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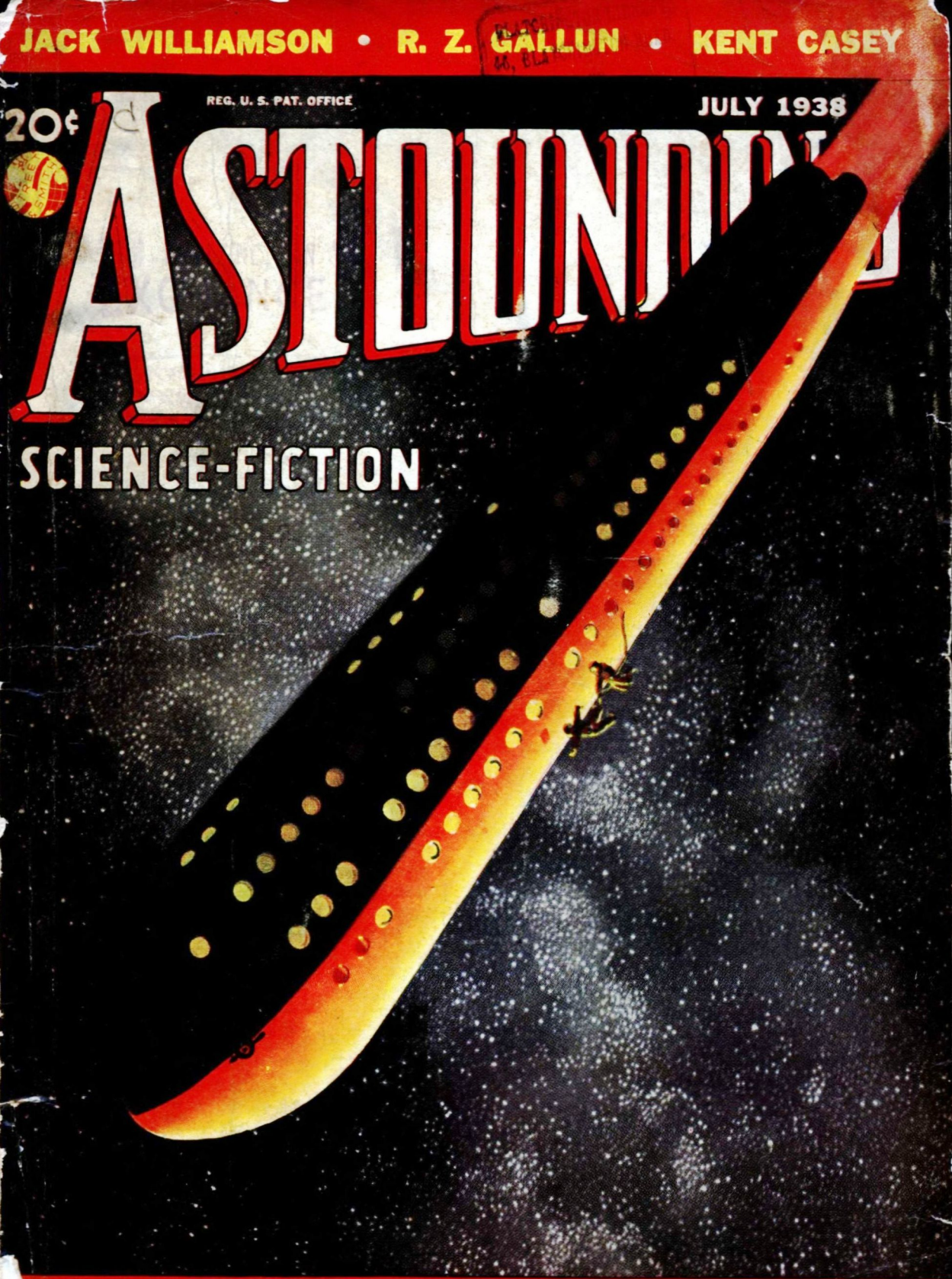
JULY 1938

# ASTOUNDING

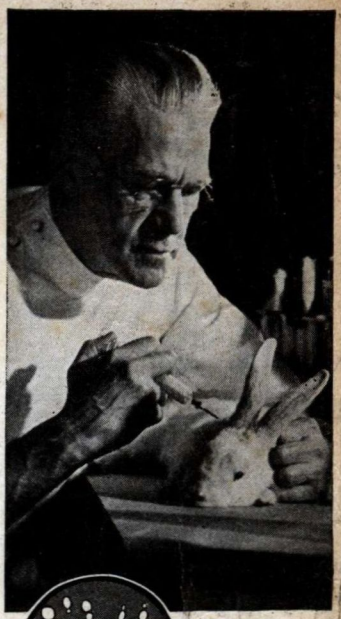
SCIENCE-FICTION



Voyage 13 by RAY CUMMINGS

# Sensational Scientific tests prove LISTERINE CURES DANDRUFF

***First Science discovered the dandruff germ...then, that Listerine kills it. 76% got quick relief in New Jersey clinic.***

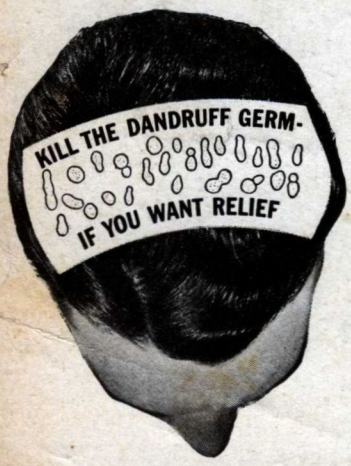


*Pityrosporum ovale, the germ that causes dandruff, magnified many times.*

If dandruff has you in its grip, if you have tried remedy after remedy in vain, here is the most welcome news you could possibly read:

Listerine has been scientifically proved a positive cure for dandruff.

Once or twice a day, just douse full-strength Listerine on your scalp; massage vigorously and persistently until every hair is bathed in soothing, health-promoting antiseptic. Listerine attacks and kills that queer, bottle-shaped germ—*Pityrosporum ovale*, which causes dandruff.




### *Here is proof*

When Science discovered the dandruff germ, an astounding series of experiments immediately followed. Rabbits were infected with dandruff. When treated daily with Listerine Antiseptic, they were cured within two weeks on the average.

In a great midwestern skin clinic, a group of dandruff sufferers applied the daily Listerine treatment. A substantial number of these Listerine users obtained marked relief within the first two weeks on the average. In many other cases scalps were found to be free and clear of dandruff in from three to eight weeks.

In another recent test, 76% of the dandruff patients of a New Jersey clinic who used the Listerine treatment twice a day, showed complete disappearance of, or marked improvement in, the symptoms within 30 days.

### *Listerine treats dandruff for what it really is*

Why use old-fashioned remedies which merely wash away the surface symptoms of dandruff temporarily? Listerine Antiseptic actually cures dandruff, by killing the germ itself.

Start ridding your scalp of dandruff today. Stop the gnawing, burning dandruff itch. Get back the natural health and vigor of your hair. Remember—only Listerine Antiseptic, so far as we know, has a clinical record of such positive dandruff cure.

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Title Registered U. S. Patent Office

Volume XXI Number 5

JULY, 1938

A Street & Smith Publication

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Single Copy, 20 Cents Yearly Subscription, $2.00

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# RAY CUMMINGS

***tells of the politics and death that walked the corridors of the spaceship WANDERER on—***

# VOYAGE 13

BY the gods of the Starways, that's a sweet-looking girl," Green said. "Fling her a look, Jon."

I peered with interest. Wavvy Green, young Helioman of the *Wanderer,* and I were lounging under the dome near the bridge outside the Control Room, watching the embarking passengers. The *Wanderer* was racked in the big landing stage at Amberoh, Capital of the Venus Free State, ready now to start for Great New York. The big glassite ports were still rolled back from the deck dome, and Green and I had a vista down into the blue-lit stage.

"See her?" Green added.

I saw her presently as she came up the little incline—a small, pale-blonde girl, with a young man beside her. Both wore the long cloak-drapes characteristic of the upper caste of the Venus Free State. The girl's drape was pale blue. As she boarded us, the incline tube-lights glared on her face. It was a face of delicate, exquisite beauty—lilylike—with the creamy complexion characteristic of the Venus nobility.

I was not unduly impressionable to feminine beauty; certainly in my capacity as Assistant Navigator of the *Wanderer* I had seen girls of scores of races and on many planets. But here was something that quickened my pulse—an ethereal beauty—a purity—and a sort of helplessness. At the top of the incline she stopped suddenly. Her young man companion had turned away momentarily. She spoke to him, and he quickly took her arm.

"She's blind," Green said.

"You know who she is?"

"Normah Velah II, no less," he explained. "The young fellow with her is her brother, Roberoh. And if you look closely you'll see at least fourteen men down there on the stage who have bodyguarded them here. And now that they're on board it's up to Mac."

Our little red-headed helioman always made a point of knowing everything. I had had no idea we were to have such distinguished passengers this voyage. As a matter of fact, their embarkation had not been announced; Wavvy got it from our Purser.

The girl and her tall, dark-haired brother had disappeared now on the side deck almost directly under us.

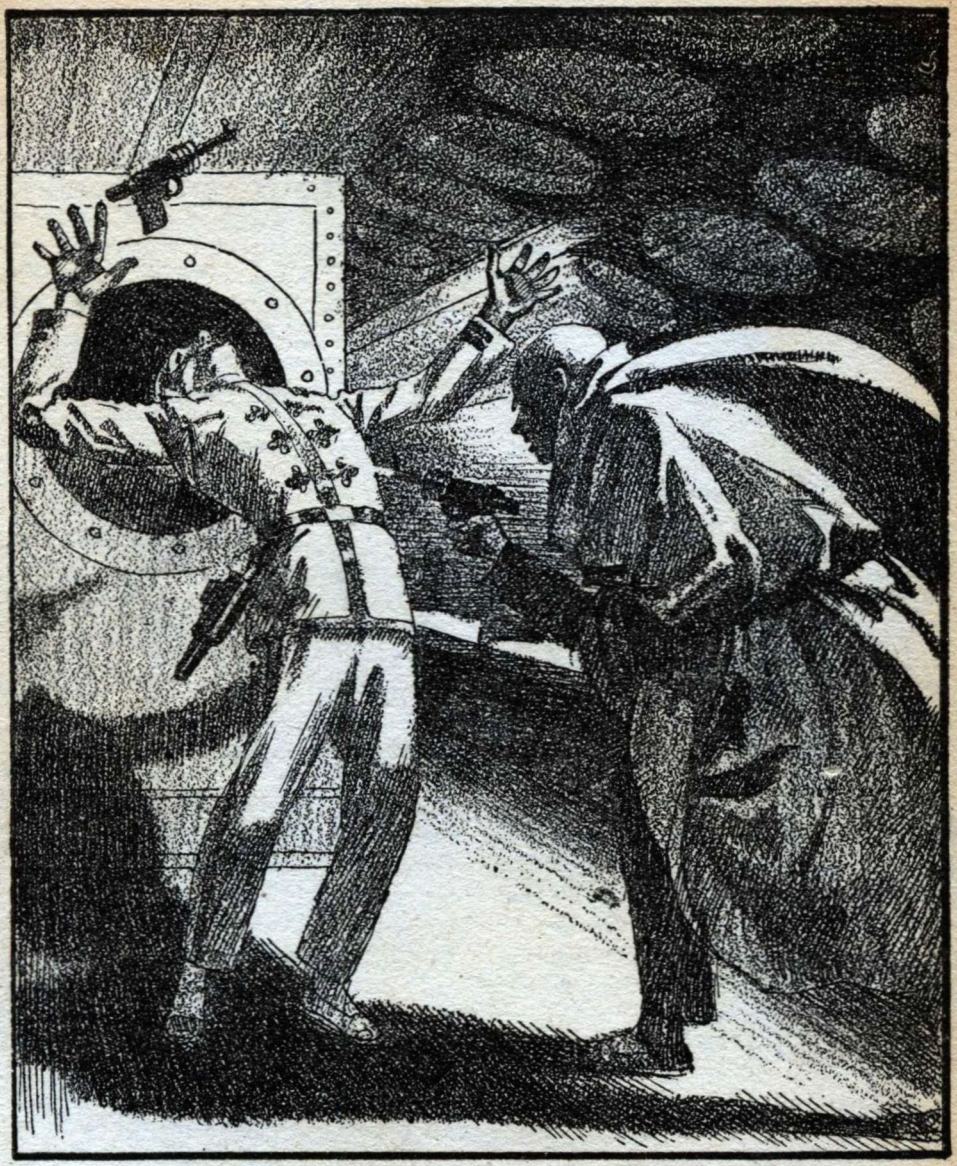
"Here's Mac now," Wavvy Green added.

Mack Mackenzie, a big, rawboned, six-foot Scotsman, was an Anglo-Alliance Shadow Man, detailed from Great-London for duty on the *Wanderer* to represent the Interplanetary Police. He always posed as a passenger. He came lounging toward us.

"I see we've got distinguished guests," I murmured.

"Ye'll be forgettin' it," he retorted softly. "Eavesdroppin' rays have keen ears."

"The girl knocked Jon dead," Green chuckled. "You could see it on his



*A shadow stirred far down the deck—a Banning spat its sizzling spark of heat. Wavvy Green slumped almost silently to the deck plates.*

face. So now he's a star-crossed lover —moon-struck. I'm a motor-oiler if he isn't."

"You go wrap up an electric spark," I told him. I moved away from his gibes and went into the Control Room, to work on the trajectory charts. And a few minutes later Voyage 13 was under way—a voyage ill-fated for us as the ancient superstition of the number would indicate.

I AM Jon Halory. I was age twenty-five at that time—Assistant Navigator of the *Wanderer*. With the Earth and Venus well past conjunction, this was

to be our last voyage of the Astronomical Season. By ship's routine, it was midafternoon when we departed. I went at my duties. But despite the necessity of tossing long and intricate equations to calculate the elements of our forthcoming course, I could not get that Venus girl, Normah Velah II, out of my mind. I had heard of her, of course. The *Wanderer*, this voyage, had been racked in the stage at Ambelah for nearly a week.

It had been a tumultuous week in the affairs of the Venus Free State. For nearly a year trouble had been brewing with the natives of the outlying, mountainous districts. The hill people were restless, eager for a governmental change that would benefit their benighted condition. It was largely the result of their own incapacity; the Liberal Government of the Free State was doing very well by them. But always under such circumstances, a leader will arise to capitalize discontent for his own lust for power.

Such a leader had arisen. He was known as Talone, not even a native of Venus. Vaguely it was understood that he had come from Mars—ousted from Ferrok-Shahn for similar activities.

But on Venus, among the ignorant, his bombastic talk gained him a huge following.

I was not familiar with the details. But this week, when the *Wanderer* lay racked in Ambelah, open revolt broke out in the city. There was an attack upon Government House, and President Velah was assassinated. The mob within a day was in control; and from the hills, Talone came marching, possessing himself of the Government, proclaiming Interregnum Law until a new election could be held.

My fellow officers and I were not allowed from the *Wanderer*. The city was in a turmoil. Vaguely, we were given to understand that Roberoh, and Normah—the President's young son and daughter—had escaped from Government House and taken refuge in the living quarters of the Officials of the Landing Stage. It was under the flag of the Interplanetary League—and not even the swaggering Talone and his roistering fellows dared attack it. And now Roberoh and Normah were embarking for Earth. All that afternoon and evening, I could not get the vision of that ethereal-faced little blind girl out of my mind.

It was well after the evening meal before the *Wanderer* rose through the dense fogs of the Venus atmosphere and emerged into the sunlight of Interplanetary Space. Captain Jaquero was never one to hurry his ascent; the comfort of the passengers, to him, was beyond a few hours of the voyage. Mrs. Reynolds, our Matron, had few cases of pressure sickness. The *Wanderer*, of all the Starway Fleet, had a reputation for comfort. Despite the trying Venus atmosphere—with its weird changes and its interminable moisture content—the *Wanderer* remained comfortable. We maintained on board a gravity of Earth .9; temperature 72 F.; interior air pressure 15.75 lbs. per square inch, with the Erentz pressure equalizers working perfectly.

It was nine p. m., ship's time—midevening—when I finished calculating the elements of our trajectory. Captain Jaquero and First Officer Peters approved them; we set the electronic gravity plates and slowly turned, with the sunlight bathing our stern and the bow a glory of starlight, prismatic in the black vault of Space.

WITH MY JOB done, I went from the Control Room for a stroll on the star-gazer's deck, as they call it—a seventy-foot little deck under the glassite dome. A few of the larger passenger cabins were here, and in the stern was Green's little helio-radio cubby. We had few passengers this voyage—no more

than six or eight, it seemed. One or two were standing gazing through the bulls-eyes of the dome.

Then to one side, I saw a little group —Dr. Blake, our Ship's Physician, seated with Roberoh and Normah Velah. I approached them with my heart accelerated and a queerly asinine regret within me that this blind girl could not see that I was a stalwart, fairly handsome fellow, sleek and efficient-looking in my white linen. Green would have gibed at me, but there was no one to know how I felt as Dr. Blake introduced me and I sat quietly in the group, smoking and saying very little.

I recall we talked of nothing in particular. I saw this murdered President's son as a youth no older than his sister. They were twins in fact, I learned now. Roberoh was not yet of age—which is twenty-two for a male in the Venus Free State. He could not have held office.

Dr. Blake—always a blundering fellow—said something like that to Roberoh. A flush came to the youth's patrician face.

"We do not speak of such things now," he said. "All Venus people are intuitive linguists; Roberoh spoke English with the soft, curiously limpid quality characteristic of his race. "My sister and I—we are making a voyage to Earth—to forget what we have been through. Dr. Blake, perhaps, hardly understands. But you do, Mr. Halory?"

"Yes," I murmured.

Our bullet-headed doctor possibly was piqued at the rebuke. At all events he presently left us. Always, in the offing, the tall figure of Mac, our A. A. Shadow Man, was visible. I saw him now, clad in a Venus cloak that looked absurd on his burly figure as he stood alone by a bulls-eye with the starlight painting him. Apparently he was engrossed in the glittering dome of the Heavens; in reality I knew he was watching us.

Normah had said almost nothing. At ease, she sat back in her padded deck chair, her poor blank eyes, blue with the starlight, gazing idly—seeing nothing but her own thoughts. She was even more beautiful, here as I sat with her, than I had pictured. Small, slim as a child, yet rounded with full maturity, the lines of her figure obvious beneath her flilmy blue-gray dress with its gold cords crossed over her bosom, wound around her slight waist and dangling with tassels almost to her sandaled feet.

Perhaps, normally, there would have been nothing unduly pathetic in her blindness. Certainly she did not seem to feel it morbidly. Roberoh spoke of things she had read; sculptured works of art she had seen with her fingertips. And she was a musician, skilled with the lutelike *vicahnah* of Venus.

"My brother paints me with very glorious colors," she said once. She laughed, musically as a lute itself. But at once, when her face went into repose, I could not miss that there was upon it a queer look of uneasiness. A sort of tense expectancy. As though her mind were not on what we were saying, but on something else. Something—terrifying perhaps.

QUITE SUDDENLY, as Roberoh and I were talking some triviality, she broke in upon us.

"Would you go to our cabin, Roberoh?" She had suddenly lowered her voice. She leaned toward me. "I know that we—we can trust you, Mr. Halory. Could there—could there be any eavesdropping ray upon us now?"

"Quiet, Normah," Roberoh murmured. "You want me to go——"

"Yes, please. Oh hurry—I just feel frightened——"

It was as though some extra-normal sense were warning her of danger, so that she sat with hands gripping the sides of her chair, her bosom rising and falling with her quickened breath, her delicate nostrils dilating.

Roberoh leaped to his feet with his cloak around him.

"I will go see. But it is nothing, Normah."

He moved forward along the starlit deck, and disappeared down a little half-flight inclined to a balconied recess where his cabin and Normah's were located side by side almost under the control turret.

Normah and I were left alone. Momentarily Mac had moved away.

"What is it?" I murmured tensely.

"That Dr. Blake who was here——" She was leaning with her hand upon my arm; her voice was barely a whisper.

"What about him?" I prompted.

"I—I'm afraid of him—I don't like him——"

Well, the burly, bullet-headed Blake had never been any great favorite of mine. But there had not seemed anything terrifying about him. He was, however, what they used to call a lady-killer.

"What did he do to annoy you?" I murmured.

"Nothing. I just feel—that he's an enemy. And others—the whole ship maybe——"

I tried to scoff, but she was so earnest, so obviously terrified that it made me tense. Why had she sent her brother so hastily to their cabins?

Her hand still gripped me. "We must not talk of it," she murmured, "but you, I know, we can trust. No more now, please——"

I sat staring at her. And then she smiled.

"Shall we talk?" she murmured. "What do young men—like you—on Earth talk about when they sit with a young girl in the starlight?"

That wouldn't have been hard for me—under the circumstances she pictured. But it was hard now, so that I sat suddenly tongue-tied.

"Well——" I said.

"Of music? Of the stars? You have a beautiful Moon, some of the nights on Earth? I have read about it." She was smiling quizzically.

"Yes," I agreed. "The moonlight and a pretty girl—well you're supposed to talk about love. I guess it's the same on Venus——"

I checked myself. Her hand had come out; her fingers lightly brushed my face. She was still smiling.

"Excuse me," she said. "One likes to see to whom one is talking."

There was no pathos. Her smile was faintly quizzical, as she added, "Being blind is a little disadvantage in the moonlight."

"Not at all," I said. And then impulsively I quoted, "Flinging back a million starbeams, the vault of Space reminds me of thine eyes."

As her hands went to my shoulders, I stared into her eyes. The blankness seemed vanished, for they were, in truth, filled with starlight. For that moment our bantering was gone. Both of us were breathless. But a little vestige of sanity clung to me.

"A President's daughter," I murmured, "could never be interested in a ship's officer——"

"You think so? There is no difference—a ship's officer, or a King—— 'If you were a King'—there is on Earth a poem like that. You say it."

"'If I were King'", I murmured.

*"'Ah love, if I were King,*
*What tributary planets I would bring*
*To bow before your sceptre, and to swear*
*Allegiance to your lips and eyes and hair.*
*The stars would be your pearls upon a string,*
*Red Mars a ruby for your finger-ring,*
*And you could have the Sun and Moon to wear—*
*If I were King.'"*

IT WAS OUR moment, so suddenly come as I held her there in the starlight. And then it was dashed. A step sounded on the deck near us. I could feel Normah stiffen in my arms. Then she drew away. A man was coming

toward us—one of the passengers. I knew his name, Graeff III. He was an elderly fellow—a wealthy importer, I understood, in Ambelah. His dark cloak shrouded him—a tall, but bent figure, bare-headed, with the starlight gleaming on his mass of gray-white hair, long about his ears in the Venus fashion. His vacuum-cupped sandals squished on the metal-grid of the deck as he walked.

"That man Graeff——" Normah was murmuring.

"You've met him, Normah?"

"Yes—this afternoon. Dr. Black introduced him." A shuddering terror was upon her.

He came past us. I saw that Mac was lounging at a near-by bulls-eye port. Graeff, as he came abreast of us, turned and came smilingly forward.

"Ah—it is the beautiful little Normah," he said. His gray-white sagging face, with queerly heavy jowls, was wrinkled into a smile. His eyes, deep-set under shaggy white brows, swept me a glance. "One of our young officers?" he added.

"This is Jon Halory," Norman introduced.

I was on my feet, but I did not offer the chair. Graeff nodded, teetering on his sandals, unsteady as though with senility.

"The starlight," he said, "is very beautiful. We will have the Earthlight glow in a night or two." He nodded to me, and passed on; vanished down a near-by incline to the cabin quarters below.

Mac again had gone. I sat down beside Normah.

"He—of them all—terrifies me," she murmured. "There is evil in him. It radiates——"

Wordlessly, I could only stare. Was the *Wanderer*, this voyage, bristling with Talone's spies? Suddenly I felt our helplessness—a little world here, poised seemingly motionless in the great abyss of Space. Captain Jaquero was armed; the Control Turret was a little arsenal. But whom could we trust? Normah's words rang through my startled mind: "He, of them all, terrifies me." As though this little blind girl could feel the radiations of evil. And looking back on it now, I have no doubt that she did.

But why should Talone's spies be here? I knew that by Interplanetary Law, this girl and youth—both under legal age—could have no bearing upon the governmental status of the Venus Free State. They could not appear before the Interplanetary League of Great London in protest at Talone's usurpation. Why then would he pursue them?

Normah was clinging to me. "My brother," she murmured. "He has not come back from our cabin! Oh, please—take me there—hurry!"

What was there about her cabin that was so terrifying? She clung to me as we hurried forward on the starlit deck. At the little half-flight incline, Roberoh appeared from below.

"It is—all right?" Normah murmured.

"Yes," he said. He flung a glance at me as his arm went around his sister. He was smiling, but I could not mistake his agitated tenseness, the pallor of his handsome, boyish face, the look of terror in his eyes.

"It is all right, Normah," he added gently. "Do not be frightened."

I accompanied them to the mid-flight balcony catwalk upon which their communicating cubbies opened. At Normah's door we paused. Roberoh gestured down the spiral to the main cabin corridor close under us.

"That fellow Graeff," he said softly, "was standing down there. When he saw me, he came and went on deck."

It brought a little cry from Normah. Roberoh drew me aside.

"I follow my sister," he said. "In English you call it intuition. She has it. She knows we can trust you——"

I nodded. "There is something you want to tell me?"

"No—or at least not now. I thought when we boarded your ship we would be safe." He was murmuring with swift vehemence; his gaze again swept down the shadowed tube-lit spiral to the blue corridor under us. "I know now that we are not safe, Halory. You, we can trust. And the Captain?"

"Of course," I murmured.

"And there is your Shadow Man Mackenzie——"

So they knew about Mackenzie.

"And your First Officer Peters—and your crew——"

That startled me. Of our crew of twelve, seven had been on shore leave when the trouble broke out in Ambelah. They had vanished. Captain Jaquero had engaged others—seven new men about whom we knew nothing.

"What do you want me to do?" I said.

"You are armed?"

"Not now. But in my cubby——"

"In the night—I want no prowlers here at our door——"

Normah's cubby was dim behind them. "Goodnight," she murmured. "Of everyone—it seems perhaps there is only you."

The door closed upon their tense, white faces.

THE RHYTHMIC HUM of the Erentz pressure equalizers sounded dimly through my silent cubby. Outside my latticed bulls-eye, facing sternward, the gigantic silver crescent which was Venus still nearly filled the quadrant of the sky, with the Sun blocked behind it now.

