most readers do not object to actual present impossibilities in stories, if so, the magazine would go unread; but we do object to an author's violating the logical probabilities under any implausible theory he starts with.

Your April issue stood out through uniform excellence. "Revolt" was best; but sounded like chapter one, to me. "Catalyst Poison" classed as a nova, in my opinion; and the cover was elegant.

You seem to have built a fire under Schachner and Williamson, whose stories slop less than usual. Why not have Van Lorne and Fearn collaborate? Results might be sad beyond words; but again, might be pleasing.—Marshall J. Hayden, 128 Maple St., Reno, Nevada.

PANDORA'S ICEBOX

An article of such unusual interest that Astounding breaks an old custom in reprinting this material on the exploration toward absolute zero.

By Philip M. Morse

Reprinted courtesy Technology Review.

THE story of research on materials at very low temperatures affords a good example of the surprising grab bag which painstaking scientific research can turn out to be. You reach in for a lollipop and come out with a platinum wrist watch or some other delightful gewgaw. Kamerlingh Onnes and his helpers at the university at Leyden, Holland, thus set out to study the compressibility of gases at very low temperatures; they ended by discovering some completely unexpected and amazing properties of solids and liquids.

In 1900, when Onnes was starting his laboratory, the study of the behavior of substances at low temperatures was considered to be an interesting, but not very exciting, field for research. It was expected that as a gas was cooled far below zero it would become less and less capable of keeping its molecules apart under applied pressure, until eventually it would collapse into a liquid, which in turn would later solidify. If the solid were then further cooled, the random jigglings of its atoms would weaken until finally, at the ultimate limit, minus 460 degrees F., all motion would cease. It was expected that at this limit, called absolute zero, everything would be solid, for here everything had to be quiet, in a rigid conformity and regularity—the dictator's ideal state. Most scientists agreed in 1900 that to follow these changes down as close to absolute zero as possible would be a worth-while task—for someone else. As for themselves, there were many other more exciting and easier fields of study.

After all, research at low temperatures was, and still is, an expensive and laborious task. There are the terrific difficulties of experimenting with the chilled substances, watching them, and, at the same time, insulating them from the warm outside so as to keep them chilled. To materials near absolute zero anything else is superheated: An ordinary lump of ice has the same effect on liquid air as a red-hot pebble has on water.

Then, also, the process of removing the heat from a substance must be indirect. The usual way is to use a cooled gas to cool the substance. To cool the gas, one first heats it by compressing it, then removes its extra heat and lets it cool itself by expanding—either shooting it into an evacuated chamber through a nozzle or letting it do work as it expands. This first batch of cooled gas can then be used to cool still further the next batch of compressed gas and so on, until enough heat has been extracted to liquefy the gas and the limit is reached for that gas.

THE NOZZLE method is the one used in most commercial liquid-air machines. It has the advantage of not requiring moving parts running at low

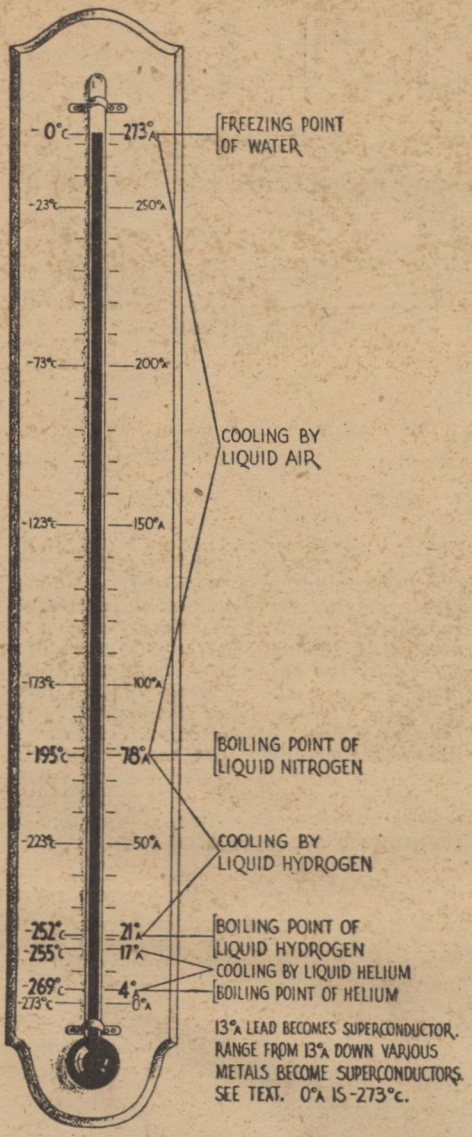


Fig. 1. Toward Zero Absolute! Below 4°A., the boiling point of liquid helium, none of the usual cooling methods is possible—for no substance is colder. Below this temperature, the "evaporation" of a magnetic field is the only known practicable method.

temperatures, so that the consequent difficulties of lubrication are avoided. But it has the disadvantage that it will not "take hold" at ordinary temperatures with some gases. Unless hydrogen is already cooled to liquid-air temperatures, expansion through a nozzle heats, instead of cools it. Likewise no cooling results in helium until it has been precooled with liquid hydrogen. In order to reach the temperature of boiling helium—about 7.2 degrees above absolute zero (or minus 452.8 F.)—Onnes used liquid air to obtain liquid hydrogen, and this in turn was used to obtain the liquid helium. Since liquid hydrogen is dangerously explosive unless absolutely pure, the process is perilous as well as complicated.

The alternative method, that of making the gas do work when expanding, will work on any gas at any temperature; but it requires moving parts at low temperatures, and the lubrication difficulties have only recently been overcome. The low-temperature apparatus being developed by Professor Frederick G. Keyes at Technology uses this method and thereby avoids the need for liquid hydrogen as an intermediate stage in getting liquid helium.

The next problem Onnes faced was to obtain temperatures below 7.2 degrees absolute and eventually to obtain solid helium. Somewhat lower temperatures were reached by pumping off the helium vapor above the liquid, thereby cooling the liquid by evaporation. And now came the first unexpected result: Although the liquid helium cooled, no solid helium appeared. Prolonged investigation showed that solid helium can be made by combined compression and cooling, but it cannot be made by evaporating the liquid; though every other gas can be solidified by the evaporation method. Still further study showed that with evaporation and cooling, the liquid helium does change, not into a solid but into another form of liquid helium. And this new liquid, called helium II, is the most remarkable of all liquids.

Ordinary liquid helium, helium I, is not particularly unusual. It is colorless; its density is about one-seventh that of

water; its viscosity (resistance to stirring or to leaking through holes) is somewhat lower and its heat conductivity somewhat higher than that of water, but this condition is to be expected at low temperatures. It bubbles away as the helium vapor is pumped off, quite like boiling water. When the temperature goes below four degrees absolute, however, the bubbling stops abruptly; the liquid has changed to helium II. There is not much apparent change beyond the cessation of bubbles: The liquid is still colorless and there is no sudden change in volume. But "beneath the surface" the change is as profound as with some of the split personalities reported by psychiatrists: The countenance is the same but the actions show a new personality.

Liquid helium II is an almost perfect fluid. Its viscosity is less than a three-hundredth that of water, less than a hundred-thousandth that of crankcase oil. It will actually flow through minute holes and cracks six times more easily than will ordinary air. A piece of apparatus may be watertight and even airtight and yet not be helium II-tight—a fact which creates difficulties.

In addition, helium II is an almost perfect heat conductor, being about a hundred thousand times as good as water is and even two hundred times better than ordinary copper. No irregularities of temperature are possible in a liquid of such great heat conductivity, which fact partially explains the lack of bubbling. Also it seems to be the only liquid which can be cooled to absolute zero without freezing. Somehow helium II is as good as a solid in its regularity and yet is better than any other liquid in its fluidity. Its remarkable properties will probably make it a dangerous siren for the theoretical physicist, luring him to attempt a theory to explain its peculiar behavior and then shipwrecking the theory on its irreconcilable properties. Yet it must be explained before we can completely understand ordinary liquids, just as paranoia must be explained before we can completely understand the normal human mind.

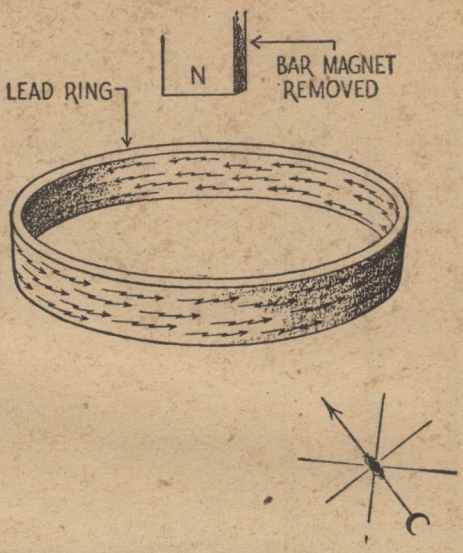


Fig. 2. Method of producing the ever-flowing current in a lead ring. Actually, electromagnetism is employed, but the effect is as follows: A magnetic field is impressed through the lead ring, represented by the bar-magnet here, while the lead is above the superconductive temperature. The coming of the magnetic field induces a surge of current which, due to the resistance of the lead, rapidly dies out. Then the lead is cooled below 13°A., becoming superconductive, a perfect conductor without resistance. This stage of the process is represented here.

WHILE THE research on liquid helium was going on, other workers at Leyden were studying the properties of metals at these extremes of cold. The expectation was that many of a metal's properties would change slowly and regularly as absolute zero was approached: Its electrical resistance would diminish, as would its resistance to heat flow and its heat capacity, but none of these would become zero until the ultimate, unattainable zero of temperature were reached. No peculiar magnetic effects were expected, except perhaps with iron.

Again Dame Nature disappointed the experimenters' expectations and delighted their souls with new wonders. When measurements were made on lead, electrical resistance vanished suddenly at 13 degrees absolute. Below this temperature the measurements seemed to indicate that the lead had no electrical resistance at all, though its resistance to heat was normal. This change seemed incredible; so a more searching experiment was tried. A ring of lead was put in the apparatus, and a magnetic field was applied. The lead was then cooled to the temperature of boiling helium, 7.2 degrees absolute, and the magnetic field was turned off. At ordinary temperatures a momentary surge of current is produced when the magnetic field is cut off; the current starts to move but it almost immediately stopped by the resistance of the lead. The electrons, which are given a kick by the cessation of the field, bump into lead atoms, get discouraged, and soon stop. It was felt that if any minute amount of resistance were left in the lead at 7.2 degrees absolute, so that the electrons would have to bump into even only a few of the billions of atoms they passed as they went through the metal, the current induced in the lead would soon die out.

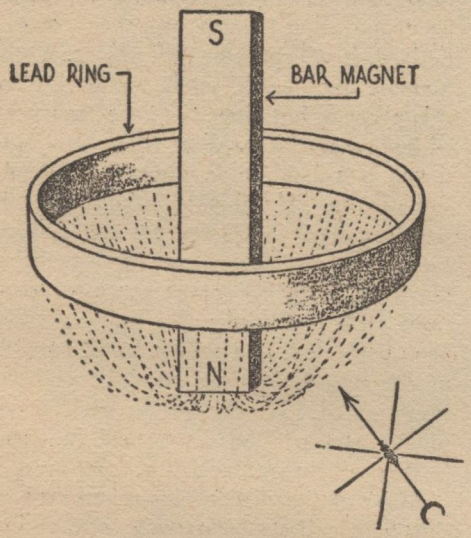


Fig. 3. If the magnetic field is now withdrawn, lines of force associated with it cut the conductor, a current is induced and, because the lead now has no resistance whatever, continues indefinitely.

Since the current was induced by the removal of the magnetic field, only the magnetic field of the ever-flowing current remains. The continuance of the current can, then, be shown by the fact that a compass needle (or other magnetic indicating device) can detect the presence of a magnetic field. This method does not appreciably alter the unresisted current, but continuously indicates its existence.

Imagine the Leyden workers' surprise and delight when they found that the current in the loop, once started by cutting off the field, kept on indefinitely. The current gives the loop magnetic properties, just as does current sent through an ordinary loop of wire, and the current could be detected by these properties. But the current in an ordinary loop must be kept going against resistance by the use of a battery or generator, whereas the current in the cold lead loop keeps going of its own inertia, the electrons sliding around continually in their perfectly smooth toboggan slides. Loops of lead have been kept for weeks at 7.2 degrees absolute and no diminution in the induced current has been found. Somehow all the countless billions of lead atoms have parked themselves off the current boulevards, so that none is hit by the electrons. No traffic lights and no collisions—a model of the motorist's heaven!