"Of everyone—it seems there is only you." Normah's last words of terror pounded in my head. Only these two fugitives, and myself to protect them? But that was absurd, of course. There was old Captain Jaquero; and Mac—— But who else? Wavvy Green, perhaps. I could name no one else. If, indeed, Talone's spies were here, I could easily fathom that Blake and Peters could be bribed. And Roberts, the purser? I knew nothing about him, save that he had always seemed a very decent fellow. We had no more than five passengers. Who were they, beyond Graeff, Normah and Roberoh? I did not know.

It was the trinight hour now—midway between midnight and dawn. I had prowled, Banning gun under my night cloak. But there was nothing. I had not seen Mac. Once I searched for him, with a sudden impulse to consult him. But with the skill of years, Mac was like a shadow himself—unseen when he was prowling.

The little Trinight buzz from the Control Turret sounded through the silent interior. I knew that the Captain would be at the controls now, with Collins, our Chief Navigator, beside him. The other officers, like myself, were off duty.

For another ten minutes I sat tense, pondering. Then again I started for Normah's cabin. The eerie blue-lit corridors were empty. There was no one, seemingly, on the star-gazer's little deck. The glassite dome over it glowed with starlight. Green's cubby was dark.

Silently, cloak around me, I moved forward, went down the half incline to the catwalk balcony. At Normah's door I listened. There was no sound from behind its metal panel.

I am no professional prowler. I was tense, jumpy. Was that a moving shadow in the corridor under me? I thought so. I started down, but if something had been there, it was gone.

Then, as again I paused at Normah's door, dimly from within I heard a murmuring voice.

"Normah——"

Then there was an answer in the Venus tongue. It was Normah's agitated voice, unmistakable. But whose was the other? Not Roberoh's! It was blurred, throaty—almost a groan.

"Normah—Normah——"

And then I heard Roberoh's voice. Three of them were in there!

For that instant I was shocked into confusion. But my wits came back, steadied as I realized the existence of a low hum—the tiny, microphonic, grinding hum of electronic interference.

An eavesdropping ray! You can hear them sometimes, when you are close to a metal obstruction through which they are passing. An eavesdropping ray from some near-by point was focused upon Normah's door. It was picking up the murmur of the three voices and humming a little with the door's interference.

FOR THAT SECOND I stiffened, with my Banning gun pointing down the spiral. Was the eavesdropper down there? Abruptly I was aware that the hum was gone—as though he had learned what he wanted to know.

I recall that I was part-way down the spiral. And then I heard a groan from below—a ghastly, gurgling groan as though from a throat and mouth choked with blood.

And then came my name: "Halory—I'm here——"

It was Mac. He had misjuggled his job, just for once in his life. But once was too much. I found him lying in a black recess of the lower corridor. A knife handle protruded from his chest. His hands were futilely plucking at it.

"Halory—get them—all three of them to the Control Turret——" Blood was grewsome in his throat. "Halory—I'm gone—you hurry—they know now he is on board—you get to the Turret—your only chance because all hell will break loose——"

His words were lost in the blood that gushed from his mouth. Then he twitched and the light went out of his eyes.

For a second I stood transfixed. And in that second, as Mac had warned, all hell broke loose. From somewhere in the ship, like a signal, a brief penetrating little whine sounded. There was a distant scream from the crew's quarters under me—the sizzling, muffled flash of a Banning gun—the tramp of running feet—men's shouting voices——

I turned and leaped up the incline to the catwalk balcony—pounded on Normah's door. They had heard the commotion, of course. The door swung inward as Roberoh opened it to my imperative voice. In the center of the dim cabin, Normah stood with her arms around an elderly man. He was pallid, trembling; his head and one arm were bound with surgical bandages.

Roberoh swung toward me. "My father," he said swiftly. "He did not die. The surgeons—were loyal. We pretended he died, you see? Or the mob would have come again and killed him surely——"

I was barely aware of Roberoh's tense words. The interior of the *Wanderer* resounded with the distant commotion. Banning flashes—several screams now and doors slamming. The aroused passengers were screaming with terror—screams that turned ghastly with agony as the bandits struck them down.

"They've killed Mac," I said. "We've got to get to the Control Turret."

Oncoming footsteps thudded in the corridor under us as we went to the catwalk. A figure was coming up the spiral. I turned sternward. We ran some thirty feet on the catwalk, then went up another incline to the upper deck. Forward on the turret bridge, I saw Chief Navigator Collins. He had a Banning gun in each hand.

"Halory!" he shouted. "Halory—Lord, what's happening?"

The aged President Velah stumbled as Roberoh and I gripped him, half carrying him. Obviously he was numbed by terror, and by the pain of his wounds.

"What is this?" he muttered in English. "What is this going on?"

"You're all right," I said. "Just a little further—hurry——"

My arm was around Normah, guiding her. From Green's helio cubby, Wavvy came dashing at us. "I sent a call for help," he shouted. "Contacted the Interplanetary Patrol cruise ship. It'll come in a few hours."

FROM ACROSS the starlit deck a shadow rose up. A Banning gun spat its sizzling heat-ray, drilled Green and ended with a violet-red shower of sparks up on the metal dome-casing. Wavvy flung up his arms silently and went down. It was Dr. Blake who had drilled him. I saw the running figure heading sternward—and I didn't miss. My heat-stab went through him, so clean and swift a drilled little hole that, though he was dead, his body of its own momentum seemed to keep on running with buckling legs. Then his head crashed against a metal ventilator.

We shoved the numbed President into the Turret and slid its metal door-slide. Captain Jaquero had locked the controls and came running at me. "Halory," he gasped, "murder—death everywhere on my ship—are we all who have survived?"

Except the traitors. I could not doubt it. Ruthlessly, the passengers and all our loyal crew had been killed. And here in the Turret there were only the Captain, Collins, and I; the President, Roberoh, and Normah. I had taken Normah and her father to a side couch across the circular little Control Room. The bulls-eye windows gave us a vista in every direction of the starlit ship. The forepeak—empty save for the crumpled figure of the lookout lying weltering beside his electro-telescope—the narrow, empty side-decks between the Turret and the dome-sides—and sternward, along the empty star-deck where the figures of Green and Dr. Blake lay sprawled.

Then from the dull glare of Venus-light at the stern, a figure with a raised handkerchief was slowly advancing. It was Graeff.

"Do not fire," he called. "Will you have a truce so that we may talk? It may save your lives."

Our microphone picked up his voice and amplified it in the Turret. The bulls-eye sternward was partly open. Chief Navigator Collins stood there and raised a handkerchief.

"Very good," Graeff said. "I will trust you."

He had stopped, but again he advanced, his long cloak swinging with his aged, tottering step. In the center of the deck, again he paused, and I saw him straighten from his bent, decrepit posture. It was a startling metamorphosis—the fellow was a skilled actor. His face had been altered by the disguiser's art. He was still old-looking of countenance as he stood grinning at us in the starlight. But his bent body had unlimbered; his sagging shoulders were squared; his legs straightened so that here was a burly fellow as tall as myself.

"By the Gods——" Collins muttered.

At the open bulls-eye, the angry Captain roared, "You damned murderer—what do you want?"

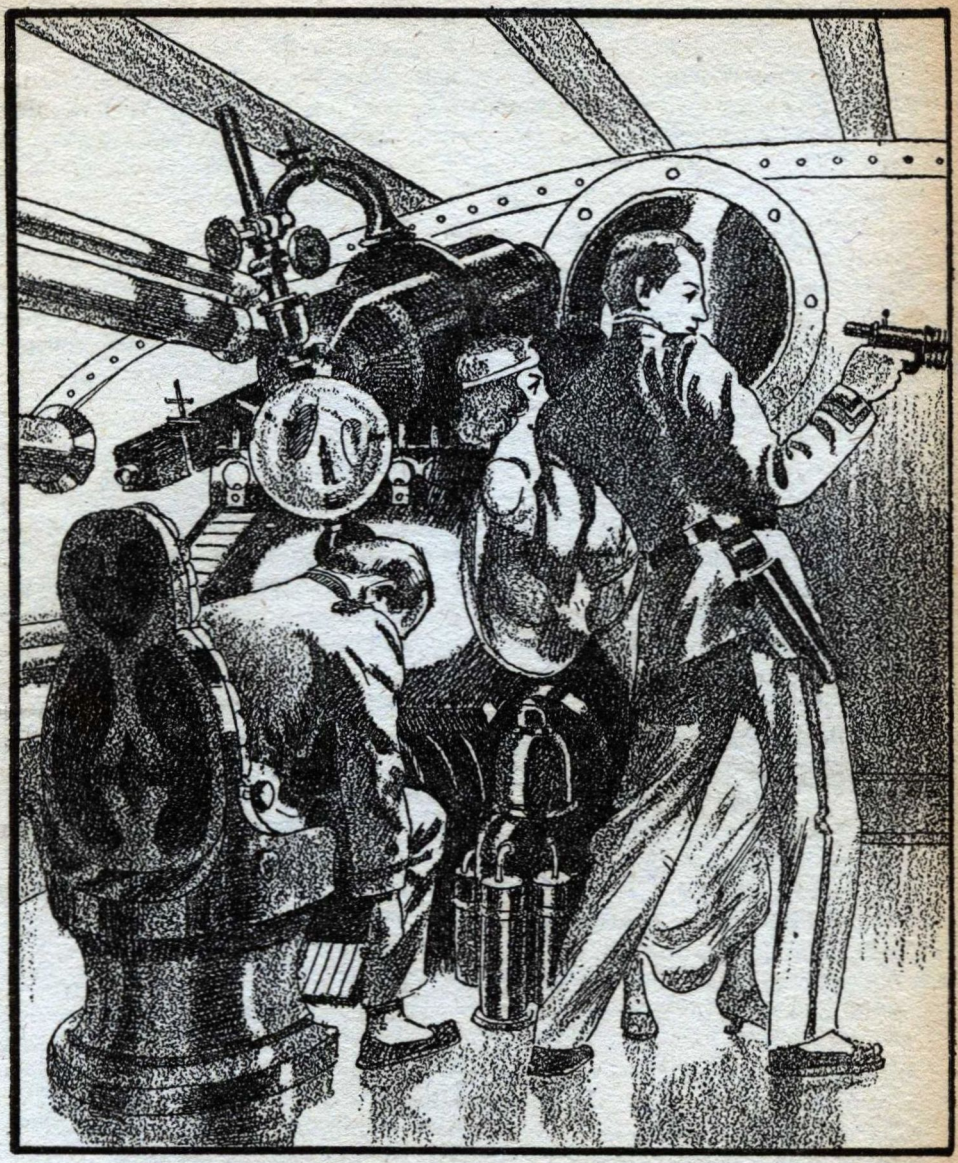
"I am Talone," the fellow said. "No murderer." He grinned sardonically up at us. "This is warfare, not murder. There is a distinction, even if little of difference. I come for President Velah."

"Well, you don't get him," I said. Behind me I was aware of the wounded old President coming forward, courageous despite his confusion and his pain. But I shoved him back.

"Keep him away from the window," I warned Roberoh. "Keep Normah over there."

"Oh, it is you, Halory," Talone was saying. "So you are yet alive? I speak with Captain Jaquero."

"Say what you wish and have done," the Captain shouted.



*The flash of my Banning gun died in a smother of sparks as the shadowy attacker ducked behind a metal bulkhead.*

"Thank you. I demand Velah. Do you think I would permit him to reach Great London and protest me at the Interplanetary League?"

THEY HAD smuggled the wounded Velah on board to save his life. But it was true also that if he appeared alive in Great London before the League, by treaty, all the Planetary Governments would send an armed Interplanetary Patrol to Venus—to take over the ministration of the Free State, guaranteeing Velah's government and his personal

safety. There could be no conquest by Talone, no crooked subsequent election of him later, as of course he planned.

"Well that's what we'll do," the Captain roared. "And jail you and your murderers."

"You jest with me, Captain," Talone retorted. "I have the ship. Your controls in the Turret—how can you shift the rocket jets when my men below are shifting them by the manual levers? Don't you see the heavens swinging already?"

I was aware of it. Over our stern Venus was slowly mounting; the great blazing black firmament was swinging.

"I offer you life," Talone was saying. "I can starve you there in the Turret. I can shut off your air-renewers——"

"That's a lie," I murmured to Roberoh. "We have pressure equalizers and emergency air renewers here in the Turret. The whole system independent of the rest of the ship."

"We'll drill any man who comes near us," the Captain roared. "Go back. We've had enough of your talk."

"Then I will just say I can navigate from below by disconnecting your controls," Talone retorted. "Already I have done that. We are returning to Ambelah. But I offer you life. If you toss out your weapons now, I will put you on an asteroid. Little kings to rule all you survey."

"By the Infernal—go back from the deck, you smidge," the Captain roared. "I will parley no more with a murderer."

Still grinning, Talone raised his white handkerchief with a derisive flaunting gesture and backed away. I barely saw his other hand go under his cloak. I had no time to shout a warning, or even to move. From beneath Talone's cloak, a flash spat through the fabric—the flash of an electronic spray gun. At our Turret window its lurid, blue-green bolt struck with a shower of sparks. Dimly I was aware of the Captain and Collins as they fell. I was close behind them. Not directly hit—but the aura of the bolt stunned me. All the world seemed bursting into a roaring glare of light which faded as I fell, with my senses whirling off into the soundless, black abyss of unconsciousness.

HOW LONG I was out I do not know. I recovered consciousness lying upon the Turret couch, with Normah bending over me. As I stirred, and my eyelids fluttered up, her fingers felt them.

"Oh," she murmured. "You're all right now?"

My head was roaring, but my strength came rapidly. President Velah was in a chair across the Turret. The white-faced Roberoh helped me to my feet. On the Turret floor-grid, Captain Jaquero and Collins lay with their clothes charred upon them. Both were dead.

"I bolted the bulls-eyes," Roberoh was saying. "No one has come to the deck. Oh, I am so glad you did not die."

He was grim with terror as he held the pallid Normah against him. In the chair his wounded old father seemed dazed. Roberoh was only a boy really; with me unconscious he had felt himself here alone, so that now with a rush of relief he clung to me.

The star-gazer's deck outside our bolted bulls-eyes was empty. Through the glassite plates of the enclosing dome I could see the black firmament. We were still in the cone of Venus' shadow. The great crescent of the planet lay now in advance of our bow. Talone had turned us, shifted the rocket jets so that with full drive and gravity added we were heading back.

The audiphone in the Turret buzzed. I jumped for it.

"This is Talone," the microphonic voice said. "Shall we talk again? Will you starve? Or shall I shut off your air?"

"You can't," I said. "We have emergencies here."

Talone knew that he could not risk an assault now upon the Turret. The aluminite walls and the bulls-eyes would resist his weapons. If we fired out of the ports, some of his attacking party undoubtedly would be killed.

But of what use for us to keep alive, imprisoned here until the *Wanderer* was racked at Ambelah? Talone's men would surround the ship and starve us out. Or, with the ship abandoned, blow us into Eternity.

He recognized my voice. "Oh—it is you, Halory? Are you yet alive? Will you stay there, or disarm and let me maroon you on an asteroid?"

I slammed the connection, and turned to Roberoh. The beginnings of a plan were in my mind, and as I told it to Roberoh, he listened with dropped jaw. It was so desperate a plan that Normah gasped,

"No—no, please!"

"You'll never get down there," Roberoh murmured. "They'll see you."

"Well I can try," I said. I grinned at him. But in truth I was as desperately tense as himself. "What else is there to do? If they—seize me——"

"Kill you," Normah corrected.

"All right—if they kill me, you'll be no worse off here."

As one of the ancient philosophers said, "Desperation doth make heroes of us all." I felt like that. When one is sure he is going to die it takes no courage to try and stay alive. Heaven knows, in all my eight years flying the starways, never had I had occasion to jump into Space from my vessel. But the occasion was here now.

THE EMERGENCY air-suits were hung in a closet of the chartroom. I drew one out—a double-shell of fabricoid, with the Erentz pressure equalizing current circulating between the inner and the outer layer. With Roberoh watching me—and Normah white and silent peering with her sightless eyes—I donned the suit. From feet to neck it encased me with its black baggy folds. The mechanism pack was a great lump on my back, with the goggled helmet hinged back behind my head. For weapons there was a hook with a length of wire hung at my belt, and a knife stuck there.

With gloved hand, I clapped Roberoh on the back. "Good luck to us." And I touched Normah's sleek, blonde head.

Neither of them answered. Roberoh moved the door-slide a little. For a second I stood peering at the deck. It was only a few feet from here to the incline opening leading below. With the feeling that a flash from some near-by shadow would end all my problems, I jumped the few feet and darted into the companionway. There was no flash. The descending spiral seemed empty. I passed the catwalk where Normah's cabin door stood open—went down another flight to the main corridor.

Still there was no encounter. A little further along I came upon a dead passenger; near the stern, the body of Mrs. Reynolds, the Matron, hung over a catwalk rail, her head grewsomely dangling with crimsoned slashed throat.

It seemed a ship of the dead; silent, with just the purring hum of the Erentz current. I went down another little flight, knife in hand, silent as a cat on my rubberized soles. I was in the lower part of the hull now. The door to the lower Control Room, where the rocket-jet controls were located, stood open. As I stood silently peering I could hear the murmur of voices—Talone and his men who were gathered in there.

I went down another half flight, into the dim little pressure chamber of the lower keel-fin. Triumph was within me

now. Nothing could stop me from my purpose. Talone and his men were roistering in the shifter-room, befuddled now by alcohol so that they had left the upper part of the vessel unguarded, secure in the belief that none of us would dare venture from the Turret.

The pressure chamber was almost wholly dark. The lower glassite trap was closed. I peered down through it at the vast starry abyss of the firmament. It took me no more than a minute to adjust my helmet and start the suit mechanisms. The suit bloated with air; my little pressure current hummed in my ears.

The pumps of the pressure chamber were at the side of the wall. In ten minutes, with the bulkhead door to the hull closed, I could have emptied the little chamber of its air. But Heaven knows I had no need to do that now. With the manual lever, cautiously, I opened the lower trap about an inch. The ship's air whined as it began going out—the interior pressure forcing it out into the vacuum of Space.

At the inch-wide slit I knelt, bracing myself against the downward rush of air. I sucked, whined, then howled as I slid the port a little farther. I was almost flattened now by the downward pressure. All the air in the ship—save only the hermetic, independent Turret—had egress here. The pressure of it had me almost pinned over the slit. I saw my danger, twisted and slid the big port wide.

THERE WAS a roar—a giant, tumbling torrent of wind, like water surging under pressure in a pipe—a cataclysm of outward rushing air. No doubt in every corner of the vessel the sucking draft and lowering pressure were at once apparent. And here at the open port it was a maelstrom. There was a second when I thought I would be hurled down against the casement of the port, my helmet to be smashed and make an end of me. Then I was blown down through the center of the opening—hurled outward, down into Space!

My first sensation was a nauseous feeling of falling. But in a moment it was gone. In soundless emptiness, I felt nothing—saw myself poised, the great, black dome of the firmament a vast enclosing shell, everywhere gem-strewn. But close over me—a hundred feet away perhaps—the hull of the *Wanderer* loomed sleek, shining with starlight. The torrent of air was pouring out of its lower port, but so instantly dissipating into the vacuum that already I was beyond its force. I had blown a hundred feet, still moving with small momentum. I saw the ship drifting away, and desperately threw from me the heavy magneto shoes designed to hold a man against the ship's outer skin. I still moved. But the gravity of the vessel was checking my velocity.

Within a minute I was poised. Then I began falling back, rising toward the ship. I had had a sidewise, diagonal thrust when the mass of the heavy boots left me. It balanced with the *Wanderer's* gravity pull so that my movement now was a curve—an elipse, with the vessel at one of its foci.

I was a tiny satellite—and the *Wanderer* my greater world. It was a dizzying experience, for slowly I was turning upon an axis of my own, so that all the firmament and the vessel seemed shifting. Within a minute I had swung up over the upper dome, where I could see the Turret and its upper little pressure port at the dome-peak. Then my orbit took me down the other side, and again under the hull. The port I had opened was a black rectangle, with the air still an outpouring maelstrom. And as I stared, a bloated figure like my own came hurtling out. It was Talone. Of all his roistering fellows, only he had had the knowledge and the presence of mind to seize an air-suit and don it.

Doubtless he had intended to cling within the ship, but had been blown out.

At all events he was here. He, too, broke the rush of velocity that would have carried him off into depths of space. Now he was another little satellite like myself. He was closer to the vessel, revolving slightly more swiftly, and with a more nearly circular orbit. I stared down at him as he swung past some twenty feet under me. And doubtless he stared up. Then he was gone ahead of me, while still I was only passing over the turret.

Within two rotations he had caught me again. It chanced that I was at the perihelion of my little orbit here. Talone was no more than ten feet from me. And suddenly I flung the heavy metal hook which was at my belt. It struck past his leg, and as I jerked the wire, the hook caught his ankle. My pulls on the wire hauled us together. I saw the naked knife blade gleaming with star-sheen as he clutched it in his gloved hand. But I had him at a disadvantage. He was coming at me feet first, floundering to twist himself around.

My knife flashed; ripped his bloated suit. It deflated as his air puffed out; and then, suffocating, with bursting lung tissues and blood-vessels, he died.

The *Wanderer* had only one satellite now—Talone and I, the dead and the living, our bodies merged as we rotated in our new, combined little orbit.

ALL THAT WAS five years ago. I have little to add to my brief narrative of that ill-starred Voyage 13. I was able to cast my hook, pull myself down to the dome, and like a fly crawl flattened to the Turret's upper pressure port. Roberoh had pumped out the air of the tiny upper chamber. I crawled in, closed the outer slide, and then he let in the air upon me.

It was indeed a ship of death. But in the turret, with emergency air renewers working, we remained for that day until the Interplanetary Patrol—seeking us after poor Green's helio call for help—came and rescued us.

Normah and I have been married for nearly five years now. Her father appeared before the League in protest at Talone's Government. But he did not desire to renew his Presidency; he was shattered in health. The Venus Free State had a fair election, with the Interplanetary League presiding, so that no duplicate of Talone could come into power.

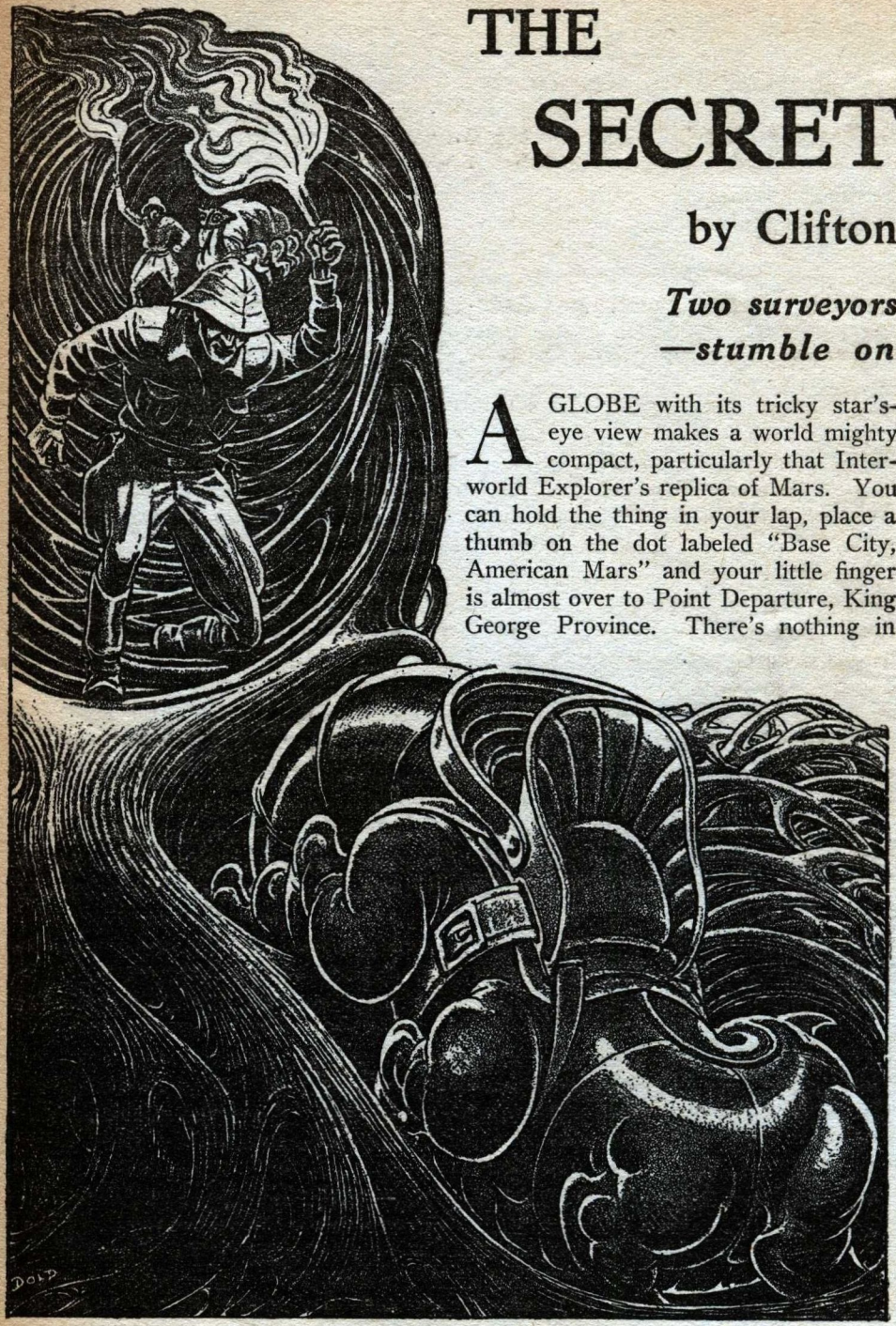
The Venus Free State is talking now of a union with the great Anglo-Saxon Alliance of Earth. Normah and I are interested in that, because in our own small way already we have accomplished it. Our little son seems to combine the best of both his parent worlds. We are very proud of him.

# THE SECRET

## by Clifton

### *Two surveyors —stumble on*

A GLOBE with its tricky star's-eye view makes a world mighty compact, particularly that Interworld Explorer's replica of Mars. You can hold the thing in your lap, place a thumb on the dot labeled "Base City, American Mars" and your little finger is almost over to Point Departure, King George Province. There's nothing in




***My lead buggaroo slipped suddenly, slid, and vanished nose-first into that tangle of canali-vines, headed for the ground half a mile below——***

# OF THE Canali

## B. Kruse

***mapping Mars' ancient secret—the Canali the Door through which the Martians fled.***

between but the usual crisscross *canali;* although the map publishers very conscientiously drew an imaginary boundary several hundred miles long, dividing the territory with mathematical equality between the holdings of Great Britain and the United States. It's a pretty sight—on the globe map!