This phenomenon of superconductivity, as it is called, occurs in some metals but not in all. Mercury is superconductive below 4.2 degrees absolute, but copper has not yet been made superconductive. The transition point, the point below which aluminum is superconductive, is 1.1 degrees absolute; but silver's transition point, if it has any, is below 0.2 degrees. It is possible that all metals would become superconductors at a low enough temperature: All we know at present is that only 15 metals have

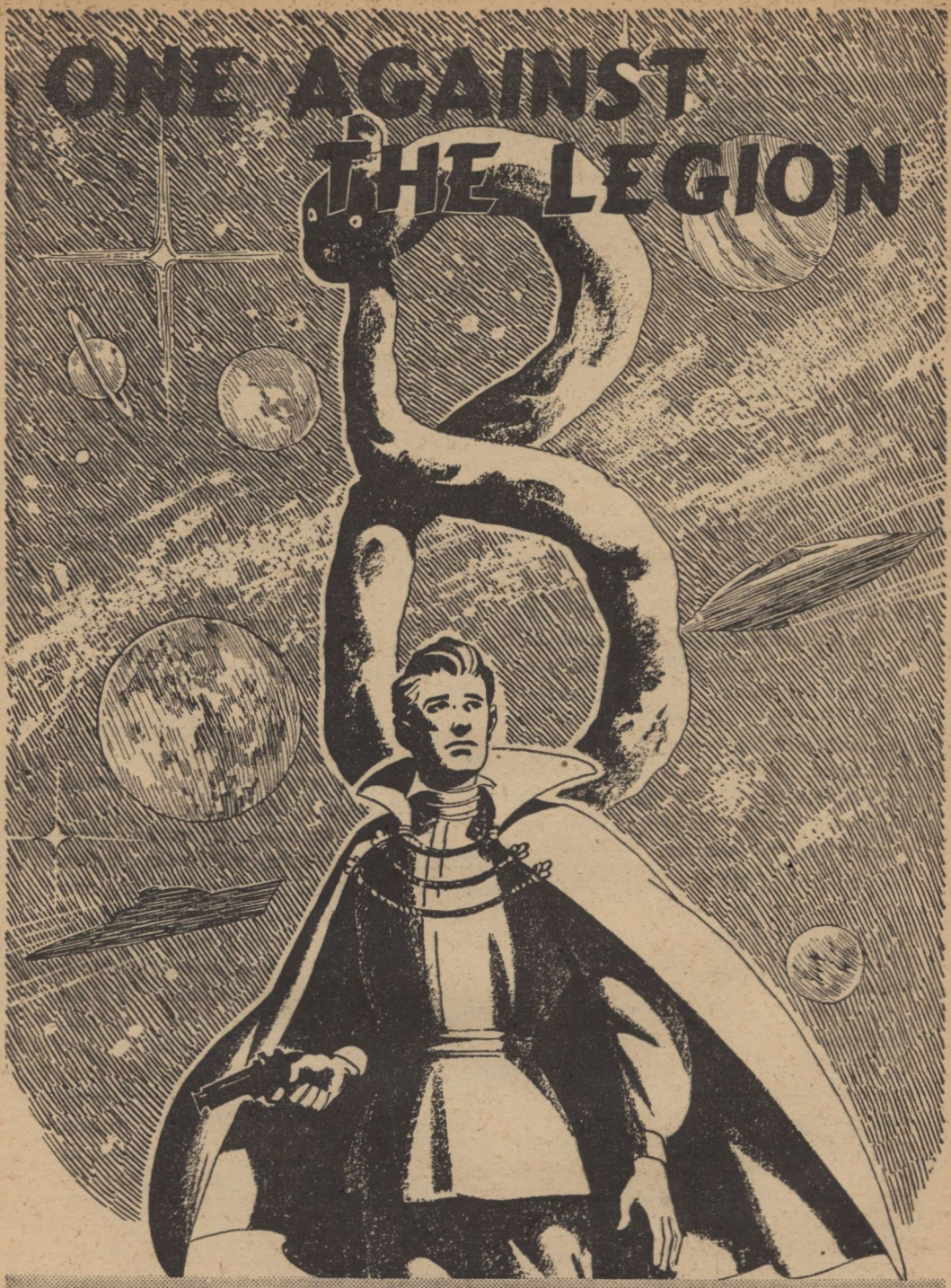
been made superconductive, and that the transition points of the other metals have not yet been reached. There are many alloys which become superconductors; among them is an alloy of gold and bismuth, though neither of the constituent pure metals has been made superconductive. Niobium carbide, which is not really a metal, has a transition point at the "high" temperature of 18 degrees absolute (minus 442 degrees F.).

NATURALLY the explanation of these amazing properties has become a sort of mental Matterhorn for theoretical physicists: Many have tried it but none so far has conquered the summit. How can the electrons find absolutely smooth paths past all imperfections of the metal, through or around every obstructing atom of the substance, so that they can keep on sliding indefinitely? Why do metals suddenly become superconductive at the transition point and yet show no other concomitant abrupt change in properties? None of these questions has been satisfactorily answered.

It seems certain that there is some connection between superconductivity and magnetism. A metal's transition point is lowered somewhat by the presence of a magnetic field. Moreover, below the transition point the metal refuses to contain any magnetic field at all. The field is pushed out into the surrounding space, and, if the metal is hollow, the field within the hollow is trapped. If the outside field is shut off, the field in the hollow space stays caught, for it cannot get out through the surrounding metal. For a short time it was thought that all the phenomena of superconductivity could be explained as magnetic effects, without needing the incredible free flow of current. This belief was soon shown to be wrong, however. The effects produced in the lead ring are true currents, and they really do flow without friction.

The magnetic field is also used to obtain the lowest temperatures so far reached. Temperatures lower than the boiling point of helium can be reached by evaporating the liquid at reduced pressures, but this method has its limitations, for our pumps are not perfect, and the helium cools less easily by evaporation the colder it gets. We cannot use another gas to go farther, for all other gases are solids at these temperatures. Obviously a new technique had to be developed. The new technique, as worked out, utilizes the magnetic properties of certain salts of the rare-earth elements. These salts heat when magnetized and cool when demagnetized—that is, when the outside magnetic field is turned off. Consequently when one of these salts is magnetized, then cooled by evaporating helium, and then demagnetized, it will become still colder. Only a small amount of heat is withdrawn by this process, but since the heat capacities of bodies are so small at these temperatures, a considerable amount of cooling results. By this technique, a temperatures only 0.008 degrees above absolute zero has been reached—truly a "farthest south" in temperature exploration. The technique has only recently been perfected, and only a small portion of the new field thus opened has been investigated. No one knows what queer phenomena will be discovered in these farther reaches of frigidity.

Most of the discoveries mentioned in this article have been made at Leyden with the apparatus built by Kamerlingh Onnes. These results and the many others discovered by his colleagues constitute an almost perfect tribute to a man who had the hardihood to tackle a job which was too difficult for the rest of his contemporaries. In the past ten years, now that the importance of such research has been demonstrated, low-temperature equipment has been set up in a number of other places in the world.



A GREAT SEQUEL TO "THE COMETEERS"

BY JACK WILLIAMSON

ONE AGAINST THE LEGION

Concluding the latest and greatest of Williamson's Legion sagas.

By Jack Williamson

Synopsis of First Two Parts:

"Unusual. Important. Indubitably dangerous."

Such was the duty before him, big, bronzed young Captain Chan Derron was warned by Jay Kalam, commander of the legion of space. That duty was to guard the great geodesic engineer, Dr. Max Eleroid, during the test of a new and mysterious instrument.

The experiment was performed on a lonely islet, in a locked and hidden underground chamber. Chan Derron stood watch, outside. Dr. Eleroid and his assistant failed to emerge. When the fleet came, the door was found surprisingly unlocked. The two men were dead inside—apparently killed by Chan's own missing barytron blaster.

Convicted of the double murder, tortured because he could not reveal the whereabouts of the missing invention, Chan escaped after two years on the prison rock of Ebron. His efforts to find safety, however—first within the System and then on a new astronomical object he discovered, ten billion miles northward—were mocked by the Basilisk, a supercriminal who displays an uncanny mastery of space. False clues planted by the Basilisk convince the legion that Chan is the criminal, and a huge reward is offered for his arrest.

Mockingly warned by the Basilisk that he will be blamed for the next outrage in the New Moon—the Basilisk has promised that he will rob and murder the highest winner at the tables of that great interplanetary resort—Chan braves the fleet and the guards to enter the artificial satellite, seeking to turn the tables on the Basilisk. Disguised, he is recognized by a strange, lovely girl—no human being, he suspects, but Luroa, the notorious criminal android.

Despite all the efforts of the veteran legionnaires, Jay Kalam and Hal Samdu and Giles Habibula, the crime takes place. A little gambler named Abel Davian vanishes from the floor, and a fantastic robot appears in his place.

The robot attacks the girl. Chan, in spite of his suspicion of her, stops it with his blaster. She, believing him to be the criminal, threatens him. Attempting to explain, he is himself whisked away by the Basilisk.

Studying the robot, legion engineers conclude that it was built in the System of an ancient red sun, eighty light-years northward. Suspecting that System is be the headquarters of the criminal, Jay Kalam orders Aladoree to destroy it with her ancestral weapon, AKKA. But he learns that she, also, has been abducted.

Chan Derron finds himself in the New Moon's treasure vault, which has been looted by the Basilisk. Gaspar Hannas, owner of the resort, with his police, traps him there. Unarmed, but still in possession of his geopeller, Chan attemps to escape.

XIII.

THE geopeller's tugging straps cut savagely into Chan Derron's flesh. For the propulsive geodesic field, while it extended beyond his body, rapidly diminished, leaving con-

siderable strain upon the straps. Air screamed about him, tried to suck the breath out of his lungs. The blood was driven from his head, so that he felt as if he were plunging into a barrier of darkness.

Bright proton guns flung up. But their deadly violet lances stabbed behind him, for he was already driving bullet-like down one of the long corridors beneath the gaming halls.

"After him, you cowards—"

The great, roaring voice of Gaspar Hannas was whisked away, upon the shrieking wind. But the rays could overtake him. Thin lines of fire cut straight to the armored wall ahead. One hissed very near, and ionized air brought Chan a stunning shock.

Teeth gritted, fighting the darkness in his reeling brain, he twisted the little spindle back and forth. The geopeller flung him from side to side, in a swift zigzag, with a savage force that strained his tense muscles.

Danger awaited him at the long hall's end. For, once he stopped to seek an exit, he would make a fair target for the men behind—and the first bull's-eye worth half a million dollars.

He bent his twisting flight toward the floor, and blinked his streaming, wind-blinded eyes. And he saw a small door swing open ahead. A huge man in white filled it completely, carrying a covered tray ahead of him.

Chan checked his velocity—but perilously little—and aimed his bullet flight for the fat cook's head. He saw the man's eyes begin to stare and widen, and he set his own body for the impact.

The geodesic field shielded him somewhat from the impact, but it was still a dazing blow. The cook was hurled flat in the doorway. And Chan, beyond him, came into a kitchen bigger than he had ever dreamed of.

Acres of stoves, it seemed, and endless white conveyor tables that were loaded with dishes and food. But it was all but deserted now. For the New Moon was being emptied, he realized, by the terror of the Basilisk.

Beyond the kitchen, in the narrow quarters of the servants, he found that he had lost his directions. Behind him was a tumult of fear and menace. Half those who glimpsed his flight screamed and fled or hid. But another half, made daring by the magic promise of that half million, shouted to the pursuers behind, or snatched at some weapons of their own.

But the geopeller was swifter than all the hue and cry. Chan dropped upon his feet, walked breathless around the turn of a corridor, and met a yellow-capped porter hastening with a bag.

"Which way," he gasped, "to the docks?"

"That way, sir." The man pointed. "To your left, beyond the pools. But I'm afraid, sir, you'll find the ships all booked—"

His mouth fell open as Chan lifted into the air and soared over his head.

"The Basilisk!" he began to scream. "This way! To the docks!"

The pursuit followed his voice. But Chan's plunging flight had already carried him into the "flying pools" that were one of the New Moon's chief attractions—great spheres of water, each held aloft by a gravity-plate core of its own, each illuminated with colored light that turned it to a globe of splendid fire.

The swimmers had fled. Chan threaded a swift way among the spheres. He heard an alarm siren moaning behind him. And suddenly the gravity circuits must have been cut off, for the shimmering spheres of water turned to plunging falls.

But already the geopeller had flung him over the rail of a high balcony. He burst through a door beyond, and came into the vast space at the docks. The immense floor was crowded, now, with gay-clad thousands, swept into panic by

fear of the Basilisk, fighting for a place on the outbound ships.

LEANING for a moment against the balcony door, Chan caught his breath. He must have a spacesuit. And his own—not many would fit him—was in the locker rooms beyond this frightened crowd, beside the great valve where he had entered the New Moon. He must leave as he had entered.

He could fly across the mob, he knew, in seconds and with but little risk. But sight of him, flying—when it was the mistaken fear of him that had brought them here—would surely turn fear to a stark madness of panic. Hundreds would doubtless be trampled and maimed.

After a second, Chan went down the steps on foot, and pressed into the fighting throng. That was the longer way. It meant the danger that the valve crew would be warned. But he could not take the other.

It took him endless minutes to make his way through the crowd. He heard the distant sob of sirens and the thunder of annunciators beating against the roar of the mob. He knew that the hunt was spreading. He was aware of his head towering above all those about him.

But he came at last to the little door marked "Employees Only," and slipped through it into the locker rooms. Here was less confusion than he had found anywhere—the workers in the great sign, he supposed, were less concerned about the Basilisk. He hurried to the locker where he had left his armor, stripped off his borrowed clothing, flung himself into it, and strode toward the great valve.

The inner gate was open. A crew of silver-armored technicians were just marching out. Chan entered, as the last of them stepped out, and made a gesture to the man at the controls. But he had turned to listen, as:

"Warning!" an annunciator crackled. "Close all locks—until Derron is caught. This man is attempting to escape the New Moon. There is a half-million reward. Derron is six feet three, believed—"

Chan saw quick suspicion change to certainty in the eyes of the man at the controls, heard the beginning of his muffled shout to the armored men. He caught the glint of quick-drawn weapons.

He leaped forward to the outer gate. His bright-clad fist shattered the glass over the emergency lever—intended to be used only when the massive valve was closing upon a man's body. He pulled down the lever.

The gate before him flung open, as the one behind automatically clanged shut in the face of pursuit. A blast of air spewed him out. The geopeller stopped his spinning flight, brought him to the platform where he had landed.

He found the wire marked "Sector 17B," snapped the belt of his suit to it, and squeezed the little spindle. The geopeller sent him out along the wire.

Five hundred miles to go. The great sign's web spread about him, against the dark of space. Silver wires burned white in the glare of the Sun. Great mirrors glinted, filters glowed red and blue and green. And he glimpsed the gibbous Earth, huge and mistily brilliant, so near that he could almost reach out and touch the disk of snowy cloud that covered Europe.

Five hundred miles—but he pushed the geopeller to a reckless pace, for a warning must be flashing out, he knew, over the wires about him. In four minutes—no more—he had released himself from the pilot wire, beside the silver ball of the motor house.

His searching eyes found the *Phantom Atom*. The tiny ship was safe—incredible good fortune!—still hidden behind the great foil mirror. The geopeller carried him to its valve.

The first intimation of disaster came when he saw that the prisoner he had left here, space armor welded to the housing, was gone. His heart stood still. Was this some new, ruthless trick of the Basilisk?

He plunged through the valves, and came face to face with a man waiting for him in the corridor within.

A very fat, short man, with protruding middle and bald, spherical head and wrinkled, yellow skin. The same man—no mistaking him!—whom Jay Kalam had sent to pick his pockets in the Diamond Room. He was blinking ominously at Chan, with pale small eyes. His fat hands held a thick cane, so that it pointed straight at Chan's body—and a deadly little black orifice was visible in the ferrule that tipped it.

"Ah, so, Mr. Basilisk!" he wheezed triumphantly. "You may be mortal clever—but Giles Habibula has got you!"

XIV.

HOPE CAME to the legion with the first ultrawave message from Giles Habibula. Uncharacteristically laconic, it ran:

"Aboard Derron's ship. Bound for mysterious object near Thuban in Draco. For life's sake, follow!"

And the legion followed. Jay Kalam put the mighty *Inflexible,* his flagship, at the head of Hal Samdu's fleet of ten geodesic cruisers. At full power they raced northward, toward Alpha Draconis—which had been the pole star in 3500 B. C., worshiped by the ancient Egyptians.

What mysterious object?

Every observer in the fleet was set to find the answer to that question. Every electronic telescope and mass detector was driven to the utmost of its power. And, by the time they were one day out from the New Moon, the answer—or part of it—had been discovered.

Jay Kalam, tired and pale from the long strain of the chase, restlessly pacing the deep-piled rugs of his soundproofed and ray-armored chambers in the heart of the *Inflexible,* paused at the signal from his communicator, and lifted the little black disk to his ear.

"We've found it, commander!" cried a tired, excited voice from the great ship's observatory. "Forty-four minutes of arc from Alpha Draconis. It's still invisible—albedo must be very low. But the mass detectors indicate an object of nearly twenty million tons!

"A strange thing, commander! This object, whatever it is, must be a newcomer to the System. We estimate the distance from the Sun at a little less than ten billion miles. Any object of that size would surely have been discovered by the legion's survey expedition, five years ago—if it had been there then!"

Jay Kalam put the communicator to his lips.

"Can you identify the object?"

"Not yet," came the humming voice from the instrument. "Until we can see it, we won't know whether it's just a rock—or something else."

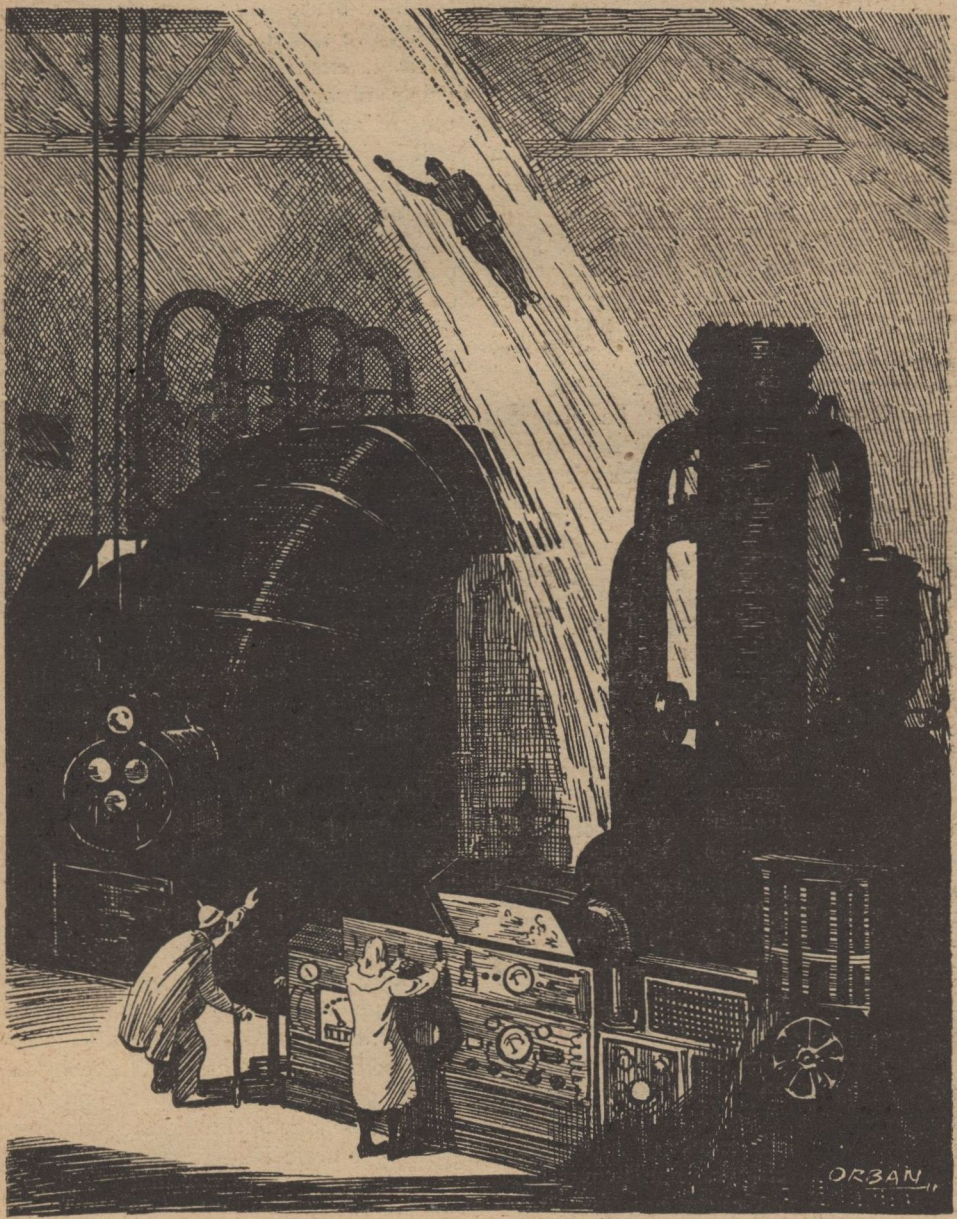
"Keep the telescopes on the spot," Jay Kalam ordered. "And use every instrument to search space ahead of us, until we pick up Derron's ship. . . . The communications room is standing by for another message from Giles Habibula, and the vortex gun will be ready for action."

The atomic vortex gun, a weapon borrowed from the strange science of the conquered Medusæ, was, next to AKKA, the most deadly instrumentality possessed by mankind. The colossal vortex projector built into the nose of the *Inflexible* could hurl out a spinning, growing etheric field whose white central sun of atomic annihilation could swallow a planetoid.

Shift and changing shift, the gun crews stood ready about the ponderous

weapon. In every observatory on every racing ship, men searched the dark void amid the stars of the Dragon ahead. And the communications men waited and waited—waited in vain—for any further word from Giles Habibula.

But the weary commander of the legion, sleeplessly pacing the silent, empty luxury of his apartments upon the racing flagship, restlessly combing his white forelock back with anxious thin hands, received other messages. They came by



The vast engines shuddered once, and the man vanished away on a sweeping beam—vanished to reappear eighty lightyears distant!

visiwave from the System behind—for the hard-driven fleet was already beyond the light-speed of the ultrawave. And their import was all of alarm.

The first came from the captain in charge of the legion operatives who had been detailed to shadow the three suspects on the New Moon—Amo Brelekko and John Comaine and Gaspar Hannas. The three had vanished!

"John Comaine mysteriously disappeared from his laboratory, with two of our men on duty outside the only door," the report stated. "Gaspar Hannas had locked himself in his empty treasure vault. His scream for aid was heard by communicator. When associates opened the vault, he was gone. And Amo Brelekko was taken from the floor of the Diamond Room, as the little gambler, Davian, was taken—and in his place, before the few appalled spectators who remained upon the New Moon to see it, was dropped a decaying human skeleton which has been identified as that of a female android."

That made little sense to Jay Kalam. He pondered the implications of it, and then dispatched a message to Captain Fayle, asking for further information. The reply, relayed from Rocky Mountain Base, informed him that this officer had also vanished!

Krrr! Krrr! Krrr!

It was the penetrating beat of the emergency call, G-39, that heralded the next call. And the message was more disturbing. Relayed from Lars Eccard, chairman of the Green Hall Council, it ran:

> DEAR COMMANDER KALAM:
>
> It is my duty to order the legion of space to take immediate measures for the effective defense of the Green Hall and the Council. I have received mysterious warnings, signed by that criminal who calls himself the Basilisk, stating that all members of the Council are to be abducted, one by one. No demands were made. The criminal offers no way of escape. And several members of the Council are already unaccountably missing—

There the message from the statesman was terminated. A note from the visiwave operator added:

> The dictation of the above message was interrupted. Pages entering the chambers of Chairman Eccard found that he was gone. And reports from subordinate officials at the Green Hall confirms the first rumors that all sixty members of the Council have been abducted.

THE Green Hall—kidnaped! That was a staggering blow. Jay Kalam slumped wearily into a chair. Those sixty men and women had been the supreme government of the System. Representatives of the local planetary governments, of capital and labor, of the various arts, crafts, and sciences, they had been the very cream of civilization. And now—on what diabolical whim none could say—they had been snatched away by the shadowed power of the Basilisk.

"Why?" The tired red eyes of the commander stared across his great empty table, at the blank wall beyond. "Why take them?"

With an uncanny promptness that startled him, the keening beat of the emergency signal came again from his communicator. His nervous hands set the little disk, and put it to his ear. What he heard was not the crisp, familiar voice of the legion announcer at Rocky Mountain Base.

It was a muffled, distorted whisper. It rasped and croaked from the little instrument. It mocked the tired commander, jeered at him.

"I'll tell you, commander," it husked and hummed in his ear. "I took them because I want the System to know my power. I want every man on every planet to shudder and grow white when he thinks of the Basilisk. I want men to regard me as angry gods were once

regarded, before science destroyed them. I want every man to know that his smallest thought, turned against the Basilisk, can lead surely to unpleasant death.

"For I have suffered manifold indignities, commander, that must be avenged. Many once ignored me, scorned me, injured me. Now they shall look up where they once looked down, worship whom once they hated. For now I am the Basilisk.

"Therefore, commander, I am taking one hundred of the foremost citizens from the System. They have been the leaders in the foolish attempt to destroy me, and therefore I can deal with them without compunction. I shall use them without remorse for the text of a peculiar lesson to mankind. One, out of the hundred, shall be permitted to survive and return to the System, so that he may teach the lesson of the Basilisk to the rest of humanity."

A curiously unpleasant little chuckling sound rasped and whirred out of the communicator. Some cold, gloating madness in it sent a shudder through Jay Kalam's thin, weary body; set rough goose pimples over his flesh.

"One hundred, commander!" croaked that leering voice. "And one will come back to tell the rest. You already know most of the hundred, commander. Aladoree, with her secret weapon—what good is AKKA, commander, against the shadow of the Basilisk? John Star. Bob Star, and his wife and their child—there would have been another, commander; you keep few secrets from the Basilisk! I have taken a few others of your most conspicuous legionnaires. I have taken a score of private individuals, mostly scientists and financiers—among them three men you know, from the New Moon, Hannas and Comaine and Brelekko. I have taken the sixty members of the Green Hall Council—and you could not name sixty others in all the System, commander, equally distinguished in statesmanship and science and art."

The humming whisper paused. Again that mocking, twisted chuckle. Jay Kalam's hand tensed and trembled on the little black disk, and his weary, aching body was cold with sudden sweat.

"The total now is ninety-nine," came that husking rasp again. "I need one more to complete my hundred. Knowing the other ninety-nine, Commander Kalam, you will not need to be told who the hundredth is to be. And now farewell, commander—until we meet again!"

With that, the humming whisper ceased. Jay Kalam dropped the communicator. A swift hand snatched the barytron blaster from his belt, and he looked swiftly around the empty room—knowing all the time that such precautions were futile.

Nothing happened, however, in the long moment that he held his breath. He made himself holster the weapon again, and groped for the communicator to call Rocky Mountain Base, now a billion miles behind and more, on the visiwave relay.