Sidney Berkowitz caught my eye, and I thought the grin on his leatherish tan face meant that he felt the same as I about the commissioner's orders. Then we both turned back to face J. T. Severance, Commissioner-General of American Mars, and nodded solemnly. Sure we would go. Weren't we certified as civil engineers?

Commissioner-General J. T. Severance smiled with relief. "The English engineers are setting out from Point Departure in exactly twelve hours. Their routine will be identical with yours. You'll map the route along *Canali* 219, 408 and 17B, and somewhere along the latter you will meet. That's all there is to it. Except, of course, as you may record chance observations of unusual mineral outcroppings, oases and the like."

As simple as that to the officials. Or as Sidney Berkowitz phrased it, "The bigwigs of American Mars and King George Province are bending over backwards to fulfill every quiddity of the territorial treaty. Only we are elected to be the backs that do the bending."

"Us and the English boys from Point Departure," I added. "Now, come along and let's get out camping supplies and a flock of buggaroo!"

In a way the project ahead of us looked monotonously pleasant. It would take us at least thirty days of slow crawling across endless red plains, measuring and map making and so on, before we would meet the Englishmen and, according to plans, be picked up by a rocketeer somewhere along *Canali* 17B. The pay would be sufficient to bring us back to Earth where the air is thick enough to carry planes and there is such a thing as rain. Rain—that's the thing we miss down here on Mars, where a bathtub of water (if there was such a thing!) would be worth its weight in illumium.

Sidney stood for a minute scrutinizing the four buggaroo I had obtained. Two were already loaded with supplies, and an attendant was strapping on the sun-shaded seats of the others we were to ride. A buggaroo isn't much for looks, but it's a native of Martian deserts and can stand more heat and dryness than any other living thing. About eight feet long, and half as high, their grub-shaped bodies completely covered with chitonous plates, they creep over the hot sands on their dozen stumpy legs with the grace and speed of a caterpillar.

The sun was moving up and across the purplish sky, making the smooth

steppes south and east glisten with dry, shimmering heat. Each hoof rasped the soft, red-sand soil, and our canopied chairs rocked gently upon long, humpy backs. Behind us, Base City hovered in a deep valley, its half-hundred air-and-moisture-conditioned low buildings gleaming a scrubbed white in the steady sun glare.

For the first week we kept to the right bank of *Canali* 219—which in reality is a fifty-mile-wide depression filled with the waxy gorge-vine whose entangling stems, tough as metal, are so thickly massed that even a buggaroo unhampered with freight could sometimes spend a couple of days twisting and squirming from one bank to the other.

REALLY it's these infernal *canali* that worry the Martian explorer. The spiny leaves are so tough a man can scarcely tear one in two, and the maze of intertwining stems have transformed these great cuts into dark, mysterious labyrinths. Every now and then you can see a break in the foliage, which is rounded smooth, as if it were a tunnel-way boring its twisting, turning, course down and down into that river of grotesque vegetation. This is where the wild buggaroo, the shell-back rats and a thousand crawling insect-things live. When the polar thaws come, enough moisture seeps down along these ancient waterways to make the vines spring into renewed life. Then long, snakelike tendrils creep out over the desert. The foliage becomes a bright, waxy green, and you can hear the sibilant wail of millions of insect-things.

But no man goes prowling down into those cavelike hollows, even when they're brown and holding back to their choked-up rivers. The *canali* are deep and filled with uncountable halls and caverns. On foot you couldn't hope to find you way out again, even if the nippers didn't bore into your flesh before you died of thirst.

Naturally, at first I didn't particularly notice the way Sidney took pains to keep his mount well away from the bank. Maybe he was a little ashamed of his fear. I don't know. But anyhow it had to come out. Some place or other along the way we would have to cross over, and as our safari dragged along, I kept an eye for a chance narrowing of the gorge. It would, of course, depend upon what we should meet after reaching *Canali* 408 which we were supposed to follow. You see, we didn't know for sure what was before us. This was unexplored territory really. It had been photographed by rocket ships, to be sure, but since by necessity they had to fly so high in order to retain control against Martian gravity, the finer details could not be ascertained.

But I wasn't worried myself. Except for the insects, Mars is as peaceful a land as you could hope to find, and the eternally clear skies assured wonderful accuracies in our maps. The job was a cinch, I thought, and one night remarked as much to Sidney.

Right then I caught the first off-color slant of the expedition. The flare of the fire—made of old buggaroo bones and dead vines from the last thaw—was full on the young fellow's face. His eyes were rounded strangely so that he looked actually afraid.

"Jack," he said, "I sighted the junction in the telescope just before we made camp tonight. I—I meant to say something about it before. We've got to cross a gorge pretty soon in order to reach *Canali* 408."

"Well, what of it?" I turned my attention to slicing the canned vita-meat into our skillet. "Dry as it is, we can certainly make headway with torches and rope. We're hauling nearly a mile of trail rope along, you know."

Sidney nodded nervously and then started in to lay out our map. We al-

ways spent an hour or so finishing them by lamplight every night. However, his words, or rather the look on his face and the odd tilt to his voice, had started me to thinking. I didn't know much about this rather queer, close-mouthed chap except that he was a first-rate map man. Yet why should he shy this way at the *canali?* Sure, they were plenty dangerous; full of dens and sometimes alive with scaly, crawling, biting things. But they could be crossed. The leader would go ahead, dragging a rope behind him and holding a torch. The flames would sizzle some of the dry stuff and scare off the worst of the insects. When a big enough cavern down in the maze was located, the rest of camp would follow. Then the leader would strike out again, feeling his way down and around. Of course it was weird. The mass of metal-like vegetation shut out every vestige of light, and there was always a queer, musty stench. Too, when you stood still and listened, the sounds of thousands of scurrying claws would make the stiff, wiry stuff rasp and whistle as though a wind were tearing through the gorge. There were often sudden drops, and every foot of the way had to be tested, lest a heavy mass suddenly give way, plunging the venturer into a dark well filled with greedy vermin. Still, with reasonable precaution, Sidney and I with our four buggaroo ought to cross in one day.

WE COMPLETED our map work that night in silence. Sidney was nervous, and a couple of times got up to go make sure our four buggaroo were resting peacefully. I don't think my attitude was anything to ease him, and it was evident that he was ashamed of his fears. His lean, boyish face was set with a grim sort of determination, as though he was fighting some terrific battle inside his own mind. My impulse was to cheer him up—maybe make light of the ordeal of crossing a *canali* way out here in the unexplored wastes—and yet something held me back. Maybe I've been too long in the desolate places of the Solar System. In twenty years of engineering service for the Department of Interplanetary Colonization, I'd spent less than two years altogether on furloughs back to Earth. Sidney Berkowitz was still in his twenties, and the six months he'd spent on Mars was his only interplanetary experience save, of course, the necessary training period at the Moon Caves Station.

At any rate, we broke camp early the next morning and after a two hours' crawl came to a hump of a hill which afforded us clear telescopic views of hundreds of square miles of bleak sand-duned territory, darkened by great streaks of lesser *canali* branching out from the huge junction of 219 and 408. The thing to do was to chart a likely route which would carry us across to the bank of *Canali* 408 with the least amount of intervening vine-filled gorges.

Even Sidney couldn't overlook the impressive significance of the scene. Millions of years in the past, before the manlike intelligent Martians had been wiped out, this had been a magnificent center of rich, moisture-retaining valleys. As an engineer I thrilled at the sight. Both 219 and 408 were well over four miles in depth, representing a project of inconceivable vastness. Those old Martians had built for eternity, and it's always been a mystery what happened to them. Now, of course, the thick, choking wax-vines fill every square inch.

"At the juncture over there," I said, "who knows what lies at the bottom? Maybe the remains of an ancient city or——"

Sidney shrugged impatiently, turning away to scan the terrain to the north. His tone was succinct. "Over that way seems the best. Only three gorges, fairly narrow ones too."

I agreed with his choice. We could reach the first by midday. Night should

find us camping on a narrow island of sand between the first and second gorges. Within two days we should be safely along our way, plodding the desert beside magnificent, seventy-five-mile-wide 408.

Sidney, tight-lipped, grimly efficient, was frankly relieved when I insisted on breaking trail through the first gorge. Nevertheless I could sense that he was afraid—not the abject fear of a coward, but rather the dread of one who knowingly faces a horror which sometime in the past had made its ugly mark upon his memory.

We wound down, twisting and squirming, and with the imprisoning sea of leathery, rope-stemmed plants fairly singing in our ears from the startled protests of the insects. A half mile down and the cavernous breaks in the vegetation became pitch dark. The air was foul with the pollution of bony, pincer-bearing things that somehow managed to thrive in such a dismal world. The flickering torch scattered eerie shadows and was reflected by innumerable watchful eyes. At intervals, Sidney would follow the rope I dragged after me, his own torch swinging overhead as the ungainly buggaroo seemed to glide in and around and down, like giant worms threading through a magnificent network of underground tunnels.

We never touched ground, even at the bottom of these smaller *canali*. The crazy growths were too thick for that. It was like treading upon a constantly undulating matting, and frequently a lurching buggaroo would send one of us sprawling into a snaky network of vines.

IT WAS DARK when we reached the desert between the first two of the lesser *canali*. Sidney made camp with more than his usual energy. Once I even fancied there was a grin of triumph on his thin, tight lips, and the sight gave me hope for the young fellow. I decided I had found out his secret fear. He might have had a narrow escape in one of these mazes near Base City soon after his coming to Mars. The terror of that experience probably gave him the willies when thinking about having to cross a gorge. That seemed the rational explanation. However, now that we had negotiated one without the slightest hitch, he had doubtless got back his nerve.

I was dead wrong in this, as I was shortly to find out. I should have spoken my mind to Sidney, let him know that I liked his work and so on until I had won his confidence. It isn't that I'm hard, but on the other hand, twelve years of nosing into strange, lonely, grewsome lands has made me forget to crack that shell which such a life just naturally wraps around a man.

The second *canali* was far wider—and perhaps much deeper—than the first. It was a scant eighteen or twenty miles from bank to bank across the tops of the spinous leaves which made it look like a mighty, though motionless, greenish-brown river.

"My guess is that we can do it in eighteen hours," I called to Sidney just before nosing my sluggish buggaroo into what I hoped was a likely hole.

"Be careful, Jack," he yelled back, and there was a queer ring to his voice.

At that moment my slinking buggaroo took a nose drop for half the length of her body, nearly pitching me into another yawning hole, so that it was all I could do to pay out the trail rope and keep my torch upright. We kept dropping at close intervals, too—a point I didn't like, because it suggested that this *canali* might be of more than average depth. For this reason, I cut down my lead so that if anything should happen, Sidney would be near enough to effect a rescue before the nippers could get to me. Even a sure-footed buggaroo might plunge through the insecure matting and down a precipice. Of course, the forest of rope-stems would break our fall, but

the loss of a torch could easily prove fatal.

The noise of insects seemed unduly loud. Several times, when he had caught up with me, Sidney remarked on this. However, I assured him that it was due to the unusual depth of the gorge.

"But suppose the opposite bank is as steep as this?" Sidney questioned once. "The buggaroo might not be able to scale back up."

"In that case we'd just have to work our way along, letting the lead buggaroo nose out a trail. Eventually she'd find some sort of tunnel that the wild of her kind had made."

"But we couldn't camp down here!" Sidney exclaimed.

I didn't answer that one. I might have told him of the time a party of us had spent four days and nights feeling our way out of one of the big *canali*. It wasn't a pleasant story. Life down here is good for as long as the torches hold out. The nippers can see in the dark. You can't. They're afraid of fire, but when the fire is gone the billion insect jaws are clamoring for moist, human flesh.

Twelve hours had gone by when we reached a level which seemed to indicate that we had touched the bed of the ancient waterway. I was beginning to feel a keener sympathy for poor Sidney's fears by this time. The worst half of the crossing was still ahead of us, and even if we didn't run up against an insurmountable precipice, there was only a slim chance of getting out again without having to give the buggaroo a rest. The weird beasts had had a hard time of it. We had scrambled down well over a mile—maybe two—and the climb ahead of us would tax their strength to the breaking point.

WE HAD COME into a sort of clearing like a vast cathedral with a matted ceiling a hundred feet overhead. All about us the smooth, hard vines, some of them a dozen feet in thickness so near the nourishing ground, rose in gigantic arcs to support the incredible mass high overhead. This far down, where never the slightest shaft of sunlight had ever penetrated, the choking stuff was as pale as opal and so polished with its waxy excrescence that the reflection from the torches was almost dazzling.

I watched Sidney's face closely when I suggested we had better give the buggaroo a few hours' rest. He merely nodded gravely.

"What do you think is ahead of us?" he asked.

"That's why I'm calling a halt, Sidney. Oh, we'll find a trail all right. Only it's better not to force the beasts."

"I understand, Jack," he said and began immediately to adjust the packs on our two freight carriers so that the buggaroo could flatten out on their smooth undersides.

It was weird the way the insect sounds clamored from the darkness beyond this cavernous hold. It was Sidney and me they smelled, not the buggaroo with their armor-plated hulks. I didn't blame the young fellow for standing there clenching his torch, and eyeing the splendid madness of great steel-strong vines which are like nothing which ever could grow upon faraway Earth.

Suddenly a queer gasping cry from Sidney caused me to jump. He was pointing to something over near the wall of vines.

"It's a machine," he shouted. "Jack, look! I see a wheel."

My first thought was that Sidney had started to crack under the strain. And then I stared close and began to fear for my own sanity. We crossed together, keeping our torches swinging defensively.

It was not a wheel, and yet the sight of that disk-shaped, translucent stone was nearly as shocking. Sidney instantly recognized the material as being

a specimen of that marvelous, glass-clear steel which has been frequently found among the few ruins of the ancient Martian civilization thus far discovered by man. About the edges of the disk were the faint remnants of what must have been corrugations.

"It is work of the ancient Martians," Sidney mumbled excitedly. "Wonderfully preserved and——"

"What of it?" I interruped sharply. "We're not so many miles from the junction of two main *canali*. Isn't it logical that somewhere hereabout there was once a vast city? Sidney, you've got to steady your nerves. This isn't anything to get excited about."

"I know," he agreed hastily. "But just the same I—well, listen, Jack. You think I'm yellow! You think these confounded mazes get my goat, don't you?"

"You don't need to yell at me," I answered. "You're all right, fellow. I've been through this sort of thing before. I know how it gets under your skin—the darkness and lurking nippers and all. But I——"

"No, I don't mean that!" Sidney cried out. "Jack, I tell you it's—it's something else. I didn't intend telling you. But now—well, I've got the feeling something's going to happen. No, wait! It isn't nerves. I know what I'm talking about. There's something down here besides rotting ruins and insect hordes. I know!"

"Sidney"—I put an arm about his shoulders and tried to make my voice soothing—"it's time we should be on our way. You won't find any surviving tag-ends of the old Martians down here—or anywhere else. Think about it calmly. Those scientist chaps have dug into fourteen cities, haven't they? And every last one of them was buried under layers of rock which has been figured out as being more than a million years old. Whatever it was that destroyed the Martians did so completely, and in the seventy years of mankind's conquest of the planet, there's never been a live thing encountered save buggaroo, shell-back rats, canali-vine and insects."

SIDNEY smiled weakly and nodded his head, but the look in his eyes disturbed me. He was afraid now—really afraid. That wheel-shaped thing had undone all the strengthening effect our trip had accomplished, and I fancy my words were not good to hear. Sidney probably thought I was angry with him. This was exactly what I wanted him to think, for the truth of it was, his queer antics had begun to work on my own nerves. There was nothing to be afraid of except the insect-things, I told myself, and yet I kept looking first here and there as if expecting a million-year-old Martian to pop into view.

So I drove the lead buggaroo on, paying out the trailing rope a full quarter mile beyond the cavern and, as near as I could calculate, straight across the vine-infested gorge. It was there somewhere near the middle of the cut that I ran into the smooth wall of granite.

How high it was I had no way of determining at once, since it was possible to see only ten or twelve feet above my head. The breaks in the vegetation to either left or right were not particularly promising. Even the buggaroo, swinging her tiny head this way and that, seemed unable to pick out a suitable passage, so I let Sidney have the signal to trail me on up.

While waiting for him and the two pack buggaroo, I went up to the wall in order to examine it closely. It was built of tightly fitted blocks of perfectly squared stone.

Obviously we had stumbled upon some ancient Martian structure in an unusual state of preservation. At the time, my chief interest was centered upon the best way to get beyond it.

But if I'd expected Sidney to carry on again upon finding the wall I was

mistaken. To be sure he eyed it narrowly, but he kept his mouth closed. I could see that he was still bitter at me for refusing to encourage whatever fancies were torturing him. Very well, he'd have to get over it! Once we were back no the desert trail there would be ample time to become friends again. So I headed my buggaroo to the left, urging him to plow through, although there was scarcely a break in the huge trunks with their webs of smaller vines.

The going was unusually slow because, if possible, the entanglement became increasingly confusing. The beast, for some unaccountable reason, was beginning to balk and protested my prods. We were following the wall as nearly as we could. I had decided that if this was an ancient building we could probably break through into what might have served as a street or public square. Perhaps I had been keeping too close a watch on the wall. Anyway, when the tumble came, I was caught completely off guard.

The buggaroo twisted, floundered and squirmed like a worm trying to regain her footing. The matting of vine-remains which covered the ground had suddenly given way. We were rolling down a sharp incline, the helpless buggaroo far ahead of me.

When I had scrambled to my feet—fortunately still clutching the precious torch—I saw that the fall had pitched us into a long, narrow cave. But a new horror beset me.

The walls and floor of this place were of solid blocks of granite! The maze of canali-vine was visible through the hole above. A dank, musty odor pervaded the wretched blackness, and to my perplexity the perspiration which formed on my face did not instantly evaporate—an almost unheard of phenomenon on arid Mars!

Sidney reached the aperture within minutes, for I had advanced scarcely a hundred feet. His face in the glow of the torches was dead white, and his eyes rolled as he stared up and down the fearful, dark tunnelway.

"I'm all right," I told him. "But how are we going to get this buggaroo back up? That slope's nearly perpendicular."

SIDNEY SHOOK his head in despair. "Jack, what is this? We're inside an ancient Martian structure."

"You've answered your question, but not mine," I grumbled. "But listen, young felllow, you got me wrong back there."

"I understand, Jack," he answered humbly. "You said I was scared out of my wits. Well, I am."

"There's nothing unnatural about this, Sidney. If we were a pair of archeologists instead of government map makers——"

"Jack," he interrupted hurriedly. "I see a light! Far down the tunnel. It isn't a reflection of our torches either. See?"

"It's a likely way out," I suggested hurriedly. "There may be a break in the vines and what we see is sunlight."

"No," Sidney's voice rasped. "It's *the eternal flame*—you know, the inscriptions on the ruins all refer to it! I tell you, Jack, the ancient Martians didn't die!"

"What do you think you're talking about, fellow? Sure, the Martians are dead. They've been dead for over a million years."

"I don't mean their civilization on this planet. Listen, Jack. I've studied the archeological reports of the ruined Martian cities ever since I was old enough to read. We can't interpret the carvings, but all the scientists are agreed that the Martians worshipped fire—not ordinary fire and not the Sun either."

"I know those stories, Sidney. It's still a mystery. But you can lay your bets that no matter what they believed, they sure aren't around any more. I admit that the facts all point to their

checking out at some pretty definite time. But nobody knows why or how. So don't be——"

"I'm not mad. I've studied those inscriptions myself, Jack. And another thing—you've got to admit the Martians a million years ago were further advanced in engineering than Earthman is today, with the single exception of rocketry. A million years ago they achieved something—something that had to do with that sign which stands for the eternal flame. Put all the facts together. There had to be a reason for the simultaneous exodus of every intelligent being on the globe. It wasn't because Mars was dead. We know that. Today the planet is supporting over ten thousand Earth immigrants and could easily support ten times that number."

I tried to get him to forget his fantastic dreaming. Patiently, and with what information I possessed, I pointed out that the facts proved the ancient race did not survive. Those inscriptions, admittedly but half deciphered, were undoubtedly but a part of their religious faith despite the prevalence of what was presumed to be mathematical symbols.

"Look at the *canali*," I urged. "They're choked up and barren of intelligent life. We ought to know about that ourselves, Sidney—inscriptions or no inscriptions. It's this loneliness of the wastelands and the poisonous air of the *canali* that have got into your blood. Now pull yourself together and let's get this poor buggaroo back up out of this hole."

I had it in mind to move along the gorge toward that distant point of light, but certainly not through this narrow, dank tunnelway. If it really was a break in the vines permitting sunlight this far down, then we could find it. Suddenly I realized that the Sun wouldn't be shining at this hour. It must be night up there on the surface. Nevertheless, I didn't let out a word to Sidney. For a full hour we worked, shoving and pulling on the lead buggaroo and finally got him out of the hole. The two pack beasts and Sidney's mount were waiting patiently, their bodies crawling with the insect-things searching for a chance break in the armor-plate hides. My torch scattered them quickly, and I turned to call back down to Sidney to catch the rope and scramble on up.

A KIND of cold, unbelieving horror gripped me. I was scared as I had never been before. The hole was no longer visible. The incline had somehow sprung back into place, and no amount of stamping could affect it. I tried calling down through the matting of dead vine bits. Sidney either did not answer or else he could not.

I worked frantically, forcing the buggaroo to nose into the matting. We worked a hole nearly three feet in depth before coming to a smooth plate of transparent steel.

Never had the depths of the *canali* seemed so malignant. Their black and deathly gloom taunted me. I felt sick for the young fellow trapped down in that hideous tunnel. I'm not superstitious, and yet I kept thinking of the fatal look of his eyes, of the fear which had clamped down on him all along this trip. What, really, did young Sidney Berkowitz think he knew about the ancient, long-dead Martians which even our finest scientists hadn't been able to find out?

I berated myself plenty, though mainly to keep up my courage. It was not that I was fearful for myself. I've been in worse spots than the bottom of an unexplored Martian *canali* before this. But Sidney Berkowitz wasn't much more than a boy. Until now I hadn't known just how much he had come to mean to me.

After three, or perhaps four, hours I gave up trying either to burrow down to him or get some sort of signal through

that buried plate of nearly transparent steel. I reasoned that Sidney should have been able to see my torch through that spot I had cleared of vine rubbish. Yet the plate remained dark and soundless. To me this now meant one thing. The ancient trap had in some way killed Sidney and dashed out his torch the second it swung back up into place.

There was nothing to do but go on. I was dead tired, but the buggaroo seemed sufficiently rested. I roped Sidney's mount and the pack beasts in line and led off. The ceaseless chorus of scampering insect-things seemed to mock me.

Far overhead it was daylight again, though of course I could not see it. Before me rose the smooth and slightly curved walls of a great building. As nearly as I could figure, I knew this must be approximately the location of that curious light we had sighted down there in the tunnel. How far up did this towerlike wall extend? Surely it was high enough to catch the rays of the Sun, or one of the tiny Martian moons, otherwise there was no logical explanation for that light. Maybe Sidney's alive, I thought. At any rate I couldn't go on until I had found him either dead or alive.

That day I labored as I had never labored before. The buggaroo snorted and moaned as I drove them up and around, taking foolhardly chances on insecure footholds. Yet I never lost my bearings with regard to the incredible tower. Somewhere I'd find a break in the wall. There had to be one, I reasoned, for it was, of necessity, over a million years old.

Then the buggaroo broke through into the open. Above me shown the velvet-black and star-studded sky. Both moons were shining, illumining the vast sprawl of vine-choked *canali* with eerie light and fearsome shadows. The desert sands were beyond unaided vision; thus I realized I had come along the gorge to the very junction of the two main *canali*. The thought was staggering, for normally I would declare that such a clambering could never be made through so many miles of gorge-vine.

Yet I had accomplished the fear-inspired venture, even to making an unbelievable spiral climb from gorge bed to surface at the very junction of two *canali*. I think I laughed a bit madly. Surely the sight of open sky was enough to unsteady any man. But what about Sidney Berkowitz? What about that ancient tower?

The dome of transparent steel, half concealed by vine rubbish, was fully five hundred feet in diameter. It was like a huge telescopic eye pointing skyward. While the worn buggaroo slumped upon their undersides, I moved about the queer circle, swinging my torch and prodding with my boots as if to make sure this was real and not a dream.

I THINK I must have slept. Probably sheer exhaustion overcame me. At any rate, I remember awakening and finding myself sprawled upon one of the packs which was still strapped to one of the buggaroo. Also my torch was still flaming, although the ruddy Sun was already shining down in the eternally cloudless sky.

No slightest break was evident in the great convex eye like a wonderful island of metal in an endless sea of treacherous vine. The supporting walls, a dozen feet in thickness, had been perfectly formed, though doubtless protected by the magnificent sea of vines. I marveled at the wonderful architectural achievement which clearly surpassed any remains heretofore located.

But what should I do? If Sidney Berkowitz were still alive it would be criminal to go off and leave him in that million-year-old dungeon. Be hanged to the governments, I concluded. I'll stay here until I find the boy if Mars is never to be officially mapped! Nevertheless,

it was not pleasant to think of going back down three—or more likely four—miles to the bottom of that gorge again. Yet there seemed no other course, since the top of the strange shaft was impervious to any tool I carried. So I eyed the patient buggaroo compassionately and nerved myself for the ordeal.

"We're going back down, my fine, armor-plated slugs," I said aloud. "Up—up now!"

Then I stopped dead still. It was Sidney's voice ringing in my ears. No, it wasn't his voice exactly, for the sound of it seemed to come from within my own head.

"Jack! Where are you, Jack?" he seemed to be calling.

I was trembling with something worse than fright, and staring wildly this way and that. Once I opened my mouth to call out, but not a sound could I force through my throat.

"Don't wait for me, Jack. I know what I'm doing. I've discovered the secret of the eternal flame. The ancient Martians did not die!"

I did yell then! The startled buggaroo eyed me in dumb perplexity, for I was shouting up to the sky and out across the maddening rivers of gorge-vine. Surely I was mad. That was no voice I heard! And yet it was Sidney calling out to me. I knew, and yet I couldn't possibly explain how I knew.

"The ancient Martians conquered more than a dying planet. The secret of the eternal flame is here in this tower. That's why the archeologists were never able to grasp the meaning of the inscriptions. To the Martians it was not a religion; it was pure mathematics."

Sidney's thoughts hammering through my own brain like a man's low, yet excitedly quickened, voice talking to himself! Or was I cracking under the strain? The dread *canali* bred a kind of madness in one, it is often whispered, though I had always scorned the many mysteries men have assigned to these monuments of the Solar System's greatest engineers.

"Sidney!" I called out. "If you can hear my voice, then answer me. Sidney, do you hear me?"

But only the stupid buggaroo were disturbed by the beseeching cry of my voice.

"Jack!" That unreal voice of Sidney's rang through my head again. "You must hear me. I've discovered the secret of the living flame. Listen to me, Jack, wherever you are, for I have faith that for yet a while I can contact your mind. The Martians were wiser than men—far more advanced in science. Remember that, Jack. They sought to live, to achieve the ultimate meaning of life, not the limited existence of a not-yet-dead, but dying planet. They did that, Jack—and they live on in a better world than Mars, a better world than Earth. That's how the race disappeared—through the doorway of the Flame! It crosses to another world—another Universe! It's pulling now, pulling me—— I—cities——"

The voice faded to nothing. I stood there rubbing my head as though a terrific vibration had pounded every cell of my brain. The Sun was directly overhead now. Its shining rays fell straight down upon the wondrous dome.

I fell back in awe before the ethereal flame which seemed to leap up from the huge eyepiece. There was something like a body there. I looked closely. With arms outstretched and his face smiling with a burning eagerness was Sidney. Only an instant I saw him and then he vanished. I don't know whether he vanished away in infinite distance, or in infinite smallness. His image dwindled and was gone. Either might have given that effect. Something "pinged" softly. Then only the scutter of the vine insects remained.

A MONTH later I met the English engineers along *Canali* 17B. They were nice fellows and it was glorious to see a human being again.

"But your companion," they asked, "what happened?"

"The *canali*," I answered quietly. "Lost while crossing two weeks out of Base City."

"Oh!" They were properly sympathetic. Then one of them added. "You know, friend, there's something confoundedly mysterious about those silly ditches. Awful lot of superstition cropping up, too, since these scientists have got so vociferous about the queer inscriptions they find on the ruins. Somewhere I heard or read something about these old Martian chaps outwitting nature, you know. Devilish things, these *canali*."

"There's a lot," I agreed, "those old Martians knew that mankind doesn't, that's true."

## BEYOND THAT LIMIT——?

THE great 200-inch telescope will, when completed, reveal no new facts concerning the planets, or the Moon. It cannot be used to observe the Sun; exposure to that heat would ruin it. That is not the field of that instrument.

BUT today, out at the ultimate limit, where the greatest attainable power of the largest now-existant telescope, and the ultimate sensitivity of photographic plates is fading and blurred, there is a new effect building up. A new ratio that dwindles our Galaxy to tiny proportions.

THE clear, crystalline sky of a winter night sparkles with an overwhelming number of stars. Yet in fact, that number is only some 3600, all that the human eye can see unaided. As a telescope of more and more power is used, the number of suns visible rises more and more swiftly, for we penetrate greater and greater volumes of space.

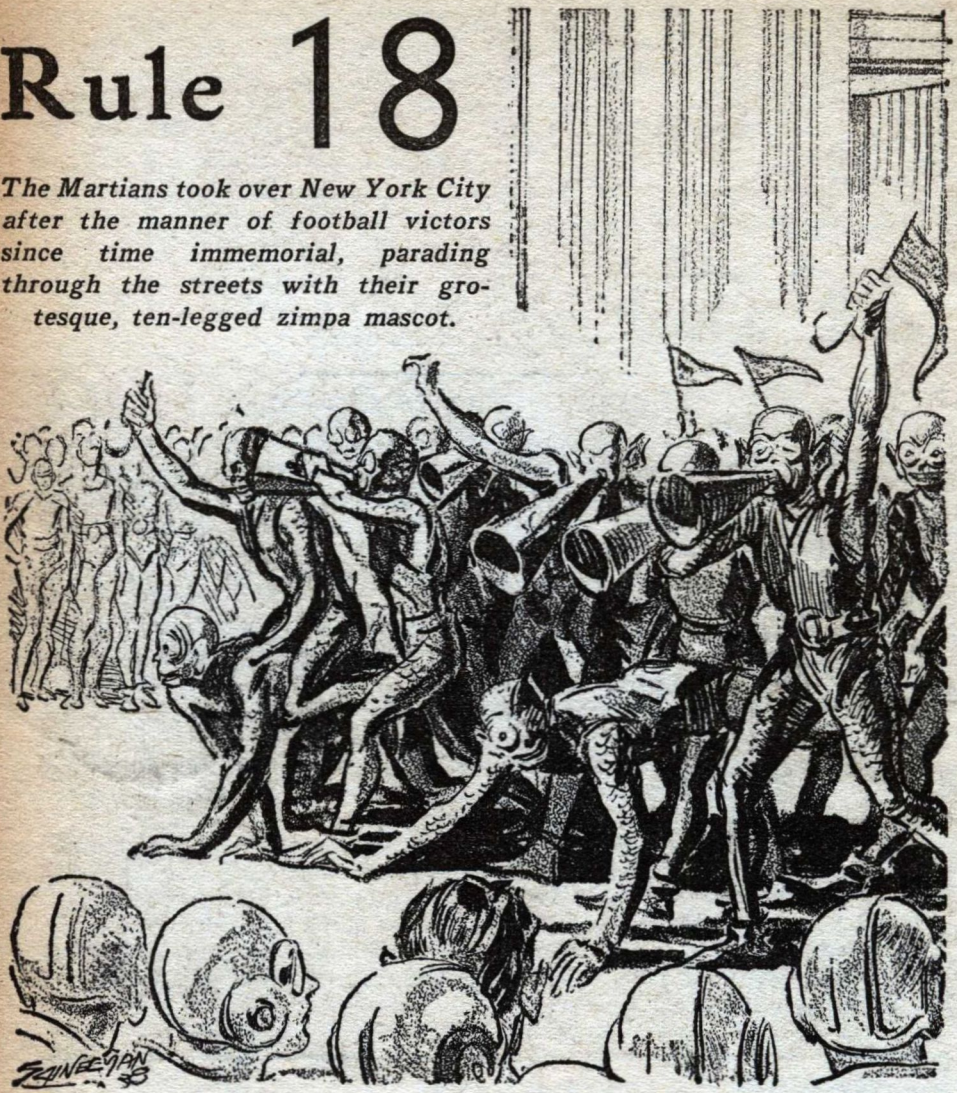
BUT there is a limit. When our line of vision is long enough to include the whole galaxy, the number no longer increases so swiftly. But then, some thousand thousand thousand individual suns are visible!

AND on those hyper-sensitive plates that catch those distant suns, other things appear. Globular clusters of thousands of suns in our Galaxy. And globular clusters of titanic galaxies, spinning round each other in a mighty system where 500 or 1000 whole universes form a single tiny dot at the far, faint edge of visibility. Out there, where definition fades away in blurr, the number of galaxies is mounting at an ever-accelerating ratio. Already, at the edge of vision *galaxies outnumber the individual suns of our Galaxy.*

BEYOND that limit, beyond the vision of the 100-inch——?

# Rule 18

*The Martians took over New York City after the manner of football victors since time immemorial, parading through the streets with their grotesque, ten-legged zimpa mascot.*



## *A rule defeated Earth teams in the annual Earth-Mars football game—till a coach pulled the prize bright trick of—quite literally—all time!*

*Rule XVIII——Each player on the respective teams must be able to present documentary evidence that he is of pure blood of the planet upon whose team he plays for an unbroken span of at least ten generations. Verification of the aforesaid documentary evidence and approval of the players upon this point shall be the duty of the Interplanetary Athletic Control Board.——From the eligibility section of the Official Rule Book for the Annual Terrestrial-Martian Football Game.*

*Year 2479*

*A Novelette by*

# CLIFFORD D. SIMAK

THE MIGHTY bowl resounded to the throaty war cry of the Druzecs, ancient tribe of the Martian Drylands. The cry seemed to blast the very dome of the sky. The purple and red of the Martian stands heaved tumultuously as the Martian visitors waved their arms and screamed their victory. The score was 19—0. For the sixty-seventh consecutive year the Martians had defeated the Earth team. And for the forty-second consecutive year the Terrestrial team had failed to score even a single point.

There had been a time when an Earth eleven occasionally did defeat the Red Warriors. But that had been years ago. It was something that oldsters, mum-

bling in their beards, told about as if it were a legendary tale from the ancient past. Evil days had fallen upon the Gold and Green squads.

And again this year the pick of the entire Earth, the Terrestrial crack football machine, had been trampled underfoot by the smashing forward wall of Martians, slashed to bits by the ferocious attack of the Red Planet backfield.

Not that the Earth had not tried. Every team member had fought a heart-rending game, had put forth every ounce of strength, every shred of football sense, every last trickle of stout courage. Not that the Earth team was not good. It was good. It was the pick of the entire world, an All-Terrestrial eleven, selected on its merits of the preceding year and trained for an entire year under the mentorship of August Snelling, one of the canniest coaches the game had ever known. It was neither of these. It was just that the Martian team was better.

Bands blared. The two teams were trailed off the field. The Martian victory cry continued to rend the skies, rolling in wave after successive wave from leathern throats.

The Earth stands were emptied quietly, but the Martians remained, trumpeting their prowess. When the Martians did leave the amphitheatre, they took over the city of New York after the manner of football crowds since time immemorial. They paraded their mascot, the grotesque, ten-legged *zimpa,* through the streets. Some of them got drunk on Martian *bocca,* a potent liquor banned by law from sale on Earth, but always available in hundreds of speakeasies throughout the city. There were a few clashes between Martian and Earth delegations and some of the Martians were jailed. New York would be a bedlam until the Martian Special, huge space liner chartered for the game, roared out of its cradle at midnight for the return run to Mars.

IN THE editorial rooms of the *Evening Rocket* Hap Folsworth, sports-writer extraordinary, explained it in a blur of submerged rage and admitted futility.

"They just don't grow them big enough or strong enough on Earth anymore," he declared. "We are living too damn easy. We're getting soft. Each generation is just a bit softer than the last. There's no more hard work to be done. Machines do things for us. Machines mine ores, raise crops, manufacture everything from rocket ships to safety pins. All we got to do is push levers and punch buttons. A hell of a lot of muscle you can develop punching a button.

"Where did they get the famous players of the past? Of a couple, three hundred years ago, or of a thousand years ago, if you like?" Hap blared. "I'll tell you where they got them! They got them out of mines and lumber camps and off the farms—places where you had to have guts and brawn to make a living.

"But we got smart. We fixed it so nobody has to work anymore. There are husky Earth lads, lots of them—in Martian mining camps and in Venus lumber camps and out on the Ganymede engineering projects. But every damn one of them has got Martian or Venusian blood in his veins. And Rule Eighteen says you got to be lily-pure for ten generations. If you ask me, that's a hell of a rule."

Hap looked around to see how his audience was taking his talk. All of them seemed to be in agreement and he went on. What he was saying wasn't new. It had been said thousands of times by thousands of sports-writers in thousands of different ways, but Hap recited it after each game. He enjoyed doing it. He chewed off the end of a Venus-weed cigar and went on.

"The Martians aren't soft. Their planet is too old and exhausted and na-

ture-ornery for them to be soft. They got brawn and guts and their coaches somehow manage to pound some football sense into their thick heads. Why, football is just their meat—even if we did teach them the game."

He lit his cigar and puffed contentedly.

"Say," he asked as the others stood in respectful silence, "has anyone seen Russell today?"

They shook their heads.

The sports-writer considered the answer and then said, without emotion, "When he does show up, I'm going to boot him right smack-dab into the stratosphere. I sent him out two days ago to get an interview with Coach Snelling and he hasn't showed up yet."

"He'll probably be around next week," suggested a copy boy. "He's probably just sleeping one off somewhere."

"Sure, I know," mourned Hap, "and when he does come in, he'll drag in a story so big the chief will kiss him for remembering us."

COACH August Snelling delivered his annual after-the-Martian-game oration to his team.

"When you went out on the field today," he told them. "I praised you and pleaded with you to get out there and do some of the things I taught you to do. And what did you do? You went out there and you laid down on me. You laid down on the Earth. You laid down on five hundred thousand people in the stands who paid good hard cash to see a football game. You let those big dumbbells push you all over the lot. You had a dozen good plays, everyone of them good for ground. And did you use them? You did not!

"You're a bunch of lollipops. A good punch in the ribs and you roll over and bark. Maybe there'll be some of you on the team next year and maybe there won't. But if there are, I want you to remember that when we go up to Mars I intend to bring back that trophy if I have to steal it. And if I don't, I'll stop the ship midway and dump you all out. And then jump out myself."

But this didn't mean much. For Coach Snelling, ace of the Earth coaches, had said the same thing, in substance, to Earth teams after each Martian game for the last twenty years.

TANTALIZING shadows, queer, alien shadows flitted in the ground glass of the outré machine. Alexis Androvitch held his breath and watched. The shadows took form, then faded, but they had held tangible shape long enough for Alexis to glimpse what he wished to see, a glimpse that filled him with a supreme sense of triumph.

The first step was completed. The second would be harder, but now that the first was accomplished—now that he really had some proof of his theories—progress would be faster.

Alexis snapped off the machine and stepped to a bowl. There he washed his hands. Shrugging into a coat, he opened the door and trudged up the steps to the street above.

On the avenue he was greeted by the raucous cries of the auto-newsstands, "Earth loses 19—0. . . Read all about it. . . Extra. . . Extra. . ." repeating over and over the words recorded on the sound film within them.

Customers placed coins in the slot, shoved a lever, and out came a paper with huge purple headlines and natural-color photo reproductions of the game.

The vari-colored neon street lamps flicked on. Smoothly operating street machines slid swiftly down the broad, glassy pavement. Overhead purred the air-lane traffic.

From somewhere came the muffled sound of the Drylands war cry as the Martians continued their celebration of victory.

Alexis Androvitch walked on, unmindful of the war cries, of the blaring

newsstands. He was not interested in athletics. He was on his way to a garden to enjoy a glass of beer and a plate of cheese.

RUSH CULVER, Wisconsin '45, was struggling with calculus. Exams stared him in the face and Rush freely admitted that he was a fool for having chosen math instead of zoölogy. Somehow or other he wasn't so bright at figures.

It was late. The other fellows in the house were asleep hours ago. A white moon painted the windows of the house opposite in delicate silver squares and rectangles. A night wind sighed softly in the elms outside. A car raced up State Street and the old clock in the music hall tower tolled out the hour with steady beat of bell.

Rush mopped his brow and dug deeper into his book.

He failed to hear the door of his room open softly and close again. He did not turn about until he heard the scuff of feet on the floor.

A tall stranger stood in the room.

Rush looked at him with something of disgust. He was dressed in purple shorts and a semi-metallic shirt that flashed and glinted in the soft rays of the desk lamp. His feet were shod in sandals. His head was verging on the bald and his face was pale, almost as if he had resorted to face powder.

"Just home from a masquerade?" asked Rush.

The stranger did not answer at once, but stood silently, looking at the student.

When he did speak, his voice was soft and slurred and his English carried an accent Rush could not place.

"You will pardon the intrusion," the stranger said. "I did not wish to disturb you. I merely wanted to know if you are Rush Culver, fullback for the Wisconsin football team."

"I have a good mind to lay one on you," said Rush with feeling. "Almost three o'clock in the morning and me wrestling with math. Want to know if I'm Rush Culver. Want my autograph, maybe?"

The stranger smiled. "I hardly understand," he said. "I know nothing of autographs. But you are having trouble. Maybe I can help."

"If you can, brother," declared Rush, "I'll lend you some clothes so you can get home without being pinched. The cops in this town are tough on students."

The stranger walked forward, picked up the book, glanced at it and threw it aside. "Simple," he said. "Elementary. This problem."

He bent over and ran a finger down the work sheet. His words came softly, in measured cadence.

"It is this way. . . and this way. . . and this way——"

Rush stared. "Say, it's simple," he chortled. "But it never was explained to me that way before. I can see how it goes now."

He rose from the chair and confronted the stranger.

"Who are you?" he asked.

II.

HAP FOLSWORTH snarled through his cigar at Jimmy Russell.

"So you came back empty-handed," he growled. "You, the demon reporter for the *Evening Rocket*. In the name of double-dipped damnation, can't you ever do anything? I send you out on a simple errand. 'Just run over to Coach Snelling,' says I, 'and get the line-up for the Earth team'. Any office boy could do that. And you come back without it. All you had to do was ask the coach for it and he would hand it to you."

Jimmy snarled back. "Why, you space-locoed tramp," he roared, "if it's as simple as that, go down and get it yourself. If you ever lifted yourself out of that easy chair and found out what

was happening, instead of sitting there thinking up wisecracks, you might call yourself a newspaperman. I could have told you a week ago there was something screwy about this Earth team. All sorts of rumors floating around. How much news have we printed about it? How much has *Morning Space-Ways* and the *Evening Star* printed about it? But you sit here and look wise and tell the world that Snelling is just using some high-powered psychology to get the Martians' goat. Making it appear he has some new material or some new plays. Say, that old buzzard hasn't had a new play since the first spaceship blew up."

Hap snorted and rescued the cigar. He jabbed a vicious forefinger at the reporter.

"Listen," he yelled. "I was a newsman when you were still in diapers. I'll lay you five to one I can call up Snelling and have him agree to give us a list of players."

Silently Jimmy picked up the visaphone set and handed it to Hap.

The sports-writer set the dial for the field-house wave length. A face appeared in the glass.

"Let me speak to the coach," said Hap.

The glass went dead as the connection was shifted.

The face of Coach Snelling appeared.

"Say, coach——" said Hap. But that was as far as he got.

"Listen, Hap," said the coach, "I'm a friend of yours. I like you. You've said some nice things about me when the wolves were out after my hide. If I had anything to tell anyone, I'd tell it to the *Evening Rocket*. But I haven't anything to tell anyone. I want you fellows to understand that. And if you send any more of those high-powered reporters of yours around I'll just naturally kick them out on their faces. That's a promise."

The phone went dead.

Jimmy laughed at the bewildered stare in Hap's eyes.

"Pay up," he demanded.

THE COACH'S office was empty and Jimmy was glad of that. It fitted in with his plans.

He hadn't liked the nasty light in the chief's eyes when he had been told to get a list of the Earth's new team. Nothing about *how* he was to get it. No suggestions at all, although it was understood that it couldn't be gotten directly from the coach. Presumably some other means of obtaining it would have to be worked out.

But while the chief had said nothing about how to get it, he had said plenty about what would happen if he returned without it. That was the way with editors, Jimmy reflected glumly. No gratitude. Just a hunk of ice for a heart. Who was it had given the *Rocket* a scoop on the huge gambling syndicate which had tried to buy a victory for the Earth team? Who was it had broken the yarn about the famous jewel-ship robbery off the orbit of Callisto when a governmental clique—which later went to the Moon penal colony—had moved Heaven and Earth to suppress the story? Who had phoned the first flash and later written an eye-witness story that boosted circulation over 6,000 copies concerning the gang murder of Danny Carsten? No one other than James Russell, reporter for the *Evening Rocket*. And yet, here he was, chasing a team list with sulphurous threats hanging over his head if he failed.

Jimmy tiptoed into the coach's office. He wasn't used to getting his news this way and it made him nervous.

There were papers on the desk. Jimmy eyed them furtively. Maybe among them was the list he sought. With a quick glance about the room, he slithered to the desk. Rapidly he pawed through the papers.

A footstep sounded outside.

Moving quickly, the reporter sought

refuge behind a steel locker that stood in one corner of the room. It was an instinctive move, born of surprise, but Jimmy, chuckling to himself, realized he had gained an advantageous position. From his hiding place, he might learn where the list was kept.

Coach Snelling strode into the room. Looking neither to right nor left, he walked straight ahead.

In the center of the room he disappeared.

The reporter rubbed his eyes. Snelling had disappeared. There was no question about that, but where had he gone? Jimmy looked about the room. There was no one there.

Slowly he eased himself from behind the locker. No one hailed him.

He walked to the center of the room. The coach had disappeared at just about that point. There seemed to be nothing unusual in sight. Standing in one spot, Jimmy slowly wheeled in a circle. Then he stopped, stock-still, frozen with astonishment.

Before him, materializing out of nothing, was a faintly outlined circular opening, large enough for a man to walk through. It looked like a tunnel, angling slightly downward from the floor level. It was into this that Coach Snelling must have walked a few moments before.

With misgivings as to the wiseness of his course, Jimmy stepped into the mouth of the tunnel. Nothing happened. He walked a few steps and stopped. Glancing back over his shoulder he could see nothing but the blurred mouth of the tunnel behind him. He reached out his hands and they encountered the walls of the tunnel, walls that were hard and icy-cold.

Cautiously he moved down the tunnel, half-crouched, on the alert for danger. Within a few steps he saw another mouth to the tunnel ahead of him, only faintly outlined, giving no hint into what it might open.

Momentarily he hesitated and then plunged forward.

He stood gaping at the scene before him. He stood in a wilderness and in this wilderness, directly in front of him, was a football gridiron. Upon the field were players, garbed in Gold and Green uniforms, the mystery team of the Earth. On all sides of the field towered tall, gnarled oaks. Through a vista he could see a small river and beyond it blue hills fading into an indistinct horizon.

At the farther end of the field stood several tents, apparently of skins, with rudely symbolic figures painted upon them in red and yellow. Pale smoke curled up from fires in front of the tents and even where he stood Jimmy caught the acrid scent of burning wood.

Coach Snelling was striding across the field toward him and behind him trailed several copper-colored men dressed in fringed deerskin ornamented with claws and tiny bones. One of them wore a headdress of feathers.

Jimmy had never seen an Indian. The race had died out years before. But he had seen pictures of them in historical books dealing with the early American scene. There was no doubt in his mind that he was looking upon members of the aboriginal tribes of North America.

But the coach was close now.

Jimmy mustered a smile. "Nice hideout you have here, coach," he said. "Nice little place for the boys to practice without being disturbed. That tunnel had me fooled for a while."

Coach Snelling did not return the smile. Jimmy could see the coach wasn't overjoyed at seeing him.

"So you like the place?" asked the coach.

"Sure, it's a fine place," agreed Jimmy, feeling he was getting nowhere with this line of talk.

"How would you like to spend a few weeks here?" asked the coach, unsmilingly.

"Couldn't do it," said Jimmy. "The

chief expects me back in a little while."

Two of the brawny Indians moved forward, laid heavy hands on the reporter's shoulders.

"You're staying," said the coach, "until after the game."

HAP FOLSWORTH stepped up to the editor's desk.

"Say," he demanded, "did you send Russell out to get the team line-up?"

The editor looked up. "Sure I did, just as you asked me to. Isn't that petrified newshound back yet?"

The sports-writer almost foamed at the mouth. "Back yet!" he stormed. "Don't you know he never gets back on time? Maybe he won't get back at all. I hear the coach is out after his blood."

"What's the matter with the coach?"

"Russell asked him if he was going to use the same three plays this year he has used for the last ten," explained Hap.

"I don't know what I can do," said the editor. "I might send one of the other boys down."

Hap snorted. "Mister," he said, "if Russell can't get the story, none of your other men can. He's the best damn reporter this sheet has ever had. But someday I'm going to kick his ribs in just to ease my feelings."

The editor rustled papers and grumbled.

"So he's at it again," he mused. "Just wait until I get hold of that booze-soaked genius. I'll pickle him in a jar of *bocca* and sell him to a museum. So help me, Hannah, if I don't."

## III.

SOMETHING was holding up the game. The largest football crowd ever to pack the stadium at the Martian city of Guja Tant rumbled and roared its displeasure.

The Martian team already was on the field, but the Earth team had not made its appearance.

The game would have to start soon, for it must be finished by sundown. The Terrestrial visitors, otherwise, would suffer severely from the sudden chill of Martian twilight, for although the great enclosed stadium held an atmosphere under a pressure which struck a happy medium between air density on Earth and Mars, thus affording no advantage to either team, it was not equipped with heating units and the cold of the Martian night struck quickly and fiercely.

A rumor ran through the crowd.

"Something is wrong with the Earth team. Rule Eighteen. The Board of Control is holding a conference."

A disgruntled fan grumbled.

"I knew there was something wrong when the members of the Earth team were never announced. This stuff the newspapers have been writing about a new mystery team must be right. I just thought it was some of Snelling's work, trying to scare the Martians."

His neighbor grumbled back.

"Snelling is smart all right. But psychology won't win this ball game. He'd better have something to show us today after all that's been written about the team."

The Martian stands shouted wild battle cries of the olden days as the Red Warriors went through their preliminary practice on the gridiron.

About the stadium lay the colorful Martian city with its weird architecture and its subtle color blending. Beyond the city stretched the red plains, spotted here and there with the purple of occasional desert groves. The sun shone but dimly, as it always shone on the fourth planet.

"Here they come," someone shouted.

The crowd took up the roar as the Earth team trotted out on the field, running in a long line, to swing into separate squads for the warming up period.

The roar rose and swelled, broke, ebbed lower and lower, until silence

reigned over the stands.

A whistle shrilled. The officials walked out on the field. The two teams gathered. A coin flashed in the feeble sunlight. The Earth captain spoke to the referee and jerked his thumb at the north goal. The Earth team took the ball. The teams spread out.

Earth was on the defensive.

A toe smacked against the ball. The oval rose high into the air, spinning slowly. The Red Warriors thundered down the field. A Martian player cupped his arms, snared the ball.

The teams met in a swirl of action. Players toppled, rolled on the ground. Like a streak of greased lightning, an Earth player cut in, flattened out in a low dive. His arms caught the ball carrier below the knees. The impact of the fall could be heard in the stands.

The teams lined up. The Martians thundered a bloodthirsty cry. The ball was snapped. Like a steel wall the Earth team rose up, smacked the Martian line flat. The backfield went around the ends like thundering rockets. The carrier was caught flat-footed. Mars lost three yards on the play.

The Terrestrial fans leaped to their feet and screamed.

THE TEAMS were ready again. The ball came back. It was an end play, a twister, a puzzler. But the Earth team worked like a well-oiled machine. The runner was forced out of bounds. Mars made two yards.

Third down and eleven to go. In two tries the Red Warriors advanced the oval but five yards. Sports-writers later devoted long columns to the peculiar psychology which prevented the Martians from kicking. Perhaps, as Hap Folsworth pointed out, they were overconfident, figured that even on fourth down they could advance the ball the necessary yardage. Perhaps, as another said, they were too stunned by the Earth defense.

The ball went to the Gold and Green.