"Did you pick up a visiwave?" he asked hastily. "Is triangulation possible on the source?"

And back across that void, that light took many hours to bridge, the voice of the operator came instantly, consternation not hidden by its humming distortion:

"We heard the Basilisk, commander. But triangulation is impossible—because the message was transmitted from our own station! We haven't yet discovered how our transmitter circuits picked it up. But guard yourself, Commander Kalam! You got the threat that you will be next?"

"I did," Jay Kalam said. "If I am taken, Hal Samdu will take my place. The legion will carry on against the Basilisk. That criminal must be destroyed!"

HE DIALED OFF, called Hal Samdu on the *Bellatrix*, and told that veteran spaceman of the Basilisk's last message.

"Draw up beside the *Inflexible*, Hal," he said, "and come aboard. I want to discuss these last developments with you. And you will take command, if . . . if I become the hundredth man."

"Aye, Jay." The rumble of Hal Samdu came thinned and furred through the communicator. "But what of Giles? Have you heard anything?"

"Not yet," Jay Kalam told him.

"I'm afraid for Giles, Jay." The deep voice seemed hoarse with alarm. "After all, he's an old man now, growing very feeble. And this Derron is powerful and desperate. I hoped that Giles would be clever enough. But Derron may have suspected—it's a whole day, now, since we have heard."

But Jay Kalam had hardly dropped the communicator before the sharp, insistent note of the emergency signal bade him take it up again. He touched the dial, and put the little black disk to his ear.

"Jay! Do you hear me, Jay?" It was the long-awaited voice of Giles Habibula, thinned, muffled with the hum of the instrument, and tense, the commander realized, with some desperate anxiety.

"I do, Giles," he said into the little disk. "What is it?"

"Turn back, Jay," came the faint, wheezing voice. "For life's sake, turn your fleet back to the mortal System! Call off your mortal bloodhounds of space, and leave us be!"

"Turn back?" cried Jay Kalam. "Why?"

"Ah, Jay, there's been a mortal error. This is not the Basilisk I've caught. My companion is but an honest, luckless man. And your chase is but a fearful waste of time, Jay. It is drawing you far out into space, and leaving the blessed System defenseless.

"In Earth's name, Jay, I beg you to turn back!"

"Giles?" demanded the ragged voice of the commander. "The Basilisk is torturing you—making you speak? If he is—"

A dead click told him that the other instrument had been dialed off. He was fumbling the little disk, about to dial Giles Habibula's call again, when the soft, musical tones of the ship's call rang from it and he heard an orderly's excited voice:

"We've got it, commander! Dead ahead, toward the object in Draco. A tiny ship. That's why it took so long to spot. It registers just forty tons—must be smaller than the life tubes of the *Inflexible!* But it has power enough. It seems to be holding its lead. We have the range, commander. What is your order?"

Jay Kalam's hand tensed on the communicator. And a cold wind seemed to blow past him, blowing away the walls of the ship, and blowing away the years. He saw Giles Habibula, a stout little man, strutting, grinning, as he had been when they were privates together in the legion. He knew that Giles Habibula was on the ship ahead. But the rushing of that wind became the husking whisper of the Basilisk, jeering at him. No man, not even Giles Habibula, could be weighed against the duty of the legion and the safety of the System.

"Do you hear me, commander?" the orderly's voice was insisting. "What is your order?"

Jay Kalam slowly closed his eyes, and opened them again. His lean hand made a slow salute. Low and forced, his voice said:

"Fire at once with the vortex gun. Destroy the vessel ahead."

Samdu's cruiser, the long, fleet *Bellatrix*, was slipping in beside the mighty flagship, when the first vortex was fired. Watching through the ports of an air

lock, he saw the great white sun of spinning atomic doom rush out ahead, flaming ever brighter as its etheric forces drew in and annihilated all cosmic matter in its path.

"Well, Mr. Derron," the cragged, gigantic admiral-general muttered with a grim satisfaction, "or Mr. Basilisk—now let's see you get away!"

Hard-driven geodynes were pushing the two colossal ships through space—or, more accurately, *around* it—at effective speeds far beyond the velocity of light. But they touched so gently that their crews could feel no shock. Air valves were sealed for a moment together. And Hal Samdu stalked impatiently aboard the great flagship.

"Quick!" he boomed to the officers who received him. "Take me to Commander Kalam at once."

But, when swift elevators and moving catwalks had brought them to the hidden door behind the chart room, the commander of the legion failed to answer their signal at his door. A call by visiwave—even the emergency signal, G-39—failed to elicit any response.

The alarmed second officer came to unlock the armored door. Hal Samdu stalked ahead into the soft-lit, luxurious apartments of Jay Kalam. Silence met him, and emptiness. The commander of the legion was gone.

"Poor old Jay," rumbled Hal Samdu. "The hundredth man!"

He turned abruptly upon the officers about him.

"Derron's ship is still in range ahead? Then fire again with the vortex gun. And keep on firing till you get it."

XV.

FACING Giles Habibula in the narrow corridor within the valve of the *Phantom Atom,* Chan Derron caught his breath. Still he was weaponless—and the black, tiny hole in the tip of the old man's level cane looked at him like a deadly eye.

"Habibula?" his startled voice echoed. "Not the great Giles Habibula?"

Chan was weaponless—but the heavy little pack of the geopeller was still strapped to his shoulders, its control spindle still gripped in his hand. It could make a living bullet of his body. His hand began to close.

"Wait, lad!"

The old man lowered the menacing cane. His fishy eyes rolled fearfully. His wheezing voice was hoarse with a desperate appeal.

"For life's sake, lad, forget your mortal tricks! There's no need for you to crush old Giles Habibula to a bloody pulp with your blessed geopeller. For he's but a feeble old soldier, doomed to perish soon enough, without. And he's no enemy, lad. Ah, no! Old Giles Habibula comes to you as a precious friend!"

Chan Derron studied the old man with a grim suspicion. And suddenly he saw, behind Giles Habibula, the money that was stacked in the corridor. Thick packets of new Green Hall certificates, bound into great bales and piled high against the walls. The wrapper on every packet was printed with a yellow crescent. Here was the treasure of Gaspar Hannas, Chan knew, that the Basilisk had taken from the New Moon's vaults!

His hand jerked tense on the little black spindle.

"You aren't—" he gasped hoarsely. "You aren't the Basilisk?"

Giles Habibula quivered like a bag of jelly. The seamed moon of his face turned slightly green. He caught a croaking, asthmatic breath.

"No, lad!" he gulped. "In life's name—no! I'm just a poor old soldier. Ah, but a hunted fugitive, lad. A friendless deserter from the legion!"

"Deserter, eh?" The dark-stained eyes of Chan Derron narrowed. "If you are the great Giles Habibula, why

should you desert? And what are you doing here?"

Giles Habibula blinked his colorless eyes.

"Thank you, lad," his thin voice quavered. "Ah, so, lad, from the bottom of my failing old heart, I thank you for calling me great. For the legion has forgotten me, lad!"

He wiped his eyes with the back of a fat hand.

"Once old Giles Habibula was the hero of the legion," he sighed. "Aye, of the whole blessed System. For his noble courage, lad, his precious genius, have twice saved the very life of mankind—once from the hateful Medusæ, and again from the frightful cometeers. And what reward has he got, lad?"

He choked, sobbed.

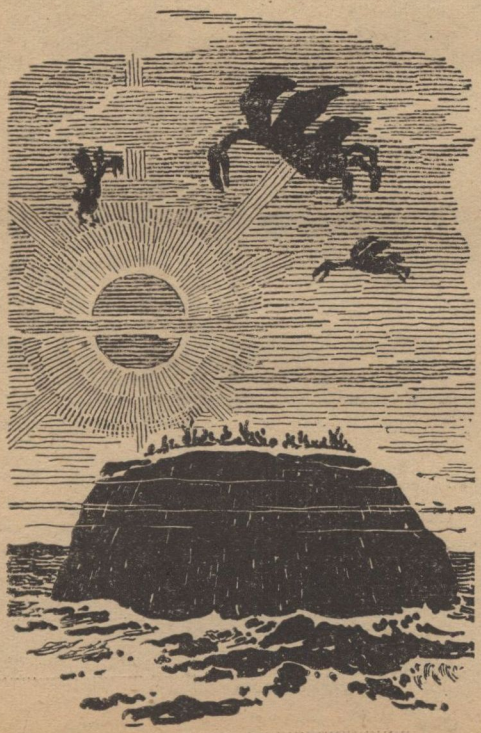
"A beggar's reward, lad. Old Giles is forgotten. His precious medals tarnish in a box. The miserable bit of cash they gave him is all drunk up. A lonely, hopeless old soldier, dying on the ungrateful charity of those who had once been friends. Ah, lad, but life was mortal black—until I heard of your exploits!"

A brighter look came over his yellow face.

"Ah, so, lad!" he cried. "You're the sort that old Giles was, in the days when he was young. A bold man, aye! Reckless and dashing. Not caring whether he drove to sunward of the law or to spaceward. Taking his wine and his gold and his blessed women, wherever he found them! Ah, lad, old Giles has come to you, to beg you to give him back his own lost youth!"

The hand of Chan Derron tensed again on the spindle.

"Don't, lad!" gasped Giles Habibula. "Don't . . . for life's sake. It's known to all the legion that you're the Basilisk. Ah, so, and that's a thing of which you should be precious proud—to stand alone against the law of all the planets, and mock the legion of space."



CHAN DERRON shook his head, protestingly.

"But I'm not the Basilisk." His voice was a little wild. "I'm just his victim. He has planted a hundred bits of evidence, to pin suspicion on me. Look at this money taken from the vaults of Hannas."

Giles Habibula nodded, and his yellow face broke into a happy smile.

"Ah, so, lad!" he wheezed. "Look at it—millions and billions of dollars! Enough to keep a man in wine and women and luxury for a whole lifetime. Or two men, when the life of one is already run to the end. Shall we take off with our loot? Ah, it will be like the old days, lad—living in flight from the legion!"

The eyes of Chan Derron narrowed to an accusing stare.

"You admit you were an outlaw in the old days," he muttered. "You are

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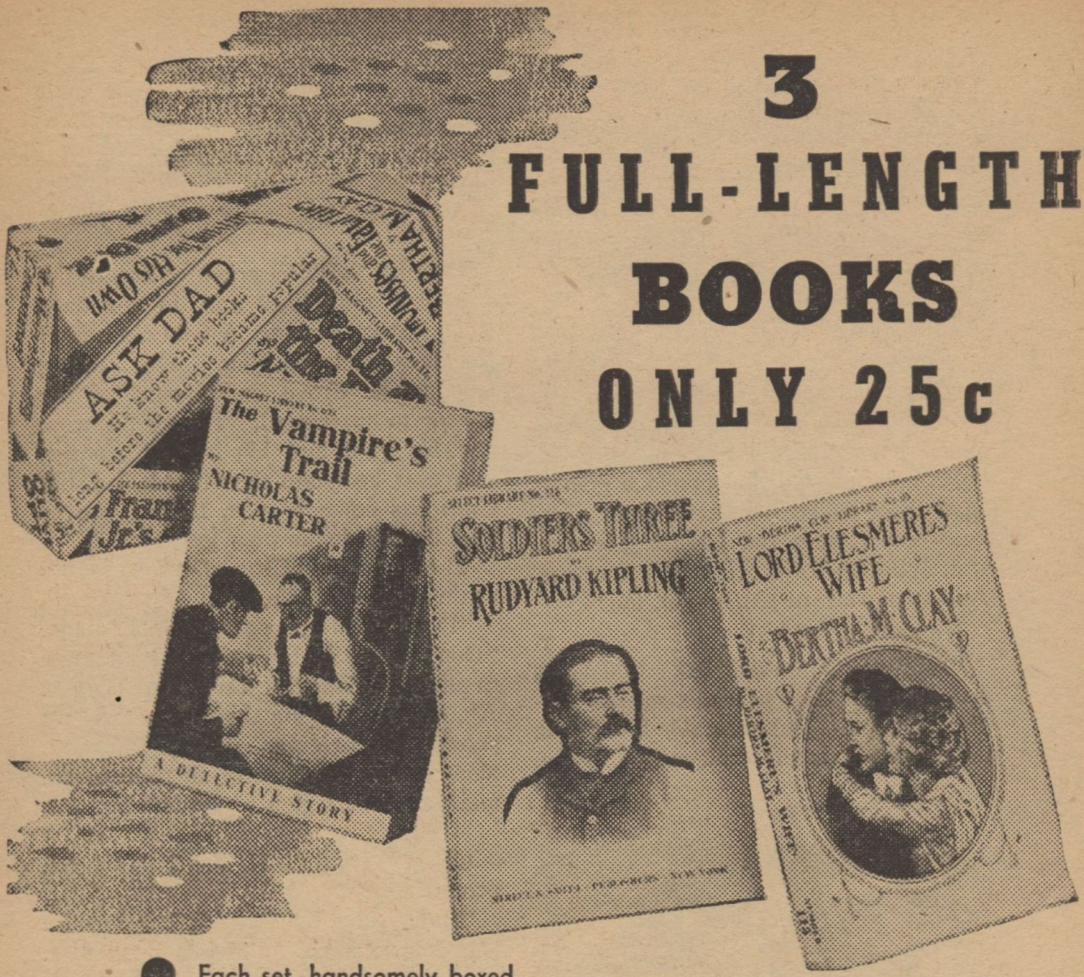

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a master of locks. And you have learned all the scientific tricks of the Medusæ and the cometeers. I believe *you* are the Basilisk, Giles Habibula!"

"Life, no, lad!" The old man turned pale. "Don't think that—"

"If you aren't," rapped Chan Derron, "tell me one thing: how did you find the *Phantom Atom,* when all the legion failed?"

"Easy, lad," wheezed Giles Habibula. "Among the keys I lifted from Dr. Charles Derrel in the Diamond Room was one stamped: 'Control Sector 17B.' And one question told me that Mirror 285, in that sector of the New Moon's sign, was out of order. Then I knew where to meet you. But surely, lad, you don't think—"

Chan Derron's dark eyes stared at him.

"Giles Habibula," he said, "I believe that you came here to catch the Basilisk. And I am going after the Basilisk. I have a clue, which is more than I believe the legion has. You may go with me, if you like."

The small leaden eyes blinked at him, blankly.

"I told you, lad, that I came to seek the Basilisk," Giles Habibula wheezed at last. "If you are not the Basilisk—and if you can take me to him—then I'll go with you. And mortal gladly!"

Chan gestured briefly toward the compact living apartments aft.

"Make yourself at home," he said. "I am going forward. We have got to slip out of the sign, and elude the fleet, and get to an object I have discovered near Thuban, in Draco. We've cathode plates enough to reach it, I think—but not to return. I shall expect you to stand a watch, later."

"Ah, so, lad. You can depend on Giles Habibula!"

Chan Derron went up into the little pilot bay, and Giles Habibula waddled back into the galley. There, preparing an extravagant meal out of the slender stock of supplies he found, he made an immense deliberate clatter of pots and pans.

Presently his skillful thick fingers tuned the visiwave relay hidden under his cloak. Keeping up the noise, to cover his voice, he put the communicator disk to his lips and dispatched his first brief message to Commander Kalam:

"Aboard Derron's ship. Bound for mysterious object near Thuban in Draco. For life's sake, follow!"

He finished getting the meal ready, tasting copiously from every dish, and carried a loaded tray forward to the pilot bay. Chan Derron was towering in that tiny space, concentrated on instruments and controls. His great hand motioned Giles Habibula impatiently back.

"What's the mortal trouble, lad?" the old man demanded.

"We've a race on." Chan Derron's intent eyes didn't look away from the controls. "Samdu's fleet picked us up. We'd outrun them if we had enough margin of fuel. As it is—I don't know. But leave me alone."

Giles Habibula shrugged philosophically and carried the tray back to the galley. Deliberately, he demolished its contents, stretched and yawned, and looked hopefully about the shelves.

"A mortal pity," he sighed, "that the Basilisk didn't use his fearful magic to pick us up a few bottles of wine! If he'll let me join him—I know a few good, well-guarded cellars—aye, vintages five centuries old—that his instrument could reach."

He pried himself upright again with the cane, labored aft, and tumbled into one of the tiny staterooms. In a few minutes, above the keen hum of the hard-driven geodynes, could be heard a regular succession of sounds: whistle and flutter and sob and moan, whistle and flutter and sob and moan—the snore of Giles Habibula.

WHEN THE regularity of those sounds had become well established, another person slipped out of the rearmost of the four tiny cabins. A woman. The quick grace of her tall, slim body spoke of unusual strength. Platinum-colored hair framed a face of surpassing loveliness. Alertly watchful, her clear eyes were violet.

Moving with no sound audible above the hastening song of the geodynes and the snoring of Giles Habibula, she went swiftly forward. One slender hand clung near a singular jewel, like a great white snow crystal, that hung from her throat. And the other, with a practiced and familiar grip, held a barytron blaster of the newest legion design.

She came to the little opening in the bulkhead behind the pilot bay, and stood watching Chan Derron, with the ready weapon leveled at his heart. His broad back was to her, as he stood over the vernier wheel. His whole big body was tense. His senses were all absorbed in the messages of his instruments. His big hands were moving upon swift, delicate little errands. He was fighting, she knew, to drag from power cells and geodynes the last possible quantum of energy.

For a long time she watched him.

Once a telltale flashed suddenly. Chan Derron started. His big hands moved convulsively, and the steady musical note of the geodynes rose higher in the scale.

"In tomorrow's name!" she heard him mutter. "For one ton more of cathode plates!"

An unwilling little glisten had come into the violet eyes. Her blond head flung angrily. She caught her breath, and lifted the barytron blaster. Its bright tube pointed straight between his shoulders. He would never even know.

But the Basilisk should know. All his crimes had earned a long, long taste of the bitterness of death. She let the blaster sink again and watched. Telltales and detectors told her that the fleet was in pursuit. Set up on the calculator board, she could read the destination of the *Phantom Atom*—a point in Draco, ten billion miles from the Sun. And every swift, tense movement of Chan Derron reminded her that he was running a desperate race.

What was the point? And why the race? Her pressure on the blaster's release would destroy all hope of answering those questions. That was the only reason, the girl told herself, that she must wait. But she turned suddenly, and went swiftly and soundlessly back down the corridor, toward the cabin where she had been concealed.

The whistle and flutter and sob and moan of Giles Habibula's snoring had never faltered. But, the instant after the girl had passed his cabin door, it ceased abruptly; and a wheezing voice softly advised:

"Stop, lass, right where you stand!"

The girl spun very swiftly, the barytron gun leaping up in her hands. She found Giles Habibula standing out in the corridor. His thick cane was leveled at her body, and her own weapon dropped from the look in his slate-colored eyes.

"Ah, thank you, lass," he sighed. "'Twould be a shameful pity to destroy a thing as lovely as you are. And I beg you not to force my hand. For I know you, lass. Old Giles could never forget the mortal beauty of Luroa!"

Something swift and cold and deadly flashed in the violet eyes. The blaster jerked again in the girl's strong hand. But it was met by an instant motion of the cane. And suddenly the girl smiled—a smile so brilliant that the old man blinked and gasped.

"And I know you," her smooth voice said. "You are Giles Habibula. I don't think any other man could have caught me as you did."

The yellow face beamed at her.

"Ah, so, I am Giles Habibula. Aye, and forty years ago you would have

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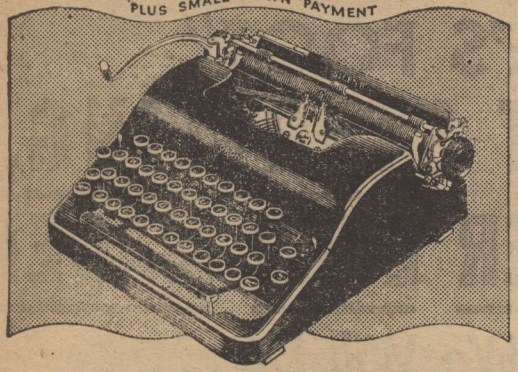

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WITH ASTHMADOR

heard my name—or a dozen of my names—in the underworlds of every planet. For Giles Habibula, in his own day, was as great an operator—as bold, as clever, as successful—as you have been in yours, Luroa."

The girl still smiled her dazzling and inscrutable smile.

"But now it seems that the two of us," wheezed Giles Habibula, "are out to hunt another as great as we have been—greater, aye, unless we prove otherwise by catching him."

His flat, leaden eyes blinked at her.

"Shall we join forces, lass?" he asked. "Until we have destroyed the Basilisk?" His round, yellow head jerked aft, toward Chan Derron in the pilot bay. "With my own blessed genius," he said, "and with the deadly cunning and the fearful strength and the mortal beauty that Eldo Arrynu gave to you—ah, no, lass, with all of them we cannot fail."

He peered at her, anxiously.

"If you will join me, lass—man and android, against the Basilisk!"

For an instant the girl's white loveliness had frozen, so that the wonder of her smile seemed a hollow, painted thing. But her face abruptly softened. She slipped the blaster into a holster that her white furs concealed, and held out a strong, slender hand to Giles Habibula.

"I'm with you, Giles," she said, "until the Basilisk is destroyed." And the old legionnaire wondered at a difference in her voice. Somehow it seemed naïve, bewildered, troubled—somehow like a child's. "Come, Giles," she said, and beckoned toward the cabin she had taken. "There's something I must tell you."

XVI.

A NAKED black rock broke a lonely sea. The sea had a muddy green-black color, cut with long strips of floating yellow-red weed. Its surface had an oily, glistening smoothness. The sky above it was a smoky, greenish blue. And the luminary that rose so very

slowly in it, baking the rock under merciless rays, seemed larger than the Sun. It presented an enormous crimson disk, pocked with spots of darkness. And the infrared predominated in its radiation, so that its dull light brought a sweltering heat.

Upon the summit of the rock, a cragged, stony shelf not fifty yards in length, were crowded one hundred men and women. Their bodies were slowly cooking under the unendurable rays of that slowly rising Sun. They were parched with thirst, for the ocean about them was an undrinkable acid brine. And they were coughing, strangling, weeping, gasping with respiratory distress, for the green in the air was free chlorine.

They were the hundred that the Basilisk had taken.

The last arrival, Jay Kalam, remembered hearing a sudden, queerly penetrating pur, as he stood in his chamber aboard the *Inflexible*. A resistless force dragged him into a frightful chasm of airless cold. But even before the breath could go out of him, light had come back —the dull, sinister radiation of this ancient star. The feral pur receded, and he found himself sprawling on this barren rock.

The chlorine burned his lungs. A savage gravitation dragged at his body. Heat struck him with a driving, blistering force. And he was sick with an utter hopelessness of despair. For what possible hope was offered now?

"Commander Kalam!" choked a voiceless voice. "You?"

It was Lars Eccard, the abducted chairman of the Green Hall Council, red-eyed and gasping, who aided him to his feet. He peered with smarting eyes about the bare summit of the rock, and saw many that he knew—even bent as they were with continual coughing, and masked with scraps of dampened rag tied over their nostrils, for some protection against the toxic gas.

He saw lean Bob Star, Captain Fayle, and a few other legionnaires who had been taken, standing on guard with their barytron blasters, at the ends of the rock. And beyond them, wheeling and soaring and diving in the poison yellow-green haze that hung upon the poison sea, he glimpsed a dozen living originals of the monstrous robot that had appeared in the Diamond Room.

"They have attacked many times, commander," rasped Lars Eccard, beside him. "Thus far we have always beaten them off, but all the weapons are nearly dead."

"I have my blaster."

Jay Kalam touched his weapon, but the lean old statesman shook his head.

"It will help, commander," he choked, "but not for long. For the tide is rising. Already, since the red dawn, it has come up the cliffs a hundred feet. Another hundred will cover the rock. And there are things in the water more deadly than those in the sky."

Jay Kalam climbed a little higher on the rock, with Lars Eccard stumbling behind him. All of the haggard, white-masked faces that he saw were familiar to him. For these were the hundred foremost citizens of the System, snatched from their careers by the inexplicable power of the Basilisk.

In a wildly shrieking thing, bound with rags and struggling on the rock, he recognized the president of the great Martian university at Ekarhenium.

"He went mad," gasped Lars Eccard. "He tried to leap from the cliffs. Perhaps we should have let him go."

A woman lay on a little bench of rock. Improvised bandages covered her arms and shoulders. A small golden-haired girl knelt beside her, sobbing. Her bandaged hand patted the child's head.

"That is Robert Star's wife," said Lars Eccard. "One of the winged monsters snatched her up. She was almost beyond the cliffs, before Bob killed it.

It dropped her, and fell into the sea. The things that dragged it under the water were terrible indeed!"

A fit of coughing seized Jay Kalam. It left him breathless, trembling, blinded. His lungs were on fire. Lars Eccard tore a scrap off his tunic, and gave it to him.

"Wet this, commander," he said. "Tie it around your face. Water absorbs chlorine. There would be no free chlorine here, a chemist told me, if the micro-organisms didn't continually break down the chlorides in the sea."

ON A HIGHER little plateau, they came upon a dozen men and women kneeling in a circle. All wore the rude masks, and one or another of them was always coughing. But they seemed to ignore the flesh-corroding death they breathed, and the black-winged death that wheeled and screamed above them, the crimson death of heat that beat down from the immense and lazy Sun, the manifold and hidden death beneath the acid, monster-infested sea that rose inexorably about the rock. Each had before him a little heap of pebbles, and their red, half-blinded eyes were upon a pair of dancing dice.

Lars Eccard looked down at them and shrugged.

"If it helps them to forget—"

Gaspar Hannas was the banker at that game. His broad face, beneath its yellow-stained mask, showed a slow and senseless smile. And the same eagerness moved his great, white hands to draw in the pebbles he won, as if they had been diamond chips on the tables of his own New Moon.

John Comaine, the big blond engineer, did not play. He squatted across from Hannas. His long, square face had a wooden, impassive look, and his glassy, protruding eyes watched his old employer with what seemed a fixed and well-suppressed hostility. Beside him was the queer boxlike thing that he had set up on the New Moon to detect the mysterious agency of the Basilisk.

Amo Brelekko was rolling the dice. A white handkerchief covered half his face, but otherwise he, alone, seemed unchanged since the Diamond Room. His gaudy garments looked immaculate. The rays of the low red Sun splintered from his jewels. His thin, yellow hands manipulated the cubes with a deft and incredible skill.