The team shifted. The ball went back from center. Again there was a swirl of players—sudden confusion which crystallized into an ordered pattern as an Earth ball carrier swung around right end, protected by a line of interference that mowed down the charging Martians. When the Terrestrial was brought down the ball rested on the Mars' twenty-yard line.

Signals. Shift. The ball was snapped. Weaving like a destroyer in heavy seas, a Green and Gold man, ball hugged to him, plowed into the center of the line. His team-mates opened the way for him, and even when he struck the secondary he still kept moving, plowing ahead with pistonlike motion of his driving legs until he was hauled down by superior strength.

The ball was only two yards from the final stripe. For the first time in many years the Red Warriors were backed against their own goal line.

The Druzec war cry thundered from the Martian stands, but the Earth fans sat dumbfounded.

No one could explain the next play. Maybe there was nothing to explain about it. Perhaps the Terrestrials simply charged in and by sheer force pushed the entire Martian line back for the necessary two yards. That was the way it looked.

An official raised his arms. The gigantic scoreboard clicked. Earth had scored!

The Earth stands went insane. Men and women jumped to their feet and howled their delight. The stadium shook to foot-stamping.

And throughout the entire game the Earth side of the stadium was a mad pandemonium as score after score was piled up while the Terrestrial eleven systematically ripped the Martian team apart for yard after consistent yard of ground.

The final count was 65—0 and the

Earth fans, weak with triumph, came back to the realization that for four long quarters they had lived in a catapulting, rocketing, unreal world of delirious joy. For four long quarters they had made of the stadium a bedlam, a crazy, weaving, babbling, brass-tongued bedlam.

In the Martian stands sounded the long wail of lament, the death dirge of the ancient Druzecs, a lament that had not been intoned over an Earth-Mars football game for more than three-score years.

That night the Terrestrials took Guja Tant apart, such as is the right and custom of every victorious football delegation. And while the Martians may accept defeat in a philosophical manner, those who participated in the kidnaping will tell one they objected forcefully when the mascot *zimpa*—which had paraded in honor of many a Martian victory—was taken from his stable and placed on board the Earth liner chartered for the football run.

HAP FOLSWORTH, who had covered the game for the *Evening Rocket*, explained it to Sims of the *Star* and Bradley of the *Express*.

"It's just a lot of star-dust," he said. "Some of Snelling's psychology. He got a bunch of big boys and he kept them under cover, taught them a lot of new tricks and built them up as a mystery team. Them Red Warriors were scared to death before they ever faced our fellows. Psychology won that game, you mark my word——"

Sims of the *Star* interrupted. "Did you get a good look at any of the boys on our team?" he asked.

"Why, no, I didn't," admitted Hap. "Of course, I saw them out there on the field from where I was in the press section, but I didn't meet any of them face to face. The coach barred us from the dressing rooms, even after the game. That's a hell of a ways to go to win a ball game, but if he can win them that way I'm all for him."

He puffed on a Venus-weed cigar. "But you mark my word. It was the old psychology that turned the trick." He stopped and looked at his two fellow sports-writers.

"Say," exploded Hap, "I don't think you fellows believe what I am saying."

They didn't speak, but Hap looked at their faces again and was certain they didn't believe him.

Arthur Hart, editor of the *Evening Rocket*, looked up as the door opened.

Framed in the doorway was Jimmy Russell. Just behind him stood a copper-colored man, naked except for a loin cloth.

The editor stared.

Men in the city room whirled around from their desks and wondered what it was all about.

"I have returned," said Jimmy and the editor emitted a strangled yelp that knifed through the silence in the room.

The reporter walked into the room, dragging his companion after him.

"Tone down your voice," he said, "or you'll frighten my friend. He has seen enough in the last hour to unnerve him for a lifetime."

"Who the hell you got there?" roared Hart.

"This gentleman," said Jimmy, "is Chief Hiawatha. I can't pronounce his name, so I call him Hiawatha. He lived somewhere around here three, four thousand years ago."

"This isn't a masquerade," snapped the editor. "This is a newspaper office."

"Sure and I work here and I'm bringing you a story that will knock your hat off."

"You don't mean to tell me you're bringing in the story I sent you out to get two weeks ago?" Hart purred, and his purr had an edge on it. "You don't mean to tell me you're back already with that story."

"The very same story," agreed Jimmy.

"Too bad," said the editor, "but the game's over. It was over two hours ago. Earth won by a big score. I suppose you were too drunk to find that out."

"Nothing to drink where I come from," Jimmy told him.

"How you must have hated it," said Hart.

"Now listen," said Jimmy, "do you want to get the inside story on this Earth team or don't you? I got it. And it's a big story. No wonder Earth won. Do you know that those Earth players were picked from the *best football players Earth has produced during the last 1800 years?* Why, Mars didn't have a chance!"

"OF COURSE, they didn't have a chance," growled Hart. "Folsworth explained all that in his story. They were licked before they started. Psychology. What's this yap about the pick of Earth teams for the past 1800 years?"

"Give me five minutes," pleaded Jimmy, "and if you aren't yelling yourself hoarse at the end of that time, I'll admit you're a good editor."

"All right," snapped the editor, "sit down and loosen up. And you better be good or I'll fire you right out on your ear."

"Now, Hiawatha," said Jimmy, addressing his companion, "you sit right down in this chair. It won't hurt you. It's a thing you rest yourself in."

The Indian merely stared at him.

"He don't understand me very good yet," explained Jimmy, "but he thinks I'm a god of some sort and he does the best he can."

Hart snorted in disgust.

"Don't snort," cautioned the reporter. "The poor misguided savage probably thinks you're a god, too."

"Get going," snarled Hart.

Jimmy seated himself on the edge of the desk. The Indian drew himself up to his full height and folded his arms across his chest. The newsmen in the room had left their desks and were crowding about.

"You see before you," said Jimmy, "a wild Indian, one of the aborigines of this continent. He lived here before the white men ever set foot on this land. I brought him along to show you I got the right dope."

"What's all this got to do with the game?" persisted the editor.

"Plenty. Now you listen. You don't believe in Time travel. Neither did I until just a few days ago. There are thousands like you. Ships bridging the millions of miles of space between planets are commonplace now. Transmutation of metal is a matter of fact. Yet less than 1500 years ago people believed these things were impossible. Still, you—in this advanced age which has proven the impossible to be possible time and time again—scout the theory of Time travel along a fourth dimension. You even doubt that Time *is* a fourth dimension, or that there is such a thing possible as a fourth dimension.

"Now, just keep your shirt on!

"Nobody believes in Time travel. Let's state that as a fact. Nobody but a few fool scientists who should be turning their time and effort toward something else. Something that will spell profit, or speed up production, or make the people happier, or send space liners shooting along faster so that the Earth-Mars run can be made in just a few less minutes.

"And let me tell you that one of those fool scientists succeeded and he built a Time-tunnel. I don't know what he calls it, but that describes it pretty well. I stumbled onto this thing and from what the coach told me, and what the players told, and from what the Indians tried to tell me, and from my own observations, I've got the thing all doped out. Don't ask me how the scientist made the tunnel. I don't have the least idea. I probably wouldn't understand if

I met the man who made it face to face and he told me how he did it.

"Here's how the Earth team beat the Martians. The coach knew he didn't have a chance. He knew that he was in for another licking. The Earth is degenerating. Its men are getting soft. They don't measure up to the Martians. The coach looked back at the Earth players of former years and he wished he could get a few of them."

"So," said the editor, "I suppose he got this Time-tunnel of yours and went back and handpicked them."

"THAT'S EXACTLY what he did," declared Jimmy. "He went over the records and he picked out the men he wanted. Then he sent his scouts back in Time and contracted them to play. He collected the whole bunch as near as I can make it out, and then he established a Time-tunnel leading from his office into the past about 3,000 years and took the whole gang back there. He constructed a playing field there, and he drilled men who had been dead for hundreds of years in a wilderness which existed hundreds of years before they were born. The men who played out in the Great Bowl at Guja Tant today were men who had played football before the first spaceship took to the void. Some of them have been dead for over a thousand years.

"That's what the squabble on the Control Board was about. That's what held up the game—while the Board tried to dig up something that would bar these men out of Time. But they couldn't, for the only rules of eligibility are that a man must be of unmixed Earth blood for the past ten generations and must be a football player on some college or university. And every one of those men were just that."

Hart's eyes were stony and the reporter, looking at them, knew what to expect.

"So you would like to sit down at your old desk and write that story," he said.

"Why not?" snarled Jimmy, ready for a battle.

"And you would like me to put it on the front page, with big green headlines, and put out an extra edition and make a big name for the *Rocket*," Hart went on.

Jimmy said nothing. He knew nothing he could say would help.

"And you would like to make a damn fool out of me and a joke out of the *Rocket* and set in motion an athletic investigation that would have Earth and Mars on their ears for the next couple of years."

The reporter turned to the Indian.

"Hiawatha," he said, "the big squarehead doesn't believe us. He ought to be back burning witches at the stake. He thinks we just thought this one up."

The Indian remained unmoved.

"Will you get the hell out of here," snapped Hart, "and take your friend along."

## IV.

THE SOFT, but insistent whirring of the night phone beside his bed brought the editor of the *Rocket* out of a sound sleep. He did not take kindly to night calls and when he saw the face of one of his reporters in the visaglass he growled savagely.

"What are you waking me up for?" he asked. "You say there are fires out in the Great Bowl—— Say, do you have to call me out of bed every time a fire breaks out? Do you want me to run down there and get the story——? You want to know should we shoot out an extra in the morning? Say, do we put out extras every time somebody builds a bonfire, even if it is in the Great Bowl? Probably just some drunks celebrating the victory while they're waiting for the football special to come in."

He listened as words tumbled out of the phone.

*Jimmy leaned against the tree. So that, then, was the mysterious team the coach wouldn't name. He began to understand why. They didn't exist—yet!*

"What's that," he shouted. "Indians? . . . Holding a war dance! How many of them? . . . You say they are coming out of the administration building? . . . More coming all the time, eh!"

Hart was out of bed now.

"Listen, Bob, are you certain they are Indians? . . . Bill says they are, huh? Would Bill know an Indian if he saw one? . . . He wasn't around this afternoon when Jim was in, was he? He didn't see that freak Jim hauled in, did he? . . . If he's playing a joke, I'll crack his neck.

"Listen, Bob, you get hold of Jim. . . . Yes, I know he's fired, but he'll be glad to come back again. Maybe there's something to that yarn of his. Call all the speakies and gambling joints in town. Get him if you have to arrest him. I'm coming down right away."

Hart hauled on his clothes, grabbed a cloak and hurried to his garage, where his small service plane was stored.

A few minutes later he stamped into the *Rocket* editorial rooms.

Bob was there.

"Find Jim?" asked Hart.

"Sure, I found him."

"What dump is he holed up in?"

"He isn't in any dump. He's out at the Bowl with the Indians. He's got hold of a half barrel of *bocca* someplace and those savages are getting ripe to tear up the place. How the Martians drink that *bocca* is beyond me. Imagine an Indian, who has never tasted alcohol, pouring it down his throat!"

"But what did Jim say——"

"Bill got hold of him, but he won't do a thing for us. Said you insulted him."

"I can imagine what he said," grated Hart. "You get Bill in here as fast as you can. Have him write a story about the Indians out at the Bowl. Call some of the other boys. Send one of them to wait for the football special and nail the coach as soon as it lands. Better have a bunch of the boys there and get interviews from the Earth players. The life story of each one of them. Shoot the works. Photographers, too. Pictures—I want hundreds of them. Find out who's been monkeying around with Time traveling and put them on the spot. Call somebody on the Control Board. See what they have to say. Get hold of the Martian coach. I'm going out to the Bowl and drag Jim back here."

The door banged behind him and Bob grabbed for the phone.

A HUGE CROWD had gathered at the Bowl. In the center of the amphitheatre, on the carefully kept and tended gridiron sod, a huge bonfire blazed. Hart saw that one of the goal posts had been torn down to feed it and that piles of broken boxes were on the ground beside the fire. About the blaze leaped barbaric figures, chanting—figures snatched out of the legendry of the country's beginnings, etched against the leaping flames of the bonfire.

A murmur rose from the crowd. Hart glanced behind him.

Streaming into the Bowl came a squad of police, mounted on motor-bikes. As the squad entered the Bowl they turned on the shrill blasting of the police sirens and charged full down upon the dancing figures around the fire.

Pandemonium reigned. The crowd that had gathered to watch the Indian dance scented new excitement and attempted to out-scream the sirens.

The dance halted and Hart saw the Indians draw together for a single instant, then break and run, not away from the police, but straight toward them. One savage lifted his arm. There was a glint of polished stone in the firelight as he threw the war-axe. The weapon described an arc, descended upon the head of a mounted policeman. Policeman and bike went over in a flurry of arms, legs and spinning wheels.

Above the din rose the terrible cry of the war whoop.

Hart saw a white man leaping ahead of the Indians, shouting at them. It was Jimmy Russell. Mad with *bocca*, probably.

"Jimmy," shrieked Hart. "Come back here, Jimmy. You fool, come back."

But Jimmy didn't hear. He was shouting at the Indians, urging them to follow him, straight through the charging police line, toward the administration building.

They followed him.

It was all over in a moment.

The Indians and the police met, the police swerving their machines to avoid running down the men they had been sent out to awe into submission. Then the Indians were in the clear and running swiftly after the white man who was their friend. Before the police squad could turn their charging bikes, the red-men had reached the administration building, disappeared within it.

Behind them ran Hart, his cloak whipping in the wind.

"Jimmy," he shrieked. "Jimmy, damn you, come back here. Everything's all right. I'll raise your salary."

He stumbled and fell, and as he fell the police roared past him, headed for the door through which the Indians and Jimmy had disappeared.

Hart picked himself up and stumbled on. He was met at the door of the building by a police lieutenant who knew him.

"Can't understand it," he shouted. "There isn't a sign of them. They disappeared."

"They're in the tunnel," shouted Hart. "They've gone back 3,000 years."

The editor pushed the lieutenant to one side. But as he set foot in the building there was a dull thud, like a far-away explosion.

When he reached the coach's office he found it in ruins. The door had burst outward. The steel plates were buckled as if by a tremendous force. The furniture was upset and twisted.

Something had happened.

Hart was right. Something had happened to the Time-tunnel. It had been wiped out of existence.

ALEXIS ANDROVITCH spoke with a queer quirk in his voice, a half-stuttering guttural.

"But how was I to know that a foolish newspaper reporter would go down the Time-tunnel?" he demanded. "How was I to know something would happen? What do I care for newspapers? What do I care for football games? I'll tell you. I care nothing for them. I care only for science. I do not even want to use this Time traveling personally. It would be nice to see the future, oh, yes, that would be nice—but I haven't the time. I have more work to do. I have solved Time travel. Now I care no more about it. Pouf! It is something done and finished. Now I move on. I lose interest in the possible. It is always the impossible that challenges me. I do not rest until I eliminate the impossible."

Arthur Hart thumped the desk.

"But if you did not care about football, why did you help out Coach Snelling? Why turn over the facilities of a great discovery to an athletic coach?"

Androvitch leaned over the desk and leered at the editor.

"So you would like to know that? You would ask me that question. Well, I will tell you. Gentlemen came to me, not the coach, but other gentlemen. A gentleman by the name of Danny Carsten and others. Yes, the gangsters. Danny Carsten was killed later, but I do not care about that. I care for nothing but science."

"Did you know who these men were when they came to you?" asked Hart.

"Certainly I knew. They told me who they were. They were very businesslike about it. They said they had heard about me working on Time travel and they asked when I thought I would have it finished. I told them I already had solved the problem and then they spread money on the table—much money, more than I had ever seen before. So I said to them: 'Gentlemen, what can I do for you?' and they told me. They were frank about it. They said they wanted to win much money by betting on the game. They said they wanted me to help them get a team which would win the game. So I agreed."

Hart leaped to his feet.

"Great galloping Jupiter," he yelled. "Snelling mixed up with gangsters!"

Androvitch shook his head.

"Snelling did not know he was dealing with gangsters. Others went to him and talked to him about using the Time travel method. Others he thought were his friends."

"But, man," said Hart, "you aren't going to tell all this when you are called before the athletic Board of Control? There'll be an investigation that will go through the whole thing with a fine tooth comb and you'll knock Coach Snelling out of the football picture if

you open your mouth about gangsters being mixed up in this."

THE SCIENTIST shook his head. "Why should I care one way or the other. Human fortunes mean little. Progress of the race is the only thing worth while. I have nothing to hide. I sold the use of my discovery for money I needed to embark upon other researches. Why should I lie? If I tell the truth, maybe they will let me leave as soon as my story is told. I can't waste time at investigations. I have work to do, important work."

"Have it your way," said Hart, "but the thing I came here for was to see you about Jimmy Russell. Is there any way I can reach him? Do you know what happened?"

"Something happened to the Time-control machine which was in Coach Snelling's office. It operated at all times to keep the tunnel open. It required a lot of power and we had it hooked on a high-voltage circuit. I would guess that one of the Indians, becoming frightened in the office, probably even in a drunken stupor, blundered into the machine. He more than likely tipped it over and short-circuited it. I understand fragments of human body were found in the office. Just why the tunnel or the machine should have exploded, I don't know. Electricity—just plain old electricity—was the key to the whole discovery. But probably I had set up some other type of force—let's call it a Time-force if you want to be melodramatic about it—and this force might have been responsible. There's still a lot to learn. And a lot of times a man accomplishes results which he does not suspect."

"But what about Jimmy?"

"I'm pretty busy right now," replied Androvitch. "I couldn't possibly do anything for a few days——"

"Is there anyone else who could do the work?" asked Hart.

Androvitch shook his head. "No other person," he said. "I do not confide in others. Once a Time-tunnel has been established, it is easy to operate the machine—that is, projecting the Time element further away from the present or bringing it closer to the present. The football players who have been brought here to play the game were in the present time over six months. But they will be returned to their own time at approximately the same hour they left it. That merely calls for a proper adjustment of the machine controlling the tunnel back into Time. But setting up a tunnel is something only I can do. It requires considerable technique, I assure you."

Hart brought out a bill fold. He counted out bank notes.

"Tell me when to stop," he said.

Androvitch wet his lips and watched the notes pile up on the table before him.

Finally he raised his hand.

"I will do it," he said. "I will start work tomorrow."

His hand reached out and clutched the notes.

"Thank you, Mr. Hart," he said.

Hart nodded and turned to the door. Behind him the scientist greedily counted and re-counted the bills.

## V.

RUSH CULVER shook hands with Ash Anderson, football scout for Coach August Snelling.

"I'm glad I didn't hang one on you that night you came into my room, Ash," the fullback said. "This has been the thrill of a lifetime. Any time you fellows need another good fullback just come back and get me."

Anderson smiled.

"Maybe we will if the Control Board doesn't change the rules. They'll probably rip Rule Eighteen all to hell now. And all because of a lousy newspaperman who had to spill the story. No

loyalty, that's what's the matter with those guys. They'd cut their grandmas' throats for a good story."

The two stood awkwardly.

"Hate to say good-by," said Rush. "One time I kind of thought I'd like to stay up ahead in your time. But there's a girl back here. And this stuff you gave me will help us get settled soon as I graduate. Right clever, the way you fellows struck off old money."

"They'll never know the difference," said Ash. "They'll accept it as coin of the realm. The money we have up ahead wouldn't help you any here. As long as we had agreed to pay you, we might as well give you something you can use."

"Well, so long, Ash," said Culver.

"So long," said Ash.

Rush walked slowly down the street. The music hall clock tolled the hour. Rush listened. Gone only an hour—and in that time he had lived over six months in the future. He jingled the coins in the sack he held in his hand and struck up a tune.

Then he wheeled suddenly.

"Ash—wait a minute! Ash!" he shouted.

But the man out of the future was gone.

Slowly Rush turned back down the street, heading for the house he had quitted less than 60 minutes before.

"Hell," he said to himself, "I forgot to thank him for helping me with math."

A TINY BELL tinkled softly again and again.

Arthur Hart stirred uneasily in his sleep. The bell kept on insistently. The editor sat up in bed, ran his hands through his hair and growled. The ringing continued.

"The *Morning Space-Ways*," he said. "Getting out an extra. Now just what in the doubled-dipped damnation would they be getting out an extra for?"

He pressed a lever and stepped up the intensity of the light in the room. Walking to a machine, he snapped a button and shut off the ringing bell. Opening the machine, he took from a receptacle within it a newspaper still wet with ink.

He glared at the second of the three news-delivery machines.

"If the *Star* beats the *Rocket* to an extra I'll go down and take the place apart," he snarled. "We been scooped too often lately. Probably isn't worth an extra, though. Just *Space-Ways* doing a little more promotion work."

Sleepily he unfolded the sheet and glanced at the headline.

It read:

## "TIME MACHINE SCIENTIST SLAIN BY GANGSTERS"

Hart's breath sobbed in his throat as his eyes moved down to the second deck.

"ALEXIS ANDROVITCH TORCHED ON STREET FROM SPEEDING CAR. POLICE BELIEVE MARS-EARTH GAME MAY BE CLUE."

The *Rocket* news-delivery machine stormed into life. Another extra.

Hart snatched the paper from the machine.

He read:

## "GANGSTERS SILENCE SCIENTIST ON EVE OF GAME HEARING"

Stunned, Hart sat down on the edge of the bed.

Androvitch was dead! The only man in the world who could set up a Time-tunnel to reach Jimmy!

It was all plain—plain as day. The gambling syndicate, afraid of what Androvitch might say, had effectively silenced him. Dead men do not talk.

Hart bowed his head in his hands.

"The best damn reporter I ever had," he moaned.

He sprang to his feet as a thought struck him and rushed to the visaphone. Hurriedly he set up a wave length.

The face of Coach August Snelling appeared in the glass.

"Say, coach," said Hart breathlessly, "have you sent all the boys back to the past?"

"Hart," said Coach Snelling in an even voice filled with cold wrath, "after the way the newspapers have crucified me I have nothing to say."

"But, coach," pleaded Hart, "I'm not asking you for publication. What you can tell me will never be printed. I want your help."

"I needed your help the other day," Snelling reminded him, "and you told me news was news. You said you owed it to your readers to publish every detail of any news story."

"But a man's life depends on this," shouted Hart. "One of my reporters is back in the time where you trained the team. If I could use one of the other tunnels—one of those you used to bring the boys forward in Time—I could shoot it back to the correct time. Then I could travel to where Jimmy is and bring him back——"

"I'm telling you the truth when I say that the boys have all been sent back and all the tunnels are closed," Snelling said. "The last player went back this afternoon."

"Well," said Hart slowly, "I guess that settles it——"

Snelling interrupted. "I heard about Russell," he said, "and if he's trapped back with those Indians it's what I'd call poetic justice."

The glass went back as Snelling cut the connection.

The *Star* machine bell hammered. Hart wearily shut off the extra signal and took out the paper.

"Hell," he said, "if we'd had Jimmy here we'd scooped even the *Space-Ways* on this yarn."

He looked sadly at the three editions.

"Best damn reporter I ever knew," the editor said.

PROF. EBNER WHITE was lecturing to Elementary Astronomy, Section B.

"While there is reason to believe that Mars has an atmosphere," he was saying, "there is every reason to doubt that the planet has conditions which would allow the existence of life forms. There is little oxygen in the atmosphere, if there is an atmosphere. The red color of the planet would argue that much of whatever oxygen may have been at one time in the atmosphere——"

At this point Prof. White was rudely interrupted.

A young man had risen slowly to his feet.

"Professor," he said, "I've listened to you for the last half hour and have reached a conclusion you know nothing about what you are saying. I can tell you that Mars does have an atmosphere. It also has plenty of oxygen and other conditions favorable to life. In fact, there is life there——"

The young man stopped talking, realizing what he had done. The class was on the verge of breaking into boisterous gayety and gales of strangled guffaws swept the room. No one liked Prof. White.

The professor sputtered feebly and tried to talk. Finally he did.

"Perhaps, Mr. Culver," he suggested, "you had better come up here while I come down and occupy your seat."

"I'm sorry, sir. I forgot myself. It won't happen again. I publicly and sincerely apologize."

He sat down and Prof. White went on with the lecture.

Which incident explains why Rush Culver became a tradition at the University of Wisconsin.

Marvelous tales were told of him. He was voted the man of the year in his senior year. He was elected a member of outstanding campus organizations which even his great football prowess in his junior and sophomore years had

failed to obtain for him.

From a mediocre student he became regarded as a brilliant mind. Students to whom he had formerly gone for help with mathematics and other studies now came to him.

At one time he took the floor in a political science discussion hour and used up the entire hour explaining the functioning of a Utopian form of government. Those who heard him later said that he sounded as if he might have seen the government in actual operation.

But his greatest glory came from the credit which was accorded him for Wisconsin's football triumphs. Rumor on the campus said that he had worked out and given to the coach a series of plays, based upon gridiron principles then entirely new to the game. Rush, when approached, denied he had given them to the coach. But, however that may be, Wisconsin did spring upon its opponents that fall a devastating attack. Team after team fell before the onslaught of the Badgers. The team traveled to Minneapolis and there it marched through the mighty Golden Gophers with apparent ease, while fans and sports-writers grew faint with wonder and the football world trembled with amazement.

Clamorous popular demand forced the Big Ten to rescind its ruling against post-season games and at the Rose Bowl on January 1, 1945, the Badgers defeated the Trojans 49 to 0 in what sports-writers termed the greatest game ever played in football.

JIMMY RUSSELL was up a tree. He had been lucky to find the tree, for there were few in that part of the country and at the moment he reached it, Jimmy was desperately in need of a tree.

Below him patrolled an enormous grizzly bear, fighting mad, snarling and biting at the shafts of arrows which protruded from his shoulders. The bole of the tree was scarred and splintered where the enraged animal had struck savagely at it with huge paws armed with four-inch talons. Low limbs had been ripped from the trunk as the beast reared to his full height, attempting to reach his quarry.

In a gully a quarter of a mile away lay the ripped and torn body of Chief Hiawatha. The bear had singled the Indian out in his first charge. Jimmy had sent his last arrow winging deep into the animal's throat as the beast had torn the life from his friend. Then, without means of defense and knowing that his companion was dead, Jimmy had run, madly, blindly. The tree saved him, at least temporarily. He still had hopes that that last arrow, inflicting a deep throat wound, from which the blood flowed freely, would eventually spell death to the maddened beast.

Sadly he reflected, as he perched on a large branch, that if he ever did get down alive the rest of the trip would be lonely. It was still a long way to Mexico and the Aztec civilization, but the way would not have seemed long with old Chief Hiawatha beside him. The chief had been his only friend in this savage, prehistoric world and now he lay dead and Jimmy faced another thousand miles alone, on foot, without adequate weapons.