But for all that skill, he rolled and lost. And the winner, whose thin, nervous hands snatched eagerly for the pebbles, was a little, gray wisp of a man whose slight, stooped figure seemed vaguely familiar. He set the play down in a little black book, and then tapped swiftly at the keys of a compact, silent little calculating machine. And suddenly Jay Kalam knew him. He was Abel Davian, the little gambler whom the Basilisk had taken from the New Moon's Diamond Room.

The yellow-stamped moneybag, that must still hold the twenty million dollars of his fatal winnings, lay disregarded on the rock beside him. But he pushed out a little heap of black pebbles, and took the dice from Brelekko. Perspiration rolled from his shrunken skin, as he shook the cubes and threw. He lost, and bent again with a worried frown to his calculator.

"Strange animals, men," muttered Lars Eccard.

Beyond, on the black rock's highest pinnacle, they discovered John Star's wife, Aladoree. She was kneeling, her proud, slight body shaken ever and again with paroxysms of dreadful coughing. Her quick hands were busy with some odd little instrument on the ledge before her, improvised from stray bits of wood and metal. Lean John Star was stooping beside her, an agony of sympathy beneath his mask, trying to help.

She looked up, and saw Jay Kalam. A weary little greeting smiled above her

mask, and he saw a stubborn hope die in her eyes.

"We had hoped to see you, Jay," came John Star's voice, hoarse and strained, "—but on the *Inflexible*."

JAY KALAM looked down at the crude simplicity of the incompleted instrument. There was a similarity to the tiny machine that he had seen obliterate the ancient Moon. This flimsy little toy, he knew, was the supreme weapon of mankind, capable of annihilating anything it was directed upon, even a star; even, if its master willed, an entire galaxy.

He breathed the symbol of its dread power:

"AKKA?"

The mistress of it shook her delicate head.

"The instrument is incomplete, Jay," her raw whisper came wearily. "The parts I have worn, disguised as jewels, have been taken from me. We haven't found materials enough. I need wire for the coil."

Jay Kalam fumbled for the small black disk of his ultrawave communicator.

"Perhaps the parts of this will help."

"Perhaps." The haggard woman took it from him. "But even if the instrument is completed," her ragged whisper said, "I don't see how it can serve us. For the Basilisk's identity, and the seat of his strange power, are still unknown.

"We don't even know where we are, not even the direction of our native Sun!"

"We can guess," Jay Kalam told her. "We made a tentative identification of the star from which the Basilisk's robot monster came. From the abundance of this free chlorine, and the appearance of the Sun above—it is pretty obviously Type K9e—I believe that this is the same star. That means that our Sun is eighty light-years to southward. When night comes, so that we can see the constellations and the Milky Way—"

"When night comes," John Star broke in huskily, "we won't be here. From the weed and slime, it is evident that the tide floods this rock."

"In that case—"

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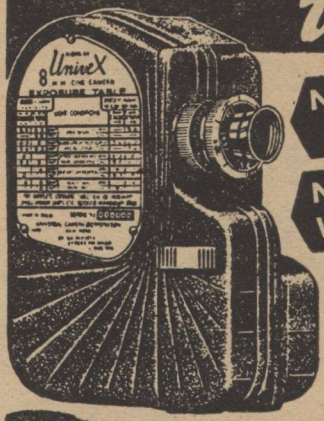

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Jay Kalam choked and coughed. It was a long time before he could catch his strangly breath, and see again. He looked soberly, then, at the tortured man and the wan-faced woman before him. They were waiting, very grave.

"In that case," he whispered again, "I see but one thing that we can do. It is very desperate, very uncertain. But it offers the only hope there is."

"Jay—" John Star gulped. "Jay, you don't mean—"

The grim dark eyes of the commander met the brave, patient eyes of Aladoree.

"If you can complete the instrument," he told her quietly, "I think you must use it in a manner to destroy this Sun, this planet, everything in this System. Even ourselves."

The woman's fine head nodded gravely.

"I'll do that," she said. Her quick hands were turning the little disk of the communicator. "And the parts of this," she told him, "will supply everything I need."

"Wait," croaked John Star's tortured voice. "First—couldn't we use it to report our position and our plight? There's the legion—Hal and Giles—we might yet get help."

The commander shook his head.

"This is just an ultrawave unit," he said. "It would take eighty years for our call to reach the Sun, and eighty years for the answer to come back—and there would be no receiver sensitive enough to pick up the signals. The visiwave, of course, is timeless—achronic. But even the visiwave relay, that filled a whole room on the *Inflexible*, had a maximum theoretical range of less than half a light-year.

"No, John. I think our only hope is AKKA."

The fine, deft hands of Aladoree were already unscrewing the thin black case of the communicator, when:

Krrr! Krrr! Krrr!

The tiny piercing beat of the emergency call, stabbing from the instrument, made her drop it from her hands. Jay Kalam swiftly picked it up.

"G-39!" he gasped. "Who could be calling that?"

THE MUTED and distorted voice that he heard humming from the instrument, he knew at once for the voice of the Basilisk. It seemed to leer at him, thickened with an ineffable sardonic malice.

"My dear commander," it said, "I must interfere with your valiant sacrificial scheme. For the quick death of AKKA is not the death I have planned for ninety-nine of you. I would have them live to feel my full revenge, for all the insults and injuries that have been heaped upon me. I would give them time to realize that the man they dealt with as the smallest and the meanest of mankind is now the greatest—the Basilisk. And when they have sensed the full truth, when their sufferings have made the fullest possible atonement, I would have them perish, not by AKKA, but in the manner that I shall ordain.

"And the hundredth man, commander," that gloating whisper rasped, "must not die by AKKA. For I shall return him alive to the System, to tell mankind of my power and my revenge. You can assure your companions, commander—if you wish to revive their hopes—that one of them is destined to survive."

The whisper ceased. Jay Kalam dropped the little instrument, and stared about the bare black rock. He saw the little circle of kneeling men and women, still intent upon their game of futile chance. He saw Bob Star's wife, who had been Kay Nymidee, weakly rising, taking their sobbing little child into her arms. Saw Bob Star himself, a lean, lonely figure at the end of the rock, standing guard against the monstrous winged things that soared and dived upon the poison wind beyond.

"The Basilisk—" he was muttering. "His headquarters, his base . . . must be somewhere . . . out there. Relatively near. For his voice came by ultra-wave, without any relay."

The choked little gasp from Aladoree brought his eyes back to her haunted, stricken face. Her slender arm was pointing, trembling. And Jay Kalam saw that the half-completed instrument of AKKA was gone from the bench of rock before her. In its place was a little black serpent, crudely shaped of clay.

XVII.

"BUT I am not Luroa."

The violet-eyed girl had closed the door of the tiny cabin upon the racing *Phantom Atom,* and the keen, endless whine of the hard-driven geodynes came but faintly to her and Giles Habibula.

"Eh, lass?" The old man blinked his colorless eyes. "But you are!"

Perched earnestly on the edge of the narrow bunk in front of him, for his mass overran the only chair, the girl flung back the lustrous mass of her platinum hair and looked gravely into the old soldier's face.

"I'm no android, Giles Habibula," she insisted, in a quick and anxious voice. "I'm as human as you are. I'm Stella Eleroid. I'm the daughter of Dr. Max Eleroid—who was murdered by the Basilisk."

A cold light flashed in her violet eyes, and her white face was hardened with a grimness of purpose that seemed to freeze its beauty into marble.

"When I knew the legion had failed," her low voice said, "I set out to track down his killer and to recover the *geofractor*—that was his last and greatest invention, the thing that Derron killed him for."

"Geofractor?" echoed Giles Habibula. "What in life's mortal name is that?" He lurched ponderously forward, his small eyes squinting into the girl's face. "But you're Luroa, lass!" he insisted. "I saw your blessed face on the notices

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of reward. There's a difference in your eyes and your hair, and I'll grant you to be a gorgeous actress—but you'll never fool old Giles."

"I can explain."

With an impatient little gesture, the girl caught his massive shoulder. The old man looked into the white, tense beauty of her face, and all the doubt melted slowly from his seamed yellow features as he smiled.

"You see, Giles," her swift voice said, "my father and Dr. Arrynu were boyhood friends. They roomed together at Ekarhenium. Each had a vast respect for the abilities of the other. My father used to say that if Arrynu had chosen to live within the law, he could have been the greatest biologist and the greatest artist in the System. Sometimes, during his long exile, Arrynu paid secret visits to the Earth, and my father always entertained him—I think he hoped to persuade Arrynu to give up his illicit researches and come back to help my father with his own experiments.

"Anyhow, on his last clandestine visit," the girl said, "Arrynu met me. He had seen me before, when I was small. But now I was seventeen. And Arrynu made violent love to me. He was a vigorous and passionate man. The romance of his outlaw life intrigued me. He told me of the luxuries and the beauties of his stronghold on the uncharted asteroid. He begged me to return to it with him.

"And I would have gone." The girl's grave eyes looked beyond Giles Habibula. "I have sometimes wished that I had. Besides my father, Eldo Arrynu was the greatest man that I have known. I loved him—then.

"But I told my father, the evening before we were to leave. It was the only time I ever heard him curse. He called Arrynu names that should have shocked me. He told me all about the criminal side of Arrynu's character—the illegal researches, the drug manufacture, the ring of desperate criminals that Arrynu gathered and subordinated to his ends.

Still, despite all that, I was mad enough to go. But then he told me about the androids, the lovely and soulless criminal slaves that Arrynu's ring had sold through all the System, often to rob and murder their purchasers and be sold again.

"That convinced me. I refused to see Arrynu again. My father met him. I don't know what happened. Dad must have threatened to expose him. But their strange friendship was ended. Arrynu returned to his hidden planetoid. I know now what he did."

An old brooding horror darkened the eyes of the girl.

"He made the thing he called Luroa. Her body had the superhuman strength of the androids. Her brain had all the inhuman, pitiless criminal cunning that he had given the brain of Stephen Orco. But she was modeled after me. From photographs and his own memory, he created a likeness almost exact."

"Ah," breathed Giles Habibula. "Ah, so! But, lass, how does it come that you have been playing the rôle of that mortal android?"

"Arrynu kept Luroa with him," the girl said, "until the cometeers, guided by that monster he had made himself, fell upon his little secret world. Arrynu was killed. But Luroa escaped. Daring and brilliant and ruthless, she assumed leadership of the interplanetary gang. And her exploits presently got the legion on her trail. It was then that she conceived her most diabolical scheme."

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THE EYES of the girl were almost black, and she shuddered a little. Her hand groped for the great white jewel at her throat, as if it had been a precious talisman.

"Luroa knew that she had been made in my likeness. She planned to steal my identity! She was going to abduct me, from the laboratory where I was trying to carry on my dead father's work. She was going to kill my brain with drugs, and let the members of her gang deliver me to the legion, for her own reward. And she would step into my shoes!"

"Ah, lass!" Giles Habibula leaned forward anxiously. "And what happened?"

"My father had once warned me of such a possibility," the girl said gravely. "And a true scientist neglects no possible contingency, however remote its possibility. When Luroa came, I was ready. It was not she who won, but I."

Giles Habibula surged to his feet and pulled her unceremoniously to him and set a very enthusiastic kiss upon her lips.

"Good for you, lass!" he cried. "Ah, blessed good, if you beat the android at her own mortal game! But why didn't you report the matter to the legion and claim your just reward?"

The girl's face grew very sober again.

"Besides the possible difficulty of proving that I was not Luroa, that same day I learned that my father's murderer had escaped from the Devil's Rock." Her voice was still and cold. "And the theft of a document from the laboratory that night proved that he was using my father's geofractor. I knew that the legion had failed—and must continue to fail, against the terrible power of the geofractor.

"But Luroa, I thought, might not fail. So I became Luroa."

"And mortal well you did!" applauded Giles Habibula. "But, lass, tell me about this geofractor?"

The girl sat down again on the edge of the bunk. Her platinum head inclined a moment, listening to the fighting whine of the geodynes. Her slender hand unconsciously touched the ready butt of her barytron blaster, and then the great white crystal at her throat.

"Don't worry, lass," Giles Habibula reassured her. "I gave our position and course to Commander Kalam and the fleet. Derron will have no time to look for stowaways. But this strange geofractor?"

"You know," she told him deliberately, "that my father was the System's greatest geodesic engineer."

"Aye, lass," agreed Giles Habibula. "His refinements made the old-type geodynes seem as primitive as mortal oxcarts. He invented the geopeller, that Derron is so ready with."

"He's good with stolen discoveries." Her white hands clenched, relaxed again. "But the geofractor," she said, "is based upon a principle totally new—affording a complete, controlled refraction of geodesics.

"The instrument utilizes achronic force fields. My father independently discovered the same new branch of geodesy that Commander Kalam's expedition got some inkling of from the science of the cometeers."

"Ah, so." Giles Habibula nodded. "It was something like that that Kay Nymidee used to escape from the comet."

"But the geofractor, as my father perfected it," the girl said, "had a power and a refinement of control that the cometeers had never approached. Its achronic fields are able to rotate the world lines of any two objects within a range of several hundred light-years."

"Aye, lass." Giles Habibula smiled comprehendingly. "But, in other words, the—"

"The geofractor is in two units," the girl told him. "Each unit is able to

refract the geodesic lines of any object out of the continuum, and warp them back again at any point within its range. Which means," she smiled, "that the object, in effect, is snatched out of our four-dimensional universe and instantly set back again at the other point.