"Maybe I should have waited at the village," Jimmy told himself. "Somebody might have gotten through to me. But maybe nobody wanted to get through. Funny, though, I always figured Hart was my friend, even if he did get hard-boiled every time he saw me. Still—I waited three years and that should have given him plenty of time."

A lone buffalo bull wandered up the gully and over the ridge where the grizzly stood guard under the tree. The bear, sighting the bull, rushed at him, roaring with rage. For a moment it appeared the bull might stand his ground, but before the bear covered half the distance to him, he wheeled about

and lumbered off. The grizzly came back to the tree.

Far out on the plain Jimmy located a skittering band of antelope and watched them for a long time. A wolf slunk through the long grass in a gully to the west of the tree. In the sky vultures began to wheel and turn. Jimmy shook his fist at them and cursed.

Twilight came and still the bear kept up the watch. At times he withdrew a short distance and lay down as if he were growing weak from loss of blood. But in each instance he came back to resume the march around the tree.

The moon came up and wolves howled plaintively from the ridges to the east. Jimmy, tearing a buckskin strip from his shirt, lashed himself to the tree. It was well he did so, for in spite of the danger below, despite his efforts to keep awake, he fell asleep.

The moon was low in the west when he awoke. He was stiff and chilled and for a moment he did not remember where he was.

A slinking form slipped over a ridge a short distance away and from somewhere on the prairie came the roaring grunting of a herd of awakening buffalo.

With a realization of his position coming to him, Jimmy looked about for the bear. He did not locate the beast at first, but finally saw its great bulk stretched out on the ground some distance away. He shouted, but the animal did not stir.

LATE AFTERNOON saw Jimmy heading southwest across the plains. He was clad in tattered buckskins. He was armed with a bow and a few arrows. At his belt swung a tomahawk. But he walked with a free swinging tread and his head was high.

Behind him a mound of stones marked the last resting place of all that remained mortal of Chief Hiawatha. Ahead of him lay Mexico, land of the Aztecs.

There he would find the highest order of civilization in pre-Columbian North America. There he would find people whose legends told of a strange white god who came to them in ancient days and taught them many things. This was the story they had told the Spanish conquistadores. That was why they had hailed Cortez as a god likewise, to their later sorrow.

"A white god who taught them many things," said Jimmy to himself and chuckled. Might he not have been that white god? Could he not have taught them many things? But if he had been a god to the Aztecs, why had he not warned them against the Spaniards?

Jimmy chuckled again.

"A newspaperman should make one hell of a good god for a bunch of redskins," he told himself.

# Good Old Brig!

## Kent Casey

***discusses the joys of jumping ship on strange planets—and finds being caught the greatest!***

THE target-hull at the end of the tow-ship's tractor-ray swooped and dived in realistic fashion. It would yaw, stall, loop, and change speed and direction with a giddy abandon few stunt-pilots could have equalled. The crew of the repair-boat, standing by in the tow-ship's repeller-cradles, watched with professional boredom.

"They'll never hit that baby," remarked Private Snell who was watching target practice for the first time.

Sergeant McClure, in charge of the repair gang, sniffed. "Don't fool yourself. You'll have plenty to do between now and pipe-down. Here she comes. Get into your space helmets, everybody. We'll take off as soon as she's halfway down the range."

"Two bits she don't hit this run," spoke up Private Kelton, leisurely securing the neck-joint of his space armor and wriggling his oxygen tank more comfortably between his shoulders.

The sour-visaged sergeant turned a baleful stare. "Yeah? Well this is no county fair. It's a workin' party. Just for that, you can weld the hull-holes she gets while Snell, here, sets up on the target-shield."

"Aw, Sarge, have a heart!" Kelton was beginning, when the firing ship flashed on a parallel course, opening fire on the target as soon as she had cleared the tow-ship's stern.

"Let's go," was McClure's grunted reply.

The little repair-boat shot off the ways and took a respectful course behind the whizzing cruiser. To Private Snell's wide eyes it looked as if every burst from the big ship's guns had obliterated the target. But it emerged, wriggling, from blast after blast. The bursts were ringing the little robot hull in a perfect salvo pattern, but still it continued to duck and dodge. "Makin' misses all over the atmosphere!" derided Kelton.

The sergeant again glowered. "Officers' string," he announced. "And a sweet one. They don't want to make the battery wait on the next run till we can put over another target. They're just ticklin' her up. You're seeing some fancy shooting if you weren't too dumb to know it!"

"Officers' string?" Snell asked.

"Sure—officers' string. First run in target practice, officers man the battery just to show you boots what you can do with a gun. They never blast the target unless they're clumsy—they just strip and founder it. Look how logy the target's getting."

With a final blast from her guns, and a flirt of her main rockets that sent the target surging to the limit of its tractor, the cruiser spun on her heel and backtracked.

"Step on it, gang," warned the sergeant. "She'll be crowdin' back here for the first crew run in about half an hour."

THE REPAIR-BOAT drew alongside the target and the spacesuited repair crew swarmed out and over her. Kelton's face, as he lugged out his welding outfit, was long. While the target had not been destroyed, her hull plates had been thoroughly peppered. Hardly a frame had been sprung, but every plate was a honeycomb of fine holes where the glancing Morrell-rays had struck at extreme bursting range.

"Get going on your two-bits' worth," McClure grunted.

Snell entered the hull, hauled out the spent neutron cartridge and installed a new one, replaced the riddled pipes to the distributors and turned for further orders.

"Come hold this dolly," the sergeant said, setting down his torch and picking up a force-hammer. "They damn near stove this frame in."

Snell pushed the heavy dolly against the red-hot beam while McClure expertly played a tattoo on it. "That's about straight," he finally approved. "O. K. Drift in a couple rivets here and she'll be good as new. How you comin', Kelton?"

"One more plate. Have to get some more flux for the next trip."

"Naw, we got enough. They won't be pepperin' her like this on crew runs. If they hit, they'll smash her square and it'll just mean new plates. All set? Let's scram before she comes again."

The sergeant rapidly, but methodi-

cally, secured the target doors, snapped the outboard switch which controlled the armor radiation and slid into the repair-boat just as the bulging neutron screen slapped it away from the target's side. The little craft had barely settled back into her cradles when the cruiser again screamed down the range.

"Two direct hits," McClure commented expertly. "Won't be much to do this time."

All through a long morning the game continued, run after run. It was a weary trio who finally secured the repair-boat an hour late for pipe-down and fell wolfishly on their delayed midday meal.

"What do we do this afternoon, Sarge?" asked Snell.

"She tows. We shoot," was the laconic reply.

"Oh! Wish I was in a gun-crew. It'll be fun to watch, though."

"Watch? You? When did you get to be a politician? When that general alarm gong goes off you better be on your job down in the plot-room if you don't want to board with Jimmy Legs for a while."

Kelton, still a private after eight years of war service, sighed reminiscently. "Good old brig!" he said. "This ship has the coolest one I was ever in. And I've been in plenty."

"Why don't you keep your nose clean and stay out of 'em, then?" growled the sergeant.

"Oh, it's peaceful in the brig. Think of all the drills you miss."

"Well, don't miss this one if you don't want the engine-room gang to work on you. They're shorthanded enough down there already."

THE ALARM-GONG broke into the conversation and the three men, cramming the last of the food into their mouths, trotted to their battle-stations.

New as he was, Snell had been in the Patrol long enough to have acquired a healthy distaste for the plot-room. It wouldn't be so bad if a guy knew what it was all about. If you could even look around a bit and see what was happening on the instrument boards and the track-charts, that would be something. But there's no percentage just sitting with your eyes glued to a Fleury gauge, holding your hands steady on the controls to keep the little blue spark centered on the scale, while it got hotter and hotter in spite of the air-conditioners. Today it was worse than ever, for it wasn't just ordinary drill, over in a couple of hours. The guns were going, and there were things to see. For the first time, Snell felt uneasily that perhaps it was just as well he hadn't been old enough to join up before the Uranus War ended. Think of being cooped up down here in a battle without even a guess as to how things were going! Gee! I should think they'd go nuts.

The ship wasn't making any too good time about this practice anyhow. On two runs they'd smeared the target so badly proceedings had to halt for an hour while the towing ship hoisted out another hull and trailed it astern. Snell's head was aching and he wanted a smoke. Between runs he slapped his hands and rubbed his tingling fingers trying to get the growing numbness out of them. The air was stale with the tart odor of sparks, and his hair was creeping and crackling with electricity. Wonder how old Kelton's doing down in the dynamo room?

A run finished and the ship turned lazily and appeared to drift. "Just one more run, bullies!" announced the plot-room officer cheerily. "Then we'll be through for the day."

Snell straightened himself and wriggled to take the crick from his back. "How're we doing, Mr. Parks?"

"So-so," answered the officer. "We've beat the *Orion* anyhow—but not good enough to have much hope of the fleet trophy. Hey, watch your gauge! Want to burn out every visor in the ship?"

Snell slumped sulkily and brought the spark back to its proper position. Do they think a guy's made of sheet metal? Got to stretch some time. Maybe old Kelton hasn't any gold hashmarks nor a buzzard on his cuff, but he's got something at that, missing drills and so forth. Wonder what you get to eat in the brig? Swing a dolly all morning and sit like a giddy robot all afternoon——

THE STEADY scream of the rockets whined into a low purr as a heavy concussion shook the ship. The little blue spark leaped and crackled as every telephone and visor in the ship went into use. Snell wrestled with his controls to keep the overloaded communications from burning out. "What the heck?" he demanded breathlessly.

"Charge burst in the outboard vent of Number Nine Morrell gun!" cried the man at the televisor board.

*Clang! Urrrk! Clang!* The alarm-gong went into action again and bugles trilled fire call. Lieutenant Parks cut out all the plot-room power switches. "Fire stations!" he yelped.

The fire was almost immediately out, but it was a good five minutes before "Secure" was sounded and Snell could leave his grenade rack and go forward to see the damage. The outboard end of a heavy Morrell tube was ripped into curling strings, and a gaping hole over six feet in diameter was blown out of the ship's side. An air-curtain bulkhead had been hastily thrown over the aperture and a crowd of engineers were securing it. As Snell stared, one of them raised his head. It was Kelton.

"Look," he said gloomily, nodding at the twisted metal. "Who wouldn't be a welder? All that extra work for me just so some dumb flatfoot can play again with his little gun."

"Looks like a back-to-Base job to me," said another. "What are you crabbing about?"

"Base nothing! You don't know our skipper! You'd have to blow the whole end off the ship before he'd ask for a shipyard job. 'Repairs within the capacity of the ship's force.' He's got a rubber stamp for that to save writing it so often, so his writer says. Naw—we'll go around here somewhere and hang up. Some planet with air around it so we can work over the side without a caisson and he can open up the ship."

"Well, that'll maybe mean some shore liberty," answered the optimist.

When the temporary patch had been made solid and as streamlined as possible outboard, the ship gathered headway and was snoring along a new course by the time the evening meal was piped. Speculation was rife as to her destination. "Way outside the Solar System this way, the Skipper won't be heading in there. Hope he don't pick on Calliope to land. That's a lousy planet."

"Shucks, Calliope's way to heck and gone the other side of the Sun from where we are. Maybe he'll hit that little place we went last year for liberty—when we all went fishing."

"Huh!" this was Kelton speaking. "All the fishing you'll do will be on busted frames! Liberty with a hole in the side of his ship? Not if the Skipper knows it!"

THE CAPTAIN'S yeoman entered the mess-room late and began to help his plate. "Where we goin', Quills?"

"Some dump called Ophidia where they got air. Ought to be there in about twenty-four hours."

"What's it like? Will we get liberty?"

"Don't ask me—never heard of the place. Maybe there'll be liberty after the repairs are done. I don't know."

"Ophidia?" mused Kelton. "Seems to me I was there once. Funny-lookin' people with feelers on their heads like big cockroaches. But they had good beer."

"Ought to see their sun by now——"

As the hours sped by, the little planet of Ophidia, in the Polaris System, became plainly visible. "Nice and green like the Earth. Don't look stormy either—that ocean looks flat as a table. This the place where you were, Kelton?"

"Yeah, looks like it. But I can't tell yet. Wait till we can see some towns."

The ship arrived and settled slowly to her repulsion anchors about fifty feet in the air, just as the Ophidian sun was setting, and a warm, bright night began. The announcers twittered overhead. "Morning orders! All hands at four o'clock! Repair gangs turn to at five in the morning. General field-day cleaning ship. Captain's inspection at one-thirty!"

The executive officer made his evening reports. "Do you expect to land liberty parties here, Sir?" he asked.

Captain Carroll smiled slightly, then grimaced. "Not here," he replied.

"The men haven't been off the ship for nearly three weeks, Sir."

"We'll be home in one more week," the Captain said.

The executive stuck to his guns. "This is a new planet to everybody, Sir. It'd maybe be good for their morale to get a chance at it."

Again a faint grimace, almost a shudder, flashed over Captain Carroll's face. "No!" he said curtly and finally.

There was some mild grumbling when this news got about, but the majority opinion was voiced by Sergeant McClure. "The Skipper knows what he's doing. Maybe the water ain't good, or maybe the people are tough. Why do you suppose he anchored way up here if this was a good place to land? Anyhow, the Skipper says no, so there's no use beefing. We'll be in San Francisco next week at that."

SNELL, however, who had not yet set foot on any planet other than Earth, was vastly disappointed and "couldn't see why". His gloom was thickened by Kelton's reply. "He's just in a hurry to get home and we can take it and like it. I know this place. I'm sure this is where I was. Right over that hill there, about two miles, there's a town in the middle of the forest—a swell liberty town."

"The old sun-downer!' was Snell's despairing comment.

Kelton, seeing the boy's face harden, suddenly had an idea. "Say, Kid, what do you say we go 'over the hill' tonight? Let the good boys patch plates and shine brightwork tomorrow. It'll be just a week in the brig for ship-jumping when we get back."

"Wouldn't that cut us out of liberty in 'Frisco?"

"Naw, the Skipper isn't that tough. He'd just keep us in chokey all the way home. The chow isn't so good, but no drills for a week."

"How could we?" Snell's conscience was fighting a losing battle with his curiosity and his gloom.

"Easy—slip through the air-valve under the general issue-room with a rope and slide down."

"How could you get back without getting caught?"

"You couldn't. But you'll get back all right. The M. P.'s will be looking for us and we'll be hoisted back in style. Maybe we can bring back a bottle. The master-at-arms is nearsighted. Come on, let's go!"

When the executive entered the cabin to make his morning reports, his face was annoyed. "Privates Kelton and Snell jumped ship last night, Sir. Snell's first offense, but Kelton's a hard-boiled egg. His record looks like it had measles from the red ink spotted over it. Shall I send a patrol after them?"

Captain Carroll's face was stern. "Not yet," he said. "We're shorthanded enough for these repairs as it is, and I do not want any more absentees—even official ones—until the hull is

patched fit for the run home. I do not want to be late for crew liberty in San Francisco, especially after their disappointment here."

The executive looked at the ceiling and rubbed his chin. "Maybe they wouldn't mind a day or so late in San Francisco if they could explore here for a day. I hate to let those two ship-jumpers get away with a liberty."

The Captain laughed a short, barking note. "They won't enjoy it. I was marooned here for a week once, and only necessity made me come here again. They will find that they have made a serious mistake. Send the patrol, say, tomorrow noon after the repairs are complete. When they are back on board, they need not stay in the brig any longer than is necessary to let them get rested. I imagine you can find enough extra duty to keep them busy on the run home, just so they won't think they escaped anything by dodging the repair work?"

"I'll keep them busy all right, Sir! Is this planet so tough, then?"

"It is. They are in no danger except from hunger and thirst, but they don't know that. They are probably scared silly by now."

CAPTAIN CARROLL overestimated by very little. The two privates were at that time not quite "silly", but they were not far removed from it. They had waited until after the master-at-arms had made his routine night inspection, slipped from their bunks and crept down to the main issue-room. "Everything'll be shut up this time of night, won't it? Hadn't we better wait until just before daylight?"

"Can't tell how long night lasts on these little planets. Hate to have the sun come up just as we were landing on the beach," Kelton replied. "We can take it easy through the woods until daybreak, and get into town early. Then we'll have two or three hours before the patrol comes, anyhow."

Silently, Snell, who as assistant storekeeper had a key to the issue-room, opened the storeroom and the two crept below. Snell was abashed to find the air-lock hatch padlocked.

Kelton, commenting only "You *are* new to this business, aren't you?" took a tablefork from his pocket, bent one of the tines at right angles, and expertly began to prod the padlock. In a short time, it fell to pieces in his hand and he opened the door. "O. K. Bend your line to the door-hinge here and let her fall. Let's go."

The air on the beach was warm and soft and the forest rustled invitingly. Leaving their dangling lines, the two runaways were soon deep among the trees, laboriously feeling their way over tree-roots and clinging, low underbrush.

"There ought to be a road over this way," Kelton said finally, stumbling a little as he walked into a tangle of vines.

"Hope we find it soon," was Snell's panting answer. His excitement over the adventure was beginning to die out as he realized that he was already tired and hungry. "This feeling your way in strange woods is—hey! What the ——" He tripped over something large and alive and fell sprawling. There was a crashing in the underbrush and a startled, mooing animal cry.

"Aw, just a stray cow," Kelton soothed.

"Cow nothing! I fell all over it and it felt like a big snake, all hard and cold and slick!"

"Huh! Who ever heard of a snake with four legs that mooed? Didn't you hear him?"

"It wasn't a cow, anyhow. Not even a wet one. Who ever heard of a cold, hairless cow?"

"Lots of funny things on these stray planets, buddy. You ain't hurt. Come on."

Daybreak came soon after, greatly to their relief. They had not found a road as yet, nor could they find any trace

of a town. "Sure this is the place you thought, Kelton?"

"Sure, it must be. We just got lost in the woods. Now it's daylight we'll be all right."

"I hope there's a restaurant open when we get there. I could eat a whole dog-wagon."

"Well, just to show you that old Private Kelton is a pretty good guide, cast your eyes on that apple tree. Let's eat."

AT THE FIRST vigorous shake of the trunk, big, rosy apples fell in showers to the ground, and the two hungry men took enormous bites. "Arrrrgh! *Pooh!* What——" The luscious-looking fruit, bitterly astringent, puckered their mouths cruelly, and the pulp bore no resemblance to any apples they had ever seen. "Ugh! Damn gray slime! Smells like a hole full of rattlesnakes! Do you reckon it's poison?"

"Well, the beer will taste all the better," Kelton answered bravely; but it was apparent that he was worried. "What did Quills call this dump?" he finally asked dubiously.

"Ophidia," Snell grunted through puckered lips.

Kelton stopped and turned toward his companion. "Buddy, I'm sorry. It wasn't Ophidia where I was. I just remembered it was Euclidia. Gosh! Maybe there isn't any town, after all!"

"Well, Private Kelton, 'good old guide', you better find something quick. And water first. That doggoned apple has just about set my gizzard afire."

Kelton made one more attempt at bravado. "O. K. Just mention what you want. There's your water, right behind that fern-clump. Hear it trickling?"

A clear little spring bubbled out of the ground, and ran chuckling across its tiny gravel bed. The two flung themselves flat to the turf and buried their faces in its icy depths. They rose with sputtering howls. "Kerosene, by golly!"

Dumb now with misery, the two stared at each other. "Enough's enough. Let's go home and take our medicine," Snell said at last.

Kelton nodded sadly, and the two turned back. After an hour's tramp they realized that they did not know where they were nor which way was "home".

Snell scrambled into a treetop, but could see no sign of the ship. "We're down between hills. We'll have to get on top of one to see her," he reported. Ugh! Even the trees are phony—clammy and stinkin'."

The nearest hill proved deceptively far away, and the going was hard. Not only was the forest here a veritable jungle, "but the vines feel cold like snakes!" Kelton mourned. And the ascent proved to be fair mountaineering. It was more than two hours later that they scrambled to the hilltop and stared about them. "There she is!" Snell cried excitedly and pointed. Far across the valley, the ship, a tiny glistening speck, hung above the trees. "Gosh, she must be ten or twelve miles away!"

They took bearings as well as they could. "We'll head for that knoll with the white rock on top of it first. It's right on the line. Then we can get another bearing from there."

FINDING the knoll, once down the steep hill, proved to be a difficult task, and the Ophidian day was well past its noon by the time they succeeded in reaching it. The ship again was visible, but was still discouragingly far away. "Don't look like we'd made more than two or three miles good for all that hiking," Kelton mumbled.

Snell almost snarled through parched lips. "Good old guide Kelton! What a swell way you picked to get out of work!"

"Yeah," Kelton answered miserably. "I pulled a dumb one this time. What's that by your foot, buddy?"

Snell looked down at a mottled, parchmentlike flake of torn skin. "Piece of old snakeskin," he answered, picking it up. "Golly, what a snake it must be—big around as my body!"

"We better watch our step," Kelton answered. "Maybe it's poison."

"There's another piece," Snell said pointing, "and there's another. It must be right near here, shedding. It must be big as that phony cow I fell over last night."

They picked out a high, gray cliff for their second landmark, and, giddy with hunger, thirst and fatigue, started toward it. Again among the trees, they stumbled along, now both watching fearfully for evidence of the "snake as big as a cow". Suddenly ahead of them sounded the barking of a dog.

"Where there's a dog there's apt to be men," Kelton said hopefully. "Maybe he can lead us to where there's something to eat and drink. Here, Pooch! Hyah, hyah!"

The barking stopped with a low rumble of growling. Kelton kept calling, "Good old Pooch! Hyah, Pooch! If it's a dog I'll make friends with him."

They turned the rocky shoulder of a little hill and the trees opened into a narrow glade. In the sunlight, on the other side of the open space, a great, gray-green beast rubbed itself against a tree, peeling off huge flakes of dead skin. It was about the size and shape of a St. Bernard dog, but its body, entirely hairless, ended in a long ratlike tail and its head was like a great blunt arrowhead. It stared at the men with unwinking beady eyes and again barked.

"Geeze! Look what you been calling! You better make friends with him quick!" and Snell stooped to pick up as big and jagged a stone as he could find. Kelton, with a gasp, also grasped a stone. The two terrified men stood waiting for the beast to charge, but after a brief stare, the horror opened its mouth. Two enormous fangs shot out from its upper jaw, a long forked tongue flashed in the sunlight. Then, with a low hiss, the beast vanished into the jungle.

"THAT'S ENOUGH for me," Snell said after his breath returned. "It's about sundown, and I'm not walking these crazy woods at night again. I'm going up that big tree and hang up there till daylight."

"You and me both," Kelton assented.

Together the runaways clambered wearily into a large tree in the center of the little clearing, and had barely succeeded in matting prehensile vines into a sort of safety harness to hold them if they fell asleep, when the sudden Ophidian night was again upon them.

"Ugh!" Snell grunted again. "Every darn thing on this goofy planet feels and smells like snakes! Even the bark on this tree. And as for these vines——"

Kelton shuddered. "Snakes—I hate 'em! But who ever would have thought that cows and dogs could be snaky? I wonder if the men are snakes too? If there *are* any men."

"Ssh!" Snell warned. "There's something down below."

Vague, swift figures flitted across the shadowy glade and clustered in the black gloom under the tree. "They're climbing up to us!" shrieked Kelton. "Break yourself off a club!"

Hysterical with fright and weak from hunger and thirst, they tore frantically at the branches, but were able only to break off small switches of the tough, flexible wood. Where they broke the mottled, hidelike bark, cold, slimy sap ran out spreading a fetid odor. The nocturnal intruders could be heard scrambling from branch to branch toward the two men, chirping and hissing as they came. Kelton slashed viciously with his switch at two prehensile, shadov[illegible]ms that reached up through the da[illegible] blow hit something solid and t[illegible]s the crash of a falling body and low whimpering. "Snake men or snake

monkeys!" he gasped. "Look out, Snell, there's one on your limb!"

"There's two," Snell groaned. "One's got me by the leg—oof! Take that, you brute!" His fists and feet flew wildly and two of the Ophidians were knocked back to the lower branches. "Arrgh! The breath on 'em!"

Kelton was moaning like a frightened child. "Light a match so we can see 'em. Remember the fangs on that damn dog-thing! Maybe these apes are poison too!"

Tremblingly Snell took a box of matches from his pocket and scratched one. He tried to hold it so the glare would strike downward, and in reaching, he brushed a branch which had been bruised. Instantly the sap caught fire with a sizzling yellow glare. "The sap's keroseney too, like that water in the spring! Get down! The whole dam' tree's afire!" Sobbing, they tumbled downward from branch to branch as the treetop turned into a roaring yellow blaze, lighting the woods in all directions. "Look out for the apes, we'll have to run from 'em!"

"Run for that heap of rocks! We can get on top of that and maybe fight 'em off!" Kelton panted.

The blue apes had scattered in alarm at the sudden flare of light and made no attempt to pursue. They stared, hissing and chirping excitedly, at the flaming tree until the two frantic men had reached the top of a pile of broken rock-shale under a high cliff. "There's enough darnicks here to fight 'em off as long as we got light to see 'em. Wish it was morning!"

Kelton began to laugh hysterically.

"What's so doggoned funny?" Snell demanded.

"M... What an egg I laid this time! ...y, Kid. First time I ever wished ...ol would get me quick. Hey! Where you goin'?" for Snell was climbing down the cairn again.

"Ssh! The apes ain't looking. I'm going to get some of that dead brush up here, so we can start a fire to see by and can throw if they come again."

THE EXECUTIVE officer again entered the cabin to make his morning reports. "Repairs completed early this morning, Sir. The men have done a good job. With your permission, I'd like to have a 'Ropeyarn Sunday' for them—no drills at all today. They've earned it."

"Fine!" Captain Carroll agreed. "Tell the steward to serve a good bang-up holiday dinner too, if he can. Any news of Kelton and Snell?"

"No, Sir. The patrol's ready to look for them whenever you say."

"Better start them now. It may take some time to find them in this jungle. By the way, warn the patrol not to be alarmed at any dangerous-looking beasts they may see. Ophidia gets its name from the fact that both the fauna and flora are reptilian—cold-blooded—and are equipped remarkably like our snakes. However, I know that they are not venomous, at least to humans. Look!"

The captain held out his left hand, showing two round white scars on its back. "A thing like a man with a snake's head struck his fangs in there when I hit him. I thought I was done for, but I've had worse bites from my own Chow dog. I discovered afterward the poor beast wanted only to crowd up against me and get warm."

The patrol in charge of Sergeant McClure landed and struck into the bush. "I saw fire over this way last night," said the sergeant taking careful bearings with his pocket compass. "The Skipper says it must have been them, so we'll look that way first. And remember this, you mugs: no rough stuff when we find 'em. The Skipper says they're probably sick and that they've had nothing to eat or drink since they jumped. Fools! A man's cracked to jump ship on a planet he ain't seen before!"

"Treat 'em soft, eh?" grumbled Corporal Mellor. "When they ran out on the heavy work yesterday and let their shipmates hold the bag?"

Sergeant McClure grinned. "Don't worry," he answered. "The exec. was asking me about any special jobs of extra duty I could think of. Those two are going to chip and red-lead the forward trimmin' tank on the way to 'Frisco all by their little lonesomes. They haven't got away with a thing. I'll see to that!"

When the patrol finally found the wanderers, they stopped short staring, and even the hard-boiled sergeant whistled through his teeth. Haggard and sobbing, the two were back to back on the summit of a little stone mound, feebly striking about them with burning branches, while around them crowded a score of slate-blue, snake-headed, manlike things, chirping and hissing. "Geeze!" yelled Corporal Mellor, his animosity forgotten. "What a jam to find a shipmate in! Sock 'em, bullies!"

WITH DRAWN truncheons, the patrol charged, scattering the Ophidians and picking up the fainting men. "Water!" was all that Snell and Kelton could say.

Back on board, revived a little by the canteens of the patrol, the two faced Captain Carroll. The captain's first intention had been to read the two errant privates a lecture on the wages of sin. One look at their ragged clothing and pallid faces was enough. "Put them in the brig until they're rested," he ordered.

"Brig ration? Bread and water, Sir?"

Captain Carroll looked at the two frightened, famished faces. "No," he said. "They have been undergoing some hardship already. Full ration," and he turned on his heel.

News of the predicament from which they had been rescued spread rapidly over the ship; and even the heart of the commissary steward was softened. It wasn't regular meal hours, but sometimes you can't be too tough. The steward himself entered the brig where Kelton and Snell were slumped wearily on their bunks. "Chow, shipmates! They do tell me you've been missing pipe-down lately."

Not until the last smear of gravy had been wiped up by the last crumb of bread and the last drop of coffee almost squeezed from the pot did Kelton and Snell find words.

"Wheee-ew!" sighed Snell gustily. "Never again!"

Kelton wiped his lips with the back of his hand and stretched himself out on his bunk. "Extra duty tomorrow, but tonight it's all night in and beans for breakfast," he murmured drowsily as he pulled his blanket over his shoulders. "Good old brig!"

# LANGUAGE for TIME-TRAVELERS

## by L. Sprague de Camp

***All things change, and language is by no means the slowest. They may both be speaking English—and neither one know it!***


GRADUALLY, the rainbow flicker of light died away, and Morgan Jones felt the tingle leave his body. The dial read 2438. Five hundred years! He opened the door of the compartment and climbed out.

"At first, he saw nothing but fields and woods. He was evidently in a farming country. Nobody was in sight—no, here came a rustic along the road, trudging through the dust with his eyes on the ground in front of him.

"'Hey there!' Jones called. 'Could

you give me some information?'

"The man looked up; his eyes widened with astonishment at the sight of the machine. 'Wozza ya seh?' he asked.

"Jones repeated his question.

"'Sy; daw geh,' said the man, shaking his head.

"Now Jones looked puzzled. 'I don't seem to understand you. What language are you speaking?'

"'Wah lenksh? Inksh lenksh, coss. Wah *you* speak? Said, sah-y, daw geh-ih. Daw, neitha. You fresh? Jumm?'

"Jones had an impulse to shake his head violently, the same feeling he always had when the last word of a crossword puzzle eluded him. The man had understood him, partly, and the noises he made were somehow vaguely like English, but no English such as Jones had ever heard. 'Inksh lenksh' must be 'English language;' 'sah-y daw geh-ih' was evidently 'sorry, don't get it.'

"'What,' he asked, 'is a fresh jumm?'

"'Nevva huddum?' said the rustic, scorn in his tone. 'Fresh people, go *Oui, oui, perlez-vous Francais, va t'en, sale bête!*' He did this with gestures. Then he stiffened. 'Jumms go'—he clicked his heels together—'*Achtung! Vorwärts, marsch! Guten Tag, meine Herren! Verstehen Sie Deutsch?* Fresh from Fress; Jumms from Jummy. Geh ih?'

"'Yes, I suppose so,' said Jones. His mind was reeling slightly——"

Thus might almost any novel on the time-travel theme or the Rip Van Winkle theme begin. The author, having landed his hero in the far future, may either ascribe telepathy to the people of the time, or remark on how the English language will have changed. The foregoing selection shows—in somewhat more detail than do most of the stories—a few of the actual changes that might take place. To be strictly consistent, I should have changed the French and German selections also, but, in the first place, I don't know enough about French and German to predict their future evolution, and, in the second, it would have made the rustic's explanation utterly unintelligible. It might be interesting to consider in detail just what changes may occur. To do this thing right we shall have to first take a brief look at the language's present state and its past history.

English is a Teutonic Language, like German, Dutch, and Swedish, with a large infusion—perhaps a majority—of French words. Its parent tongue, Anglo-Saxon, was more highly inflected than its descendant—less so than Latin, but about as much so as modern German.* Anglo-Saxon would sound to a modern hearer as much like a foreign language as German; English didn't become what would be intelligible to us until about the 16th Century. English of the 1500's would sound to us like some sort of Scotch dialect, because it had the the rolled "r" and the fricative consonants heard in German: *ich, ach* (that's what all those silent *gh's* in modern English spelling mean—or rather, used to mean) which have been retained in Scottish English, but lost or transformed in most other kinds of English. We have a fair idea of the pronunciation of Shakespeare's time because about then people began writing books on the subject. It's amusing to reflect that if Shakespeare returned to Earth, he'd get along passably in Edinburgh; he could manage, with some difficulty, in Chicago—but he'd be hopelessly lost in London, whose dialect would differ most radically from his! So much for the "language of Shakespeare!"

AUTHORS are fairly safe in having the people of the future speak English—which is very convenient for the authors. Aside from the fact that no-

*For instance, the noun *end* in Anglo-Saxon had these forms:

| | *Singular* | *Plural* |
|---|---|---|
| *Nominative* | ende | endas |
| *Genetive* | endes | enda |
| *Dative* | ende | endum |
| *Accusative* | ende | endas |

body can prove them wrong, English is, today, well on the way to becoming the world's international language. It is probably taught in the schools of more countries than any other. In number of speakers it is exceeded only by Cantonese and Mandarin, the chief languages of China, each of which is divided into a myriad of mutually unintelligible dialects; its nearest rivals, Spanish and German, are far behind it in number of speakers. It's a concise language,* and the simplicity of its grammar makes it easy to learn, though its fearsome spelling is an obstacle to the student. It's a safe bet that another century will see it the second language of every passably educated person on Earth, and in another millenium it may well be the only living language.

Like all living languages, English is changing slowly but constantly in pronunciation, vocabulary, and syntax. The first would probably cause our hero the most trouble. It changes pretty rapidly, and is responsible for the fantastic irregularity of English spelling, the spelling usually being a few centuries behind the pronunciation. The spelling of *caught* was reasonable when the word was pronounced "kowcht", with the "ch" as in German *ach*. But consider the number of sounds a single letter may represent today, as in *odd, off, come, worry, old, wolf, do, women, lemon.* Shades of sound can't be represented exactly by ordinary spelling, because all readers won't interpret the letters the same way; and some sounds simply can't be spelled: for instance, the *ir* part of *first* as often pronounced in New York City and parts of the South—a sound halfway between "oi" and "ay".

Speech sounds can be analyzed into fundamental units called *phonemes;* these move around like protozoa in a drop of water, and, like protozoa, join together and split up. For instance, a few centuries ago *person* and *parson* were one word, spelled *person* and pronounced "pairson". But the "air" group of words split, some like *jerk* joining the words like *turn,* and some like *heart* joining the words like *march.* In this process *person* acquired two pronunciations with different meanings.

Much commoner is *leveling,* wherein two phonemes merge. For instance, *vain, vein,* and *vane* were once all pronounced differently; so were *right: wright:rite:write.* We can see the process at work in the leveling, by many Americans, of *due:do* and *Mary:merry: marry.* The British, with their loss of "r" except when a vowel follows, do worse, leveling *over:ova, sort:sought,* and *paw:pour:poor.*

IF THE PROCESS goes far enough —as it has in those concise Chinese languages—language becomes a guessing-game between speaker and hearer, and speech is one long pun. In some forms of Chinese a single spoken word may have as many as 69 distinct meanings. French is worse than English in this respect, but neither is anything like as terrible as Chinese. In English a hearer can usually tell, upon hearing such an ambiguous sound, which meaning is meant from the context. If, as some people do, you pronounce *whale* like *wail,* nobody will think, hearing you speaking of harpooning a *whale,* that you really meant harpooning a *wail.* But if, as some do, you pronounce *oral* like *aural,* you're very likely to confuse your hearer if he doesn't know in advance what is coming.

If we add together all the leveling tendencies of modern English, we can synthesize a dialect in which *cud, card, cowed, coward* are all pronounced like

*The same passage translated into various modern languages has the following numbers of syllables:

| | |
|---|---|
| Cantonese | 89 |
| Annamese | 100 |
| English | 146 |
| Spanish | 157 |
| Ukrainian | 189 |
| Hungarian | 196 |
| Greek | 234 |
| Japanese | 242 |

*cod; tarred, torrid, tied, tired, towered* are all pronounced like *Todd; Shaw, shore, sure* are pronounced like *show,* and so forth. This is a reasonable speculation: some Southerners pronounce *shore, sure* like *show;* some Londoners use an "ah" sound in *cud,* etc. I hope it never happens, but it might, and we should probably manage to communicate—though with more misunderstandings, especially over the telephone. Leveling seems to be an inevitable linguistic development, though literacy—a relatively new thing for the masses—may have a countereffect. *Boil* and *bile* were once pronounced alike, but were pried apart by the influence of spelling.

The thing that would most completely bewilder our hero would be another Great Vowel Shift. The last occurred in the years 1400-1800, and resulted in changing *time, teem, team, tame* from "teem", "tame", "tehm", "tahm" to their present pronunciations. All the front vowels except those in *bit, bet* moved up. The top one, "ee", being unable to go higher, became a diphthong.* The back vowels underwent a similar change.

There are signs that another vowel shift, a little different from the last, impends. In London Cockney it has practically taken place: *punt* has become something like *pant, pant* like *pent, pent* like *paint, paint* like *pint,* and *pint* like *point. Call* has become like *coal,* and *coal* something like *cowl.*

Imagine our hero's predicament if this sort of thing becomes general. He crawls out of his time-machine in 2438 A. D., as stated at the beginning of the article, and promptly runs afoul of the law.

Hero: Beg pardon, but could you tell me——

Cop: Hanh? Didjue sy samtheng?

Hero: Yes, you see——

Cop: Speak ap; kent mike it aht.

Hero: Well——

Cop: Woss thowse fanny clowse? P'ride?

Hero: I'm sorry, but——

Cop: Downt annersten ja; kentcha speak English?

Hero: Yes, of course——

Cop: Woy downtcha, thane? Luck loik a spicious kerracter; bayter cam 'lohng to the stytion. Jile for you, me led!

ANOTHER factor in linguistic evolution is the influence of sounds on those preceding and following them. We tend to take short-cuts in getting from one sound to another. The "k" sounds in *cool* and *cube* differ slightly; the second is nearer "t" than the first, because of the influence of the following "y" sound. If this process goes far enough (as it did in Latin), the "ky" combination may become "ty", and finally "ty" may become "tch", as *statue* has changed from "stat-yue" to "stat-chue". Hence our descendants may pronounce *cube* as "chube".

Our weakness for short-cuts—plus plain laziness—results in the complete dropping of sounds. Hence we often hear "prob'ly", "partic'lar", and "com-f'table". The contracted forms "in-t'rest", "gen'ral" have become more or less standard; the others may follow in due course. Most of the "silent" letters in our spelling, as in *askEd, WrotE, KniGHt,* once stood for real sounds. The British outdo us in this respect, with their *Whitehall* "wittle" and *military* "miltry".

The British have slaughtered a large fraction of their r's; some of them have dropped "h" from their speech. The Scotch have dealt similarly with "l" and "v", so that in Broad Scottish *gave* is "gay". The story is told of an Aberdeenian in a dry-goods store who held

*If you can watch your tongue in a mirror while saying the vowels of *beet, bit, bait, bet, bat* without the "b" and the "t", you'll see why we say that *beet* has a high vowel and *bat* a low one. *Front* and *back* refer to the part of the tongue that is highest when the vowel is sounded; hence *beet,* etc. have front vowels while *odd, all, go, good, do* have back vowels; those in *above* are intermediate.

up a piece of cloth and asked the clerk, "Oo?"

"Ay, oo."

"Ah oo?"

"Ay, ah oo."

"Ah ae oo?"

"Ay, ah ae oo."

Not to keep the reader in suspense any longer, "Ay, ah ae oo" means "Yes, all one wool." (In repeating this story, remember that "Ay" is pronounced like *eye.*)

Our chief victim seems to have been "t", whence we often hear *posts, tests, loft, wanted* as "poce", "tess", "loff", "wanned". Sometimes we drop "in", nasalizing the preceding vowel to make up for it, as in *don't,* sometimes pronounced "dote" or "doh" with a nasal "o".

LET'S SUPPOSE that our hero has been hailed before a magistrate. To change the assumptions a little, suppose that the vowels are still recognizable, but that dropping and assimilation have been going full blast.

Magistrate: Wahya, pridna?

Hero: Huh?

Mag: Said, wahya?

Hero: You mean, what's my name?

Mag: Coss ass way I mee. Ass wah I said, in ih?

Hero: I'm sorry. It's Jones, j-o-n-e-s, Morgan Jones.

Mag: Orrigh. Now, weya from?

Hero: You mean, where am I from?

Mag: Doh like ya attude, pridna. Try to be feh, buh woh tollay dispecfa attude. Iss a majrace coh, ya know.

Hero: You mean, this is a magistrate's court? I don't mean to be disrespectful, but——

Mag: Weh, maybe in yooh faw. Eeah ya fahna, aw nah righ melly. Sodge, lock im up. Gah geh mel zannas dow ih, to zam is satty.

Hero: But look here, I don't need a mental examiner to examine my sanity—I'm all right mentally——

IT SEEMS our time-traveling hero may be reduced to the device adopted by a man I once knew who made a trip to Germany. Entering a hotel with a companion, he asked, in what he thought was German, for two rooms and bath. The clerk looked blank, then replied in something that was evidently intended to be English, but which conveyed no sense whatever to the American. After some more futile vocalization of this sort, the clerk had an inspiration: he got out a pad and wrote in the plainest of English, "What do you gentlemen want?" The American took the pad and wrote "Two rooms and bath", after which there was no more difficulty.

However, it's unsafe to say that English as a whole will take any particular course, merely because one of its many dialects shows signs of doing so. A phoneme may reverse its direction of change repeatedly: in King Alfred's time the first vowel in *after* was about that of modern *cat;* by 1400 it had moved down and back to the vowel of modern *calm;* by 1600 it had moved back to the *cat* position, where it still is with the great majority of Americans (don't let the dictionaries fool you with their "intermediate 'a' "). Finally in modern Southern British it has moved back down into the *calm* position again. This sort of thing can go on indefinitely.

Sounds that have been dropped can be restored by the influence of spelling. An example is the "t" in *often,* which was dropped long ago along with the "t's" in *soften, listen, castle,* but which has been revived by a few speakers, including the President of the U. S. Such an addition of a sound to a word is called a *spelling pronunciation* and is considered incorrect when first introduced. But sometimes one takes hold and becomes universal, after which it is "correct". Examples are the "h" in *hospital* and the "l" in *fault,* which originally (when the words were taken over from French) weren't sounded at all.

We might here dispose of the illusion that there is an absolute standard of "correctness" to which we can refer. There are no tablets of stone stating once and for all what is and isn't correct, and dictionaries are compiled by fallible human beings and often disagree. The only real standard, aside from individual prejudices, is the actual usage of educated people. The fact is not that we use pronunciations because they're correct, but that they're correct because we—or a large number of us—use them. If a hundred million people pronounce *after* with the vowal of *cat,* that's correct by definition, even though not the only correct form, dictionaries to the contrary notwithstanding.

THE RATE of change of pronunciation is probably dependent, to some extent, on the state of a civilization, and changes should take place more rapidly in periods when illiteracy is high, and schools and spelling have less braking effect. A collapse of civilization in the English-speaking world would make another vowel-shift more likely, and result in more dropping and assimilation of sounds. If our hero knows this, he might be able to make a shrewd guess at the vicissitudes through which the world has passed even before he learns its actual history since his time.

English has numerous dialects, some being beyond the range of mutual intelligibility. A Scotchman I once knew would testify to this: he spent an unhappy afternoon trying to find Myrtle Avenue, Brooklyn. After asking innumerable Brooklynites how to get to "Mair-r-rtle Ahvenü", one of them finally caught on and said, "Oh, you mean Moitle Ehvenya!"

But which dialect most resembles the English of the future? North America has four major dialects: those of New England, New York City, the South, and General American, which includes everything else. The British Isles have a much bigger variety; that of London and vicinity has, by virtue of London's being the capital and the commercial metropolis of Great Britain, acquired the prestige of a standard. Hence Londoners are wont to say that they speak true English, and anything else is a "bah-b'rous dahlect". Often they argue that their form of speech is the "most beautiful", but that merely means that they're accustomed to it and so like it best. One feature of Southren British (the speech of educated Londoners and ruling-class Englishmen generally), the loss of "r" sounds except when a vowel follows, is also heard in New England, New York City and the South; others, such as the use of "ah" in *half, last, dance,* and about 150 similar words, occur in New England but are rare elsewhere in North America.

These dialects tend to evolve in different directions, like species. Unlike species, they also merge into intermediate forms. Right now, the forces tending to merge and homogenize them (radio, etc.) are much stronger than those tending to separate and diversify them. Given our mechanical culture, this is likely to continue until they have all been pretty well leveled. What will the result be?

The prestige of Southern British is high; European schools teach it. Many actors and radio-announcers in this country imitate it—though the result is often more funny than impressive. But as a result of economic forces, the commercial and intellectual center of gravity of the English-speaking world seems to be shifting to this side of the Atlantic, which phenomenon should cause a decline in the prestige of Southern British. As this happens, some form of American speech will become a "world standard".

The dialects with the best chance of doing this are probably New York speech and General American. The former has the advantage of being the speech of the country's greatest metrop-

olis and its cultural center. The latter has the advantage of numbers: about as many people speak it (90 or 100 million) as speak all the other kinds of English combined. It conforms more closely to the spelling, so that it is easier for foreigners to learn. My money would go on General American—but then, like most people, I'm probably prejudiced in favor of my native tongue. Very likely the final result will combine features of both dialects.

OUR GRAMMAR has been simplified about as much as it can be, so that only limited changes are to be looked for therein. We still have some irregular plurals, such as *child:children, mouse:mice, deer:deer;* these are hangovers from Anglo-Saxon, which had several declensions of nouns forming the plural differently.* Given enough time, they will probably be cleaned up: *bretheren,* for instance, has been displaced by the regular *brothers.* Our irregular verbs, such as *take:took, drink: drank, put:put* are more numerous and will be harder to get rid of.

Idiomatic word-combinations such as *make at, make away with, make bold, make good, make light of, make off, make off with, make out, make sure, make sure of, make up, make up to, make up with* are the despair of foreigners learning English, as their meanings cannot be derived from a consideration of their component words separately. The making of these combinations goes on all the time, and they are likely to cause our hero plenty of headaches.

*For this undiluted blessing—the loss of a multitude of cases, forms, and rules—we are, probably, indebted to the fact that English was, for some centuries, the poor-man's tongue. The Normans invaded England, and made their language the tongue of all educated, refined people. For centuries, all who could write, wrote anything but English—usually Latin. The result was that English was freed of all grammarians, conservatives, and formulists. The farmers, peddlers and country people proceeded joyfully to throw out large quantities of unnecessary verbiage that got in their way. By the time the grammarians again laid hands on the language, a lot of useful pruning had been accomplished.

Another change that may cause him difficulty is the dropping of understood words from sentences, as when we say "the man I saw" for "the man whom I saw", or "Going?" for "Are you going?" That's *ellipsis,* if you want a five-dollar word. We practice it when we write telegrams or newspaper heads. As with leveling and compression of words, we gain in speed at the expense of clarity. I recall once being puzzled by a headline reading "Little British Golf Victor". Did it mean that a horse named "Little British Golf" had won a race? No, it transpired that a man named Little had won a golf tournament in England. Another read "Gold Hunt Started by Skeletons". Alas, a reading of the article dispelled my first cheerful picture of a crew of skeletons slogging off to the gold country with pick, pan, and pack-mule. All that had happened was that somebody had dug up some skeletons, quite inanimate, and this discovery had caused local gossip about the possible existence of a buried cache or hoard of gold. Of course, the head-writer had meant "The Starting of a Hunt for Gold Has Been Caused by the Discovery of Skeletons". He simply assumed that the reader would fill in all the missing words.

Again, the Chinese languages are a horrible example: one may say that the Chinese talk in headlines. The table showing the comparative conciseness of languages, in the early part of this article, indicates the extraordinary terseness of Cantonese; Annamese, another Indo-Chinese language, is second on the list. Pitkin's "History of Human Stupidity" cites the Chinese proverb "Shi ju pu ju shi ch'u"—literally "Miss enter not like miss go-out". Even a Chinese would be baffled by this unless he knew that it meant, "It is worse to imprison an innocent man than to release a culprit." As far as the actual words go, it might as well mean the opposite.

SUPPOSE that as a result of a prolonged diet of headlines, English is reduced to a terseness like that of Cantonese. Our hero is being examined by the experts for whom the magistrate has sent. We'll neglect changes in pronunciation—I think you'll have had enough of my quasi-phonetic spelling—and concentrate on changes in syntax.

Hero: Welcome to my cell, gentlemen. Your names please?

1st Expert: I Mack.

2nd Ditto: I Sutton.

Hero: Delighted; you know my name of course. What do you want me to do?

Mack: From?

Hero: What?

Mack: No what, from.

Hero: Now, let's get this straight. You want to know where I'm from? That's easy; Philadelphia.

Sutton: No hear.

Hero: PHILADELPHIA.

Sutton: No mean no hear you; hear plenty. No hear Philadelphia.

Mack: Such place?

Sutton: Maybe. Ask more. Continent?

Hero: No, it's a city.

Sutton: No mean no. Philadelphia no continent, Philadelphia on continent. Six continent. Which?

Hero: I see—North America.

Mack: No North America Philadelphia.

Sutton: Crazy. Too bad.

Mack: Yes. Word-crazy. Too much word.

Hero: Say, what is this? You two sit there like a couple of wooden Indians, and expect me to understand you from one or two words that you drop, and then you say *I've* got a verbal psychosis——

Mack: Proof. Escape. Fingerprint. Check, sanitarium.

Sutton: Right. Interest. Health. Too bad. (They go out.)

But actually, I doubt whether headlines will ever bring the language to this sad state. Their influence is probably confined to popularizing a few uncommon words, such as *laud, flay,* which are preferred to *praise* and *denounce* because of their shortness.

Changes in vocabulary are difficult to foresee, though we can classify, if we can't prophesy, them. When we have a new meaning to express, we can do any of several things: We can invent a new word out of whole cloth, like *gas, hooey.* We can combine Latin or Greek roots to make a word, like *Ornithorhynchus, telephone.* We can combine parts of existing English words, as in *brunch* (Hollywood slang for an eleven o'clock meal). We can borrow a word from another modern language, either in something like its original form, as with *knout* (Russian), *khaki* (Hindustani), or corrupted, as with *crawfish* (Old French *crevice*), *dunk* (German *tunken*). Most often, we pile the new meaning on some unfortunate existing English word, which thereafter does double, triple, etc., duty. Thus *short* has acquired the meanings of a *short* circuit, a *short* story, a *short* movie such as newsreel, a *short* shot in artillery fire, a type of defect in iron castings, etc. Next to pronunciation changes, vocabulary changes will be the most baffling of our hero's troubles with Twenty-Fifth-Century English. Perhaps he'd better take a course in sketching before starting his time-journey: when words, both spoken and written, fail, he can fall back on pictures!

Words also become obsolete and disappear. Sometimes we adopt another way of saying the same thing, because of convenience, fads, or reasons unknown. Where we once said "I height Brown", we now say "I am called Brown" or "My name is Brown". (Germans still say "Ich heisse Braun.") The old second-person singular pronoun *thou* has become obsolete, the plural *you* being used instead.

AGAIN, words may disappear because the things they refer to disappear. Thus *hacqueton* is obsolete, because nobody has used a hacqueton (a padded shirt worn under armor) for some centuries. *Buggy* and *frigate,* to name a couple, will probably follow *hacqueton* in all vocabularies save those of historians and specialists, unless somebody finds new meanings for them. Thus *clipper* has been saved by a transfer of its meaning to a modern object.

It's not strictly correct to say that today's slang is tomorrow's standard English, if we can judge from history. Of our vast "floating population" of slang terms, only the most useful few (like *mob,* originally a slang word) will be admitted to the company of words used in serious speech and writing. Our hero will find that most of the slang of his time has gone without a trace, and that the people of 2438 have a whole new set of slang terms wherewith to bewilder him. (I'm reminded of a time I had occasion to explain to a South African that by "the grub is fierce" I meant, not "the larva is ferocious", but "the food is unpalatable.")

LET'S SUPPOSE that our hero has been let out of the psychopathic ward, and has convinced the authorities of his true origin. He's turned over to a local savant who is to act as his guide and interpreter. This time we'll concentrate on changes in vocabulary and idiom.

Savant: Morning, Mr. Jones. I'm Einstein Mobray, who is to symbiose you for a few days until you hoylize yourself.

Hero: I'm sorry—you're going to what me until I what myself?

Mobray: I mean, you're going to reside with me until you adapt yourself. "Symbiose" is from "symbiosis", meaning "living together"; "hoylize" is from "Hoyle", as in the old term "according to Hoyle", "in conformity with the prevailing rules." I'll try to avoid terms like that. I have a surprise for you: another man from the Early Industrial Period—about 1600. Ah, here he is—come in, Godwin. This is Morgan Jones, who I was telling you of. Mr. Jones, Godwin Hill.

Hill: Verily, 'tis a great pleasure, Sir.