"There are two coupled units," she explained, "timed to perfect synchronism, so that each creates a perfect vacuum to receive the object transmitted by the other. That prevents the atomic cataclysms that would result from forcing two objects into the same space at the same time.

"That explains why the Basilisk"—she caught her breath—"why Derron has such a way of putting clay snakes and bricks and robots in the place of the things he takes. It balances the transmitters."

GILES HABIBULA exhaled a long, amazed breath.

"So that's the mortal geofractor!" he wheezed. "Ah, a fearful thing!"

"So Derron has made it," the girl cried bitterly. "My father intended it for the purposes of peaceful communication. He dreamed of a timeless interplanetary express service. He even hoped to make wide stellar exploration possible, so that human colonists could spread across the Galaxy.

"Yet he realized the supreme danger of his discovery. I doubt that he would have finished it at all, but for the bitter straits of mankind in the cometary war. He completed it only as a weapon of last resort—and he provided a shield against it."

"Eh?" Giles Habibula stared at her. "A shield?"

The girl touched her white, six-pointed jewel.

"This contains a tiny, atom-powered achronic field coil," she told him. "It is adjusted to create a spherical barrier zone, that the searcher rays and refractor fields of the geofractor cannot penetrate.

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"It is all that has defended me, thus far, from Derron's stolen power. And he has tried more than once to take it from me—as when he sent that robot to the New Moon to attack me—though he bungled, that time, by killing his monster too soon."

Giles Habibula blinked and squinted at her.

"Now, lass," he queried, "now that we know all this—what shall we do about it? Derron is driving out with us toward some unknown object in Draco, and the fleet is pressing mortal close behind us."

"That object," said Stella Eleroid, "must be the geofractor."

"Eh!" Giles Habibula started. "But that was a small thing, Jay Kalam said. One man could carry it."

"The model was, that Derron took," the girl agreed. "It would have had power enough to carry one man—and itself—away from the island where my father was testing it. The only wonder is that Derron didn't go with it, then, himself.

"But it had far too little power for these recent feats. A huge new machine must have been constructed—probably it was built on a planet of another star, possibly with the labor of such robots as the one sent to the New Moon. It has been four years, remember. And the model itself would have solved all problems of transportation."

"But, lass—" Giles Habibula shook the bald globe of his head, doubtfully. "If Derron was in the New Moon, and this evil machine ten billions of miles away, then how could he have been the Basilisk?"

"Remote control," said Stella Eleroid. "My father had worked out a perfect unit for that. The sensitive potentials of the achronic field make possible instant observation and control. You've seen the legion's new visiwave equipment. My father had something far more compact and powerful than that. And, with the tube field of his searcher

beam, he was able to dispense with any transmitter instrument at the other end.

"Derron is loaded with hidden equipment," she said. "I felt the wires in his sleeve. How it must have amused him, walking among those crowds in the New Moon, to know that he could hurl anyone about him to destruction in an instant—anyone but me!"

She touched the white jewel again.

"Then, lass," said Giles Habibula, "shall we just wait and keep you hidden, till Derron brings us to his mortal machine—"

CRASH!

Abruptly the flimsy cabin door was splintered. Slivers flew about them. And Chan Derron's wide-shouldered bulk was framed in the ragged opening. One hand clutched the little control spindle of his geopeller, and the other leveled the gleaming tube of a barytron blaster.

The girl's hand leaped for her weapon. But Chan's hand tightened on the spindle, and his big body came toward her with the fleetness of a shadow. The nose of his blaster caught hers, flung it against the wall. A simultaneous kick sent Giles Habibula's thick cane spinning.

The geopeler lifted Chan back to the shattered doorway.

"Some spare blasters in the chest," he panted. "And I'm not quite deaf!"

His weapon covered them while he caught his breath. His narrowed eyes swept the white, defiant beauty of the girl, and his grim face smiled a little.

"Listen," his low voice said, "Miss Stella Eleroid—I'm glad you're not Luroa—and Giles Habibula—I thought you had been a loyal legionnaire too long to desert! Listen!" His weapon gestured emphatically. "I heard everything you said. And we are going to be three together against the Basilisk. For I am going to convince you that I didn't murder Dr. Eleroid."

A little shudder swept the girl's white, tense body. The savage hate in her violet eyes drove Chan a step backward.

"I don't think you will," her voice whipped at him, "—Basilisk!"

"Ah, so." The small eyes of Giles Habibula rolled at her, apprehensively. "But we'll listen."

"What you have told about the geofractor," he said to the breathless, quivering girl, "explains what happened in that armored room. Your father and another man went into it, with the model geofractor. They locked the door, and I stood guard outside.

"Admiral General Samdu, not an hour later, found the door unlocked—that is the fact that convicted me. He found the dead bodies of Dr. Eleroid and his assistant. And all the equipment—the model geofractor—was gone.

"The body of the assistant was already stiff in *rigor mortis*. That was a point that they failed to explain, in the case against me. They simply disregarded it." Chan Derron's jaw set grimly. "But *rigor mortis* never begins in less than two or three hours after death. The other body found in that room with Dr. Eleroid must have been dead twelve hours or longer."

His somber eyes went back to the girl's intent white face.

"You have explained what happened, Miss Eleroid," he told her. "The murderer had already killed your father's assistant. He had secreted the body. He had taken the assistant's place. It was the murderer who went down into that room with your father. Do you think that is possible?"

The platinum head of Stella Eleroid nodded very slowly, unwillingly, it seemed. Her violet eyes, still very dark, remained fixed on Chan Derron's face with an intensity almost hypnotic.

"It is possible," she whispered. "My father suffered from an extreme myopia—he couldn't recognize anyone ten feet from him. And that day he must have been completely absorbed in his experiment." She nodded again. "But go on."

"THE MURDERER—the real Basilisk—is a very clever man," Chan said. "We know that he had been spying on your father. He must have planned the thing very carefully. He took a great risk—but for a tremendous stake.

"Once in that locked room, he watched your father test and demonstrate the geofractor. And then, when he had learned all he wanted to know, he killed your father. He used the geofractor to bring the stiffened body of the real assistant from wherever he had hidden it. With the geofractor, he took the blaster out of my belt, and drove its bayonet into your father's body. He unlocked the door. And then the geofractor carried him and itself to some place of safety—and I was left to be convicted of the crime."

He searched the girl's fixed white face.

"You believe me," he whispered hoarsely. "Don't you believe me, Stella?"

"I want to believe you, Chan Derron," she said slowly. "But who is the Basilisk?"

"Ah, so," wheezed Giles Habibula. "Perhaps you speak the truth, Captain Derron—and if you do, this Basilisk has done you a mortal wrong, indeed! But there's a fearful mass of evidence against you. And who else could be the Basilisk?"

"Will you trust me?" Chan pleaded. "And aid me—just until we come to the geofractor? Perhaps, there, we can learn the Basilisk's identity."

"But my orders, from Jay Kalam," the old man said, "are to bring you back. And the fleet is already close behind us. You'd best surrender, and then—"

Chan Derron's face set grimly.

"I'll not surrender," he said. "I know the fleet is close behind. And we haven't cathode plates to keep up full speed—they may soon be in range, with the vortex gun. But I'm going on to the geofractor. If you won't help—"

His weapon moved abruptly. A dull-green gleam flashed from a finger of the hand that held it, and Giles Habibula's small eyes blinked.

"Eh, lad!" he gasped. "Your ring—where'd you get that blessed ring?"

"It was my mother's," Chan Derron said. "She had the stone reset for me."

"Let me see it." The old man held out a trembling hand. "It's Venusian malichite? Carved into a die? The spots all threes and fours?" He scanned Chan's big body with a queer intentness. "Tell me, lad—who was your mother? Was her maiden name Coran?"

Chan Derron nodded, wondering.

"The ring was my grandmother's," he said. "She was a Venusian singer. Her name was Ethyra Coran."

"Ethyra Coran!"

The eyes of Giles Habibula were suddenly brimming with tears. His big body heaved out of the chair. He pushed Chan's blaster unceremoniously aside, and flung his arms around him.

"What's this?" gasped Chan.

"Don't you see?" wheezed Giles Habibula. "Your mother was my own blessed daughter! You're my own blood, Chan Derron. The grandson of Giles Habibula!"

"Then—" Chan freed himself, stared into the beaming yellow face. "Then—will you help me?"

"Ah, so!" the old man cried. "And mortal gladly! For no grandson of Giles Habibula could be the Basilisk."

With a grave and silent question in them, the eyes of Chan Derron looked

at the girl. For a long moment, her level violet eyes met his, dark with another question. At last she nodded slowly.

"We'll give you a chance, Chan Derron," she said. "If you can find the Basilisk."

XVIII.

GILES HABIBULA'S appeal to the fleet, to abandon the chase, was ignored. When the *Phantom Atom* lurched and struggled in the deadly fields of the first etheric vortex fired from the great *Inflexible:* "Ah, lad," the shuddering old man sobbed fearfully to Chan Derron, "let me to your geodynes! I've been an engine man for fifty blessed years, and there never was a generator but that would pull its precious heart out for old Giles Habibula!"

And, indeed, when his deft hands had retuned her geodynes, the tiny vessel began to draw ahead again. The second sun of atomic doom groped after them with weaker fingers, the third flamed and died far behind. And the *Phantom Atom* was many hours ahead of the fleet, when they came to the geofractor.

Chan Derron's brain was staggered by that machine's immensity, and baffled at its strangeness. Against the star-shot dark of space hung two great spheres of blacker blackness. Three colossal rings, set all at right angles, bound each of them; and between them, connecting them, was a smaller cylinder of the same dully gleaming metal.

"A little like a twenty-million-ton peanut," he muttered. "But I never saw anything so black as those great globes!"

"They are not anything—nothing more than invisible energy fields," said Stella Eleroid. "They are simply holes in the continuum. That blackness is the darkness of a lightless hyperspace, seen through the globes of force.

"It is through those spheres that the geodesics are refracted," she said. "And

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they are maintained by the achronic field coils in the rings about them. There are four rings about each globe of force—the three that you see, and a fourth that has been rotated into hyperspace.

"Except for size—miles, to feet—this machine is almost identical with my father's model. The controls, no doubt, and the atomic power tubes that activate the field coils, are in the central cylindrical structure."

"Eh?" murmured Giles Habibula. "And we may find the Basilisk there?"

"We may," the girl said. "But I think not. The remote control would make it needless for him to remain here. But doubtless the machine is safeguarded. We may meet some of his robots."

"But that mortal power"—the eyes of Giles Habibula rolled fearfully—"that snatches men away—"

"It can't reach us." The girl touched her white jewel again. "So long as this is intact, and we keep close together. But if we separate—or it is lost—"

"Ah, lass, we'll cling to you!" cried Giles Habibula. "And defend it well!"

Circling the dark mass of the geofractor, that hung in space like an elongated planetoid, they found an entrance valve in the wall of the great metal cylinder between the two black spheres. No weapon, nor any sign of alarm, met their approach. Magnetic anchors held the *Phantom Atom* beside the valve, and the three emerged, clinging close together, in white space armor.

A massive and intricate combination lock stopped them at the outer valve.

"Ah, here is a barrier that could halt all the blessed legion," muttered Giles Habibula. His fingers, in their flexible metal gloves, began spinning the dials. He set his helmet against the heavy door, to listen. "All the legion!" he wheezed. "But not the precious dying genius of old Giles Habibula!"

The colossal armored door slid deliberately aside, and they hastened into

the great chamber of the valve. Another lock, at the inner gate, yielded as readily, and they emerged into the mysterious interior of the cyclopean machine.

Chan's impression was of staggering immensity. A dull-violet light, from endless banks of gigantic power tubes, gleamed dimly upon the square masses of huge transformers, black cables writhing like incredible serpents, and the maze of titanic girders that supported all the mechanism.

His armored hand gripped the butt of a barytron blaster. But no movement met them. No living thing was visible. There was no sound save that from generators and transformers—a humming so mighty and deep that it had to be called a roar.

Already, with a swift certainty of purpose, Stella Eleroid was leading the way along a narrow catwalk, out through that web of unknown power. Giles Habibula opened another locked door, and they entered a long dim-lit chamber that was obviously a control room. For illuminated dials and gauges shone in endless rows, signal lights flashed, signal bells rang, automatic switches made an endless muffled clicking.

EERILY, this room was also empty. Sweeping it with the muzzle of his blaster, Chan Derron shuddered. This mass of untended mechanism was somehow uncanny, as if it had been itself alive.

"The Basilisk is not here," said Stella Eleroid. "I hardly expected him to be. But I believe I can operate the geofractor—I was my father's assistant, until he decided the job was too dangerous. We can disconnect the remote control, and use the searcher beam to look for him."

"Good," Chan said. "I think I know where to look. Try the vicinity of the red star Ulnar XIV, about eighty light-years north. Here's the location."

He gave her the scrap of paper he had found in Hannas' vault. She turned to the long maze of untended controls. She held hurried little conferences with Giles Habibula. And the old man waddled beside her up and down the corridors. His fat hands were as familiarly skillful, Chan thought, as if they had built everything they touched.

Gripping his blaster, peering this way and that, Chan kept an anxious watch. It began to seem to him that the humming emptiness of this space was more terrible than a horde of the Basilisk's robots would have been—until he heard a familiar feral pur, and saw green-winged horror flapping at the farther end of the long room.

This time he knew that the central crimson eye was a vulnerable point. His white ray flashed. The monster fell, sprawling weirdly over a bank of dials, before it could lift the legion-type blaster in its own green tentacles.

"Don't worry," Chan called to Giles and the girl. "I got it!"

But the violet eyes of Stella Eleroid were startled and grave.

"We had the remote control disconnected half an hour ago," she told him. "The arrival of that monster means that the Basilisk has another geofractor—somewhere!" She shuddered. "You stopped the robot, but he may send us —something else!"

Chan Derron resumed his apprehensive watch. Another hour had gone, when:

"We've found it, Chan!" came the girl's eager voice. Her eyes were fixed upon a tiny, shielded screen in a little oblong control box. "The place where the geofractors must have been built. It's on a great planet that circles the red star. In the middle of a high polar plateau, there's a clearing in the jungle. Mines. Furnace stacks. Metal roofs of factories. The foundation, miles long,

where the geofractors must have been built. A sort of robot city. I see thousands of the winged robots, wheeling about. Some of them fighting, I think, with their real-life originals at the edge of the jungle. The Basilisk must have begun by building robots, and setting them to build others—"

"But the Basilisk, lass?" broke in the nasal wheeze of Giles Habibula. "Where's the mortal Basilisk?"

Stella Eleroid shook her platinum head—which was real, Chan wondered briefly: the blond curls and violet eyes of Vanya Eloyan, or the red-mahogany hair and gray-green eyes of the reward poster of Luroa?

"There's no human being here," she said. "Nothing but the robots."

"Search, lass," urged Giles Habibula. "The criminal must be somewhere. And all those he has abducted with his fearful power—or their poor remains."

CHAN DERRON stood his endless watch. The girl moved delicate controls and looked into the small black box until:

"Here!" she cried abruptly. "There was a shadow on this ocean, that it took all our power to pierce. Beneath is a tiny rock, and there are people on it! Their faces are masked. They are coughing. A ragged, pitiful lot. The water seems to be rising. They are struggling, even fighting, for higher places on the rock. Things like the robot are wheeling over them. And great black, armored things are leaping out of the rising sea."

Giles Habibula was blinking intently over her shoulder.

"Ah, so!" he breathed. "These are the luckless victims of the Basilisk. There's Kay—poor lass, she's all bandaged! There's her child—and Bob!" His thin voice became a sort of wail.

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He caught a sobbing breath.

"Aye, and now I see those three scoundrels from the New Moon. Hannas and Brelekko and John Comaine. They are playing some game of dice—all but Comaine. And the little gambler, Abel Davian, is with them—still with his book and his mortal calculator. Playing their blessed lives away, for pebbles, while bloody death creeps down upon them!"

His quivering fingers caught the girl's arm.

"You must set them back on earth with this machine," he gasped. "And blessed quickly—before they perish."

But she shook her head.

"I can't do it," she said. "The shadow over the rock was made by some instrument like that in my jewel. The Basilisk has protected it. Only the full power of the searcher beam can penetrate the barrier. Our fields can't reach through to lift them away—not even one of them."

Chan Derron was beside her, breathless.

"Then, Stella," he demanded, "can you set me on the rock?"

"No," she told him. "The barrier zone would interfere with that, too. But why?"

His dark-stained eyes were narrowed and grim.

"I think the Basilisk is there," he said, "among them. I am going after him. If you can't put me on the rock, drop me as near as you can."

"In that dreadful sea?" Her eyes were wide with alarm. "Chan, you'll be killed!"

"Thanks, Stella!" He grinned at her, very briefly. "But I've got a clue to the Basilisk's identity. I'm going to test it. And there's no time to lose! Will you help me?"

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"I'll help you, Chan." A brief light shone in her eyes, and was extinguished with dread. "Go to the other end of the room," she told him. "Beyond the shield of my jewel. And farewell, Chan Derron!" Her voice caught. "I . . . I believe you, now. If you come back—"

But he was already striding away.

"Aye, farewell," Giles Habibula called after him, "grandson!"

At the other end of the long, dim-lit control room, Chan Derron paused and turned. He raised his head. The girl looked at him a moment, and then turned very suddenly to the little box beside her.

A savage, penetrating pur throbbed through all Chan's body. The girl and old Habibula and the strange room were all whipped away. He was flung through frigid blackness, into a world of yellow-green mist.

GREEN-WINGED horror flapped and screamed beside him. He fell through the haze, toward the dark, flat sea where greater black monsters leaped above the slime. The geopeller checked his fall. But he dived. Something attacked him, beneath the water, and the bolt from his blaster made a volcano of steam. He climbed the flooded rock, and clambered out of the water with green slime dripping from his silver armor.

The rock's highest point now stood not five feet above the tide. And the dark water visibly lapped upward. There were less than a hundred now upon the rock. And soon, he knew, there would be none.

He knew most of the masked, strangling, heat-parched human things that clung to the rock. But they paid him little heed. Most of them were too far gone for recognition. Commander Kalam saw him, and flung a barytron blaster upon him.

"The Basilisk!" he cried. "He's come to mock us. Kill him!"

But his cry was only a gasping sob,

that went unheard. And his blaster, exhausted with firing at the winged things above, flickered harmlessly and died.

"I think the Basilisk is here, commander," said Chan. "And I have come to look for him." He thrust his own blaster into Jay Kalam's hands. "Take it," he said, "and guard Aladoree. I am going to make a test."

Stripping off the metal gloves of his space armor, he flung them down upon the rock and picked up a handful of small black pebbles. He strode onto the level ledge, where Hannas and Brelekko and little Abel Davian and a few other masked, strangling men and women still knelt about their game, while John Comaine looked on with an expression of stolid hostility from beside his strange black box.

Chan Derron dropped on his knees, beside gaunt Brelekko, and heaped his pebbles before him.

"I've come to join your game," he said.

The yellow, bright-ringed claw of Brelekko shook the dice and rolled them. He said nothing. But Gaspar Hannas, smiling behind his bandage the senseless smile that was the only smile upon the rock, gasped hoarsely:

"Welcome, stranger. But our game will soon be ended. Soon we'll all be dead—all but one. That is the greatest gamble. For the Basilisk has promised that one of us will be returned alive to the System."

"One of you," Chan agreed. "But it's no gamble. Because that one is the Basilisk himself!"

Gaspar Hannas gulped and stared.

"He couldn't be— He wouldn't—"

"He could be," Chan said. "If he has the twisted, sadistic mind that he has displayed times enough before, he would. I think he is. But let us play. And will you ask Dr. Comaine to join us?"

Hannas made a gasping grunt at John Comaine. The big engineer nodded sul-

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lenly. Stiffly awkward, he rose from beside his instrument, and came unwillingly to kneel in the circle.

Chan took the dice from the talons of Brelekko, and rolled a seven. Raking in the pebbles he had won, he brushed the fingers of Hannas and Brelekko. He lost, and put the dice in the hand of Abel Davian—and watched that lean gray hand with narrowed eyes.

The little man was tapping the keys of his silent calculator again, when Chan saw the angry red welts lifting on his fingers. A chorus of muted screams, torn by terror from gas-seared throats, drew his eyes upward. And he saw the geofractor.

Or the twin colossal instrument! Miles long, dead-black globes of force bound with cyclopean metal rings, it eclipsed the enormous dull-red Sun. And it was falling!

Swiftly it seemed to expand. Chan knew it would crush the rock, and all upon it, into the deadly acid sea. And he heard again, beneath the screams, the mighty pur of the Basilisk's sinister power.

"Wait!"

HIS GREAT hand snatched the little black calculating machine out of Abel Davian's swelling fingers. He smashed it against the rock, seized a fragment of stone and pounded it to scrap and dust.

"What, sir?" The little gambler blinked bewilderedly at him through thick lenses. "What are you doing?"

"Conducting an allergic sensitivity test," Chan rapped at him.

"I don't understand you, sir!"

Chan glanced up at the stupendous shape of the falling geofractor, about at the appalled, hushed scores upon the rock. They awaited its impact, he thought, almost with gratitude.

"We've probably two minutes," he said. "You see," he told Abel Davian, "when I helped Dr. Eleroid's disguised pseudo-assistant carry the model geofractor down into that armored chamber, it happened that my hand touched his. I saw rapid red swellings come upon his fingers, saw that he sneezed."

His darkened eyes stabbed into the little gray man.

"When I learned how the crime was carried out, I happened to remember that you began to sneeze as you came toward me in the Diamond Room, just before you vanished—and already I had wondered how you had the audacity to win, on that particular night, or had the peculiar skill required, and wondered about the possible utilities of your portable calculator."

Rigid, pallid, Abel Davian was staring at him.

"I contrived to touch your hands, just now," Chan's swift, grim voice went on. "And I observe that again you manifest an extreme allergic susceptibility to my body. It is a rare but proven phenomenon—the proteids of one human body acting as allergens to another. Its very rarity made the identification positive—even before I had checked it by proving that your little calculating machine was the remote-control box of the geofractors, Mr. Basilisk!"

Ashen, palsied, the little man was cowering back from him. His pale, hunted eyes flashed up at the mass of the falling geofractor, that now spanned half the greenish sky. They came back to Chan, magnified by the thick lenses, lurid with a triumphant hatred.

"What if I am the Basilisk?" his cracked voice snarled defiantly. "I'll still be the winner—because you all will die!" His feral eyes flickered over the rock. "Hannas and Comaine and Brelekko, because they robbed me, on the New Moon, for twenty years. Kalam—because the legion stopped my robot experiments, and gave me three years, as Dr. Enos Clagg, on the Devil's Rock. The Green Hall Council—be-

cause my true name is Abel Ulnar!" His thin shoulders drew up with a supercilious pride. "I'm Eric Ulnar's son. But for you, Derron"—his voice was savage with an arrogant malice—"you, grandson of old Giles Habibula, who with John Star and Aladoree caused my father's death—but for you, the Basilisk would have restored the empire! I should have been Abel I." His thin lips drew to a venomous line. "But even yet you all shall die!"

His glaring eyes lifted again to the colossal falling machine. Now its black mass filled the sky, almost from horizon to horizon. A fantastic greenish twilight was falling fast upon the rock. The first faint wind of compression blew down upon them.

"I think not," said Chan Derron's swift, hard voice. "For the daughter of Dr. Eleroid is at the controls of the other geofractor. And I think we shall escape the fall of this geofractor as you intended to, Mr. Basilisk. Already, you see, Aladoree and many of the rest have been set back in the System!"

All the rock was trembling to a mighty purring sound. And by little groups, the parched and masked and haggard victims of the Basilisk were vanishing from the flooded rock. Familiar articles of furniture, bits of shrubbery and sod, proved that they had been returned to their own kinder world. In a few moments Chan was standing alone before the other man, beneath the many million tons of the falling geofractor.

"But I don't think that you'll escape, Mr. Basilisk." His hand made a gesture of farewell. "Because Stella Eleroid knows certainly, by now, that you —and not I—are the murderer of her father."

Then a deeper throbbing penetrated all Chan's body. Some pellucid screen, it seemed, had fallen between his eyes and the gray, stricken face of Abel Davian. The green, thickening twilight became a total darkness. And he knew that Stella Eleroid had lifted him from the peril of the rock.

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TUNE IN ON THE GOOD WILL HOUR, every Sunday Evening. See your local paper for time and station.

Irvin Echard

Gains 14 lbs. in 5 Weeks

"I was so skinny I didn't want to go out. Finally, I tried IRONIZED YEAST. In five weeks I gained 14 lbs. Now I go out regularly, have good times."

Irvin Echard, Barberton, O.

R. Loeffler

Gains 12 lbs., admired now

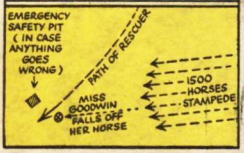
"Was losing weight and pep. Then I got Ironized Yeast. In 6 weeks I gained 12 lbs. and am full of pep. Everybody admires my physique, too."

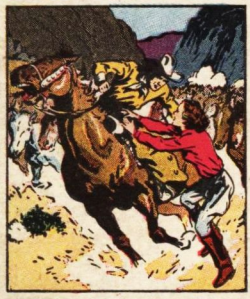
Ralph Loeffler, Arlington, Wash.

A HOLLYWOOD STUNT GIRL deserves REAL SMOKING PLEASURE!

ALINE GOODWIN, OF THE MOVIES, WORKS HARDER THAN MOST MEN. SHE PRAISES A REST AND A CAMEL FOR FULL SMOKING ENJOYMENT

ALINE GOODWIN, ON LOCATION FOR A THRILLING ARIZONA "WESTERN," IS WAITING FOR HER BIG SCENE — A SPLIT-SECOND RESCUE FROM THE PATH OF 1500 FEAR-CRAZED HORSES





"AFTER I ENJOYED MY SIXTH PACKAGE of Camels," says Fred West, master engraver, "I took them on for life. Camels taste better. They are so mild and mellow. They're gentle to my throat—which proves Camels are *extra* mild! My work requires intense concentration. So, through the day, I take time to let up—light up a Camel."

COSTLIER TOBACCOS

CAMELS ARE MADE FROM FINER, MORE EXPENSIVE TOBACCOS ...TURKISH AND DOMESTIC

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SMOKE 6 PACKS OF CAMELS AND FIND OUT WHY THEY ARE THE **LARGEST-SELLING CIGARETTE IN AMERICA**

LET UP— LIGHT UP A CAMEL!

SMOKERS FIND: CAMELS NEVER JANGLE THE NERVES