Mobray: Mr. Hill haved a most markworthy accident, whichby he was preserved from his time to ourn. He'll tell you of it, some day.

Hill: Faith, when I awoke I thought I had truly gone mad. And when they told me the date, I said "Faugh! 'Tis a likely tale!" But they were right, it seems. Pray, how goes your trouble with authority, Einstein?

Mobray: The cachet's still good, but I'll get up with the narrs yet. What happened, Mr. Jones, was that I was gulling my belcher——

Hero: Your what?

Mobray: Oh very well, my aerial vehicle propelled by expanding gasses, like a rocket. I was coasting it, and getted into the wrong layer, and they redded me down. The cachet means an upcough and thirty days' hanging.

Hill: 'Sblood, do they hang you for that?

Mobray: Not me, my silk. I mean, my operating permit will be suspended for thirty days, and I'll have to pay a fine. But I hope to get up with them.

Hero: You'll get up with them? Do you mean you'll arise at the same time they do?

Mobray: No, no, no! I mean I expect to exert influence to have the cachet rubbered.

Hill: You—your???

Mobray: I mean, to have the summons cancelled.

Hero: Oh, *I* see! Just like fixing a ticket!

Hill: What, Mr. Jones? Does that not mean "attaching an admission card"?

Mobray: I'd have neured that he meant, "repairing a public conveyance". What *did* you mean, Mr. Jones?

Hero: Well, in my time, when a cop pinched you——

Hill: Cop? Pinched?

Mobray: (dials the portable telephone on his wrist) Quick, send up six dictionaries and a box of aspirin!

Hill: Aspirin? You mean "aspen"? There grows a tree by that name——

(Curtain)

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# CONTEST

Six months ago, I said ***Astounding*** was looking for new writers with new ideas. We have been getting a number of letters suggesting that we should organize a contest to stimulate new writers. That contest idea seems to me to be a good one, so let's look into the possibilities for a moment. First, we'll have to formulate the rules.

For legibility, the manuscripts must be typewritten on one side of white paper—preferably standard typewriter size. They must be double-spaced to allow room for editing and proof-reader's markings. Entering and closing dates——? We'll let that go for the moment, and consider prizes.

A longer manuscript means more work, more research, more polishing. We ought to allow higher prizes for that. Suppose we offered $450.00 for a three-part novel, $200.00 for a novelette, and $60.00 for a short story. Those seem like pretty sound prizes. They certainly should stimulate some new writers.

Now as to eligibles. There are two possibilities; an "open" contest, free to professional and amateur alike. Or we could have an amateur-only contest. Would it make any real difference? The winning manuscripts, to be winners, must be as good as any professional's work, whether an amateur or professional does it. Since every manuscript must compete with the winner, then, it makes no real difference whether it be "open" or not. But since the thing we primarily want is good material—perhaps from professionals in other fields—we ought to make it open.

Judges? The editors usually get that job. The readers will determine whether a given contestant appears again.

Now that is shaping up remarkably like a contest we have run—run for considerable time. Every month we hold that contest, judging several hundred amateur and professional submissions. We pay those prizes to the winners—and pay several winning prizes for novelettes and short stories every month! Not just one winner, but several. Further, there is neither opening nor closing date; there is no limit to the number of submissions one entrant can make, and no waiting for months while the judging takes place. It is, in fact, our regular buying practice.

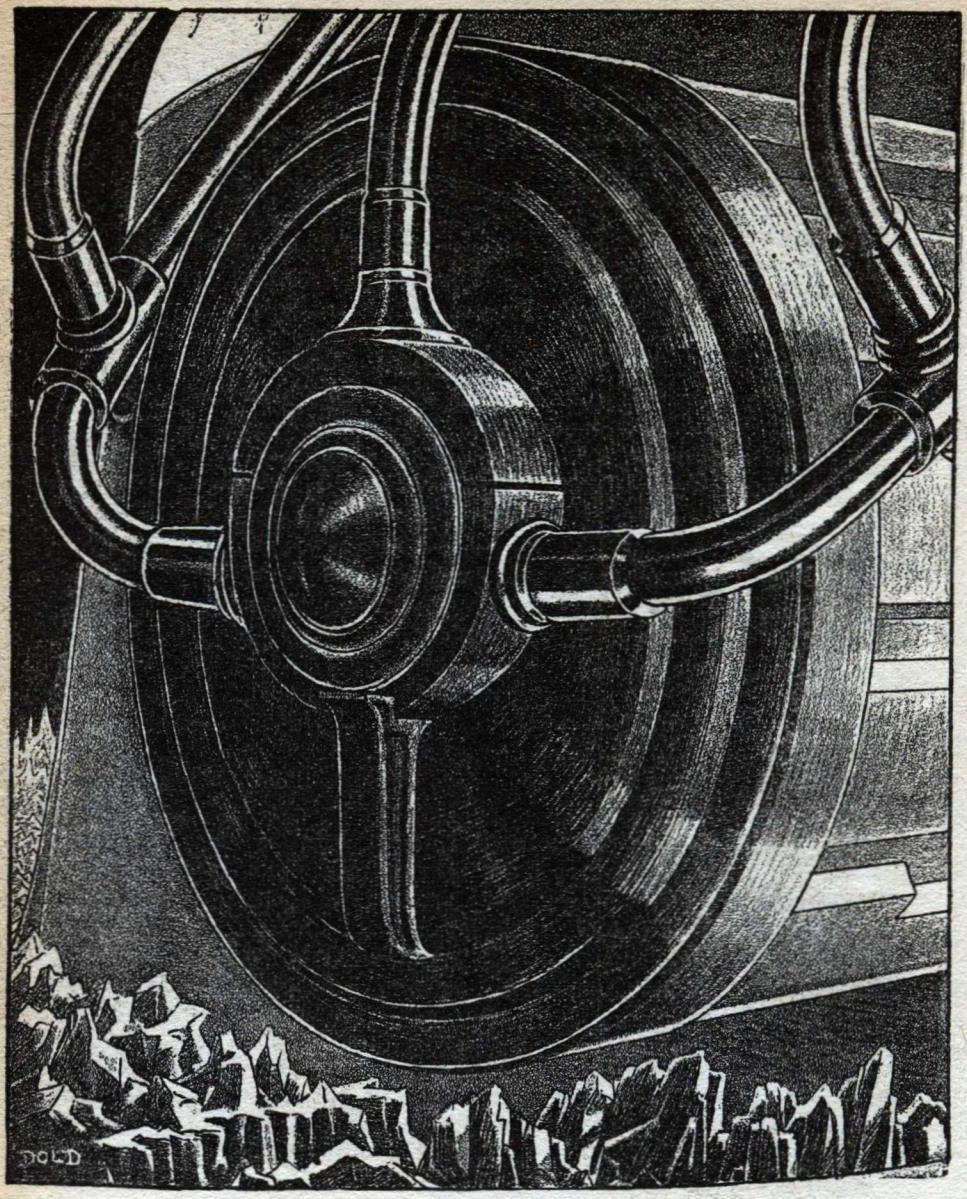
Winners? Amateurs? Kent Casey—Lester Del Rey—M. Schere—John Victor Peterson—and, less recently, a dozen others. L. Ron Hubbard, this month, represents an "amateur" in this field, well-known though he is in other fields. L. Sprague de Camp was an amateur not so long ago.

And Kent Casey, L. Sprague de Camp, Lester Del Rey, and M. Schere have all won first or near-first places in reader approval. Kent Casey and M. Schere have already won several "first prizes", too, a thing no limited contest could offer.

So ***Astounding*** can announce a contest—a contest for new, good authors, a contest that has neither entry nor closing date, nor is it limited to one prize apiece nor one entry per contestant. We've all gained by those past winners; we'll gain, I know, on new winners. Better stories—new ideas.

The contest is on—and goes on.

The Editor

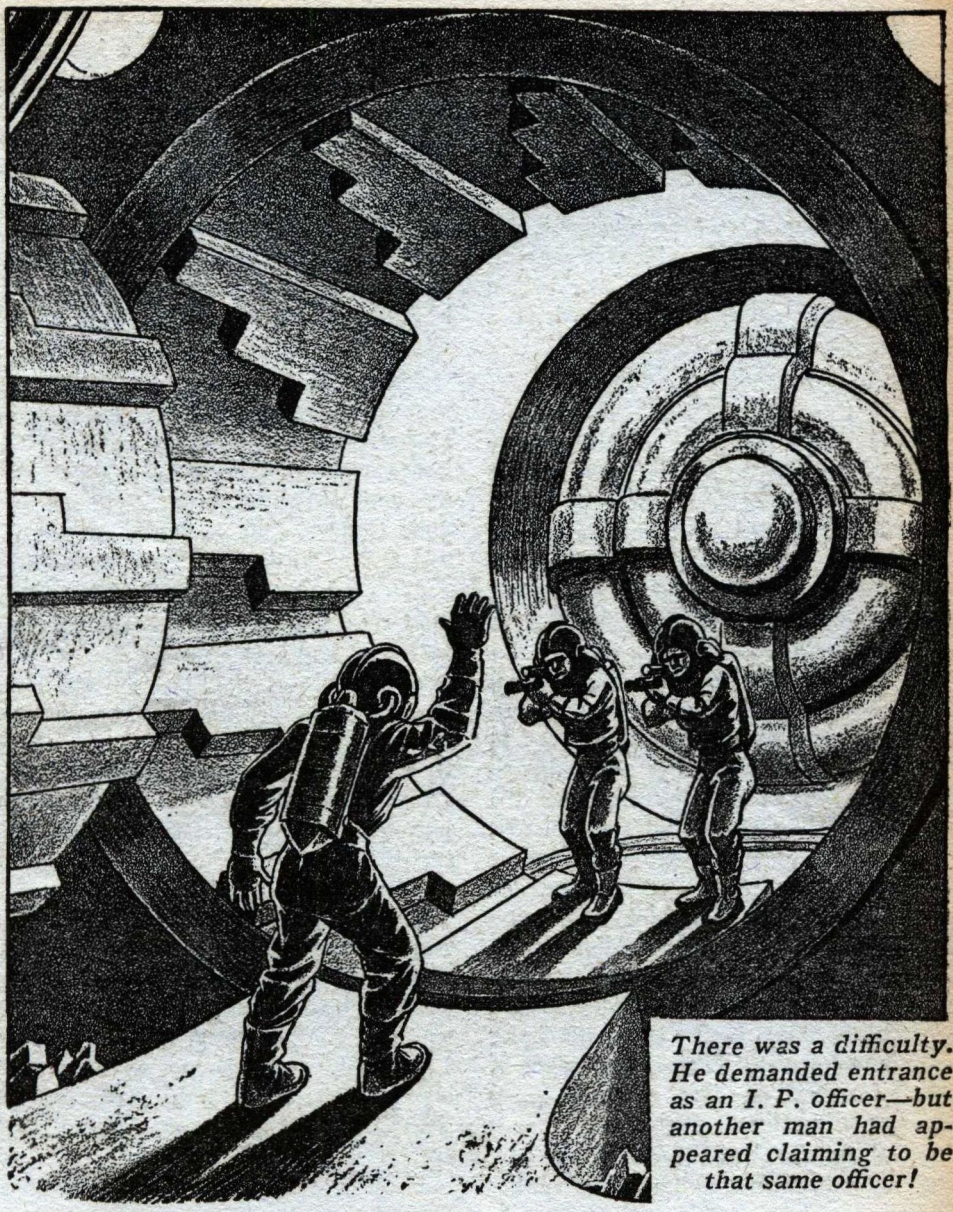


# The MEN

***Concerning the Law and the Outlaw—trapped together by the Laws of Physics.***

THE men were plunging down the gently curving surface of the mirror.

Above them were the stars of the universe, whose light was caught by the mirror, radiated and reradiated by its



*There was a difficulty. He demanded entrance as an I. P. officer—but another man had appeared claiming to be that same officer!*

# and the MIRROR

By ROSS ROCKLYNNE

concave surface, and, unimpaired, was flung back into space as a conglomerate glow.

There were two of these men. One was Edward Deverel, a worldly wise, carefree giant of a man whose profession

—up until the recent past—had been that of pirating canal boats on the planet Mars. The other, a hard, powerful man, was Lieutenant John Colbie, whose assignment it was to apprehend this corsair of the canals.

Theirs was a real predicament, for they were unable to produce, at present, any means of escape from the prison this smooth, shining, deep bowl of a mirror presented.

As to how it all came about——

WHEN Colbie, after his twelve hour trek along the ammonia river which ran from the lake into which the Fountain poured its noxious ammonia liquids, finally reached Jupiter City, he was in a state of fatigue under which his muscles every one of them, seemed to scream out a protest. He pressed the buzzer that let those within the air-lock understand that he was demanding admittance, and was decidedly relieved to see the huge valve swing open, throwing a glow of luminescence on the wildly swirling gases that raced across the surface of that mighty, poisonous planet Jupiter. Two men came forward. They covered him with hand weapons, and urged him inside the lock. The keeper of the lock desired to know Colbie's business, and Colbie demanded that he be taken before the commander of the garrison—who was also mayor of the city—as things had, of necessity, to be run on a military basis.

Riding through the streets of the city, he was both thrilled and awed, after that tortuous ordeal in the wilds of Jupiter, by the consciousness of the great genius of the human race—that it was able, in the face of so many killing difficulties, to erect this domed city, so well equipped with the luxuries of Earthly life. For outside the city there was a pressure of fifteen thousand pounds to the square inch. There was a gravitation two and a half times that of Earth. There was not a breathable drop of oxygen in the atmosphere, and not a ray of light ever penetrated the vast cloud layer to the planet's surface. But man had built the city, and it would remain forever, so solidly and efficiently was it constructed.

When Colbie came before the dome commander, that individual listened to his story, eyeing him keenly in the meanwhile.

"So you're Lieutenant John Colbie, of the Interplanetary Police Force," he mused. "Yet, not less than thirty-six hours ago, another man stood before me and presented proof that he was John Colbie. One of you is wrong, I'd say, and no mistake about it."

"I've told you my story—that other man was a criminal, Edward Deverel by name, and I was put on his trail. I caught up with him on Vulcan, near the Sun, and we found it was hollow by the simple expedient of falling through a cavity on its surface. I had Deverel prisoner then, but he proved a bit too smart for me. We were trapped there, well enough, at the center of gravity. But he figured that the gases filling the planet's interior would expand as the planet came to perihelion, thus forming currents which Deverel used to his advantage in escaping the trap and eluding me at the same time.* I found him again, but we were wrecked above Jupiter, fell into a pit with a liquid ammonia lake at the bottom. And Deverel, using, I'll have to admit, remarkably astute powers of deduction, figured that the lake drained by means of a siphon of some height. He eluded me that way, and I was left in the pit. I finally caught on—from some deliberate hints he had let drop—and followed him through the siphon. But he was waiting for me at the other end, demanded my credentials, and extracted from me a

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* *At The Center Of Gravity*, Astounding Stories, June, 1936.

promise that I'd stay where I was for twenty-four hours."* Colbie grinned in slight mirth. "So after twenty-four hours I came on. And now he's gone."

"'FRAID HE IS," admitted the other. "I had no reason to suspect he was an impostor, so I gave him a ship. Come to think of it, he seemed in a mighty hurry. Hm-m-m. How can I identify you as Lieutenant John Colbie?"

"Easy," snapped Colbie. "I'm not unknown. There must be a few IPF men in the city. Let some of them identify me."

"Good idea." The man grimaced. "Something I should have done with the other man. However, that's past. No use replotting an orbit you've swung. I'll hunt up an IPF man or two."

And this he did. Within the space of a few hours, the commander had no doubt that the man who stood before him was one Lieutenant John Colbie, a native of Earth, and in the service of the Interplanetary Police Force.

"Well, we'll outfit you again, Lieutenant," he assured Colbie. "What's your course of action after that?"

Colbie, lolling in a deep chair, bathed, resplendent in borrowed clothing and refreshingly combed hair, cigarette drooping from a corner of his square lips, said, "My assignment was to apprehend a certain criminal; those are my orders. I just have to keep on trying."

"Not if things go as they have," said the other, smiling in such a manner that his sarcasm should have been without edge; but he saw immediately that he had said the wrong thing, for Colbie's eyes narrowed half angrily. "Sorry," he added quickly. And then apologetically, "Don't blame you a bit. Must be a sore point. How come you aren't in any especial hurry?" he deftly changed the subject.

"I should say I'm not in a hurry!" Colbie exclaimed feelingly. "I've been space-tied for a few months now, and I have to stuff a few of the civilized benefits into my life now and then. There's no need for haste, anyway. Only way I can find Deverel is by deducing his destination, then going there."

"Where do you think he went?" queried the other man interestedly.

"The new planet. I notice there's quite a lot about it in the papers. It's been making its way into the solar system for the past five or six months, I understand. It's a real wanderer—probably been zipping through interstellar space for ages. There's a good chance that's where Deverel's gone. He's curious, insanely curious about all things bizarre, and he won't be able to resist it—I hope," he added.

"Good lead, anyway. It'll be a worthwhile experience, too. No exploring parties have set foot on it. You two—if Deverel is there—will be the first to set foot on it. Hope you have good luck, this time," he added sincerely.

Colbie drew smoke into lungs that had not known cigarette smoke for a full half-year. "If there's any doubt in your mind, commander, let me assure you that Deverel's already up for trial, as far as my capturing him is concerned. Yes, I feel it in my bones. He's going back with me, this time."

The two men then looked up statistics on the new planet. It was a large sphere of celestial flotsam, somewhere near five thousand miles in diameter, of extremely low density for its bulk. It was travelling at the good clip of eighty-two miles per second toward the Sun, but it was estimated that that speed would be cut in half by a near passage by Jupiter. Finally it would take up an orbit that would be located some-

* *Jupiter Trap*, Astounding Stories, August, 1937.

where between those of Jupiter and Neptune.

## II.

SHOOTING through space at furious velocity in his new cruiser, Colbie's lips were set and grim. His nerves were on edge. There was a flame in his brain. Truth to tell, he was so furious at Deverel's repeated escapes that the more he thought about it, the less he found himself able to think straight.

He could see the new planet as a small, gray dot against the ubiquitous veil of stars. It was not yet named, but was destined to be called Cyclops, for a reason to be seen. And with the passing hours it grew in apparent size, until, seven days after Colbie had shot upward into space, fighting Jupiter's gravitational fingers, it was a vast bulk in the heavens less than ten thousand miles distant. Colbie dived for it. He still had enormous speed, and was checking it with the greatest deceleration he could stand. When he came near enough to the planet, he used its gravitation as a further check. He started to circle it—and forthwith saw the "eye" of Cyclops staring up at him.

It was a mirror—a concave reflector, rather. But it looked like the eye of the planet, an eye that reflected starlight. Starlight, yes, because it was a reflector that caught the rays of the stars and threw them back to space. Indeed, Colbie, gazing on it awestruck, could see no slightest difference between the brilliance of the stars and the brilliance of that colossal mirror.

"Lord!" he whispered to himself, feeling half-reverent. He suddenly had a sensation of smallness, and realized in that second what an infinitesimal part of the universe he was. He lived for only the fraction of a second and surely was no larger than a sub-electron. For that mirror was artificial, had been fabricated by the powerful tools and intelligence of a race which had certainly lived at least thousands, perhaps millions of years ago. Who could tell how far Cyclops had travelled, plunging at steady pace across the void that separates our solar system from the nearest star? Who could tell the manner of people who had constructed it? One could only say that they had been engineers on a scale which human beings could not at present comprehend.

The mirror was perfect. Colbie took various readings on it, after the first mighty upsurge of awe had ebbed away. He found the diameter, about two miles less than a thousand; the depth, an approximate three-hundred; and the shape, perfectly circular, perfectly curved. The albedo was so close to 1 that his instruments could not measure the infinitesimal fraction that it lacked!

AND THEREAT, Colbie sat down and whistled loud and long. Man knew of no perfect reflector; it was deemed impossible, in fact. All materials will reflect light in some small degree, but more often the greater amount is absorbed. But the material of this colossus amongst reflectors reflected all light save an absolutely negligible amount of that which impinged on its surface. For Colbie knew that *some* of it was certainly absorbed—he did not believe in impossibilities. It was impossible that that mirror didn't absorb some light. His instruments had been unable to measure it, but of course there were instruments on Earth that would measure that absorption when the time came for it. But they would have to be delicate indeed. Even at that, however, the albedo of this mirror was a thing almost beyond belief, and certainly beyond comprehension.

The mirror disappeared around the curve of the planet as Colbie's ship plunged on, decreasing its velocity slowly but surely. Colbie forced his thoughts once more to the issue para-

mount in his mind—that of locating Deverel. But his exciting discovery of the mirror stayed in the back of his mind, and he was determined to know more about it. And he did; more thoroughly, in fact, than he liked at the time.

He now had his velocity under control. Hoping that Deverel had not detected his presence above the new planet, he gave himself up to the one problem that was perplexing him—where would Deverel have landed? Near the mirror; that was a certainty. Somewhere near the rim of the giant reflector—but that was anywhere on a circle three and a half thousand miles in circumference.

He finally resolved to scour the area in which Deverel would have landed. Training his single telescope downward so that it would sweep the entire area, he applied his photo-amplifiers to the light received, and then, keeping at a distance of about fifty miles from the surface of the planet so that Deverel could not possibly sight him with the naked eye, he darted around that circle at low speed, eye glued to the eyepiece of the telescope. He hoped thus to see the outlaw's ship.

And he did. It lay at the base of one of those mountains of Cyclops that flaunted a sharp peak thousands of feet up into the sky. That mountain swept down to foothills that terminated abruptly in a level plain scarcely more than seven or eight miles from the rim of the great mirror.

Colbie sighed in lusty relief, entirely glad that his assumption of Deverel's destination had now been proven absolutely correct.

Shooting the ship upward, and then, keeping that single landmark—the mountain—in view, he came up behind it, and, by dint of much use of forward, stern, and under jets, jockeyed the cruiser to rest far enough around the curve of the mountain so that the outlaw should not note his advent.

HE PUT OUT a vial to draw in a sample of the planet's atmosphere, but as he had with good reason suspected, that atmosphere was non-existent. The undistorted brightness of the stars had almost made him sure of it. He struggled into a space suit, buckled on his weapons, attached oxygen tank, screwed down his helmet, opened the air-lock and jumped down to the planet's surface. It was hard. Examining it, he found that it consisted of ores in a frozen, earthy state. Whether this was true of the entire planet he did not know.

He started around the curved base of the mountain, and, after the first mile, discovered that travelling across the surface of Cyclops was a terrific task. The planet was seamed and cracked in dozens of places; great gaping cracks which presented definite handicaps to a safe journey of any length. He found that he had to take precautions indeed, and often searched extensively for crevices narrow enough to leap with safety. He worried along, taking his time, but he was beginning to realize that he might not have as much of that at his disposal as he had indicated to the dome commander back on Jupiter.

So that, after a good many hours, he rounded the breast of the mountain and caught the black shine of Deverel's falsely acquired ship.

But he saw nothing of Deverel.

He threw himself to the ground. Suddenly he was painfully conscious that his heart was thumping. The thought of physical danger in no way caused this condition—he was simply afraid that Deverel might elude capture again by putting his tricky mentality to work. The competition between these two—law and disorder personified—had become a personal contest. Truth to tell, the IP man respected and rather admired Deverel's uncanny ability to escape him, not the fact that he had escaped. Colbie had to bring him back, but respected Deverel's unusual genius

at escaping tight spots. But—he had to bring the man in, or admit the outlaw a better man than he.

In this uneasy state of mind, he lay there, projector out. It could shoot explosive missiles at thousands of feet per second, and was, in this, the twenty-third century, the ultimate in destructive hand weapons.

Now, as he lay there, his eyes constantly on the ship and the area about, he turned his thoughts in a new direction. In the name of all that was holy, why had Deverel come here? Hadn't he realized it was the first place Colbie would look? Certainly he must have known it. Then why had he come?

COLBIE THOUGHT he saw the answer. Deverel had planned on leaving this planet long before the space policeman had arrived. He had had a full thirty-six hours start on Colbie, and he decided that would give him enough time for the opportunity he so craved—to visit this new planet, and determine to his own satisfaction whether or not there was anything about it which would satisfy that love he had for the bizarre.

He had had sufficient time. Sufficient time to satisfy himself as to the nature of the mirror; sufficient time to leave again, and break up his trail in the trackless wastes of space.

But he hadn't left.

Why?

And then Colbie began to feel acute mental discomfort. And the longer he lay there, the worse it became. He became conscience stricken. And why? Because Deverel might be lying in there sick, and Colbie could not risk coming out into the open until he knew absolutely Deverel's whereabouts. And perhaps Deverel lay in there dying. Space sickness is a recognized malady, and it is not infrequent. It is ascribed to any number of causes, among which are noted positive and negative deceleration, a missing vital element in synthetic air, and the lack of gravitation. Its only cure is absolute rest under a decent gravitation. And—such a cure was impossible for a man who was dependent on no one but himself.

Colbie squirmed uncomfortably. "The fool might be dying!" he snapped angrily to himself. "While I'm lying here. But I can't give myself away."

But his nerves grew more and more tense. He dreaded the thought of Deverel sick in there while he was able to give him help. And in the end he sprang to his feet, determined he wouldn't let the uncertainty of the situation wear on him any longer.

And then his radio receiver woke to life, and screeched calmly though waveringly, "You're out there, Colbie. You *would* be there. Listen——" The voice dwindled away, and then came back in renewed strength. "I'm sick, Colbie, rottenly sick. I think I'm going to do the death act. It's the stomach that really hurts, though there's the ears, too. They hurt, too, and they send the blind staggers right through the brain. I'm sweating——" The voice ebbed, rushed back. "If you want to—come in and give me a hand—will you? Then you can take me back——" The voice groaned off, and sliding sounds came through the receiver.

But already Colbie was tearing out into the open, racing across the space separating him from the ship, a wave of pity for the helpless man breaking over him.

The outer valve was open. Colbie climbed in, drew it shut, manipulated the controls of the inner valve, and debouched into the ship proper.

He was now amidships, standing opposite the lazarette. Forward was the control cabin and vital machinery, abaft, in the stern compartments, were sleeping and living quarters.

COLBIE bounded aft, swung through a door, and saw a pitiable sight indeed. The room was incredibly littered with such items as soiled clothing, and dishes with the scum of meals dried onto them. In the middle of the room was a table, and on that table an electric fan was whirling full blast, flinging a steady current of air upon a man who lay stark naked on a bunk which seemed the ultimate in human filth.

Deverel lay there, twisting, squirming, panting, moaning, his eyes rolling, and rivulets of sweat bubbling up from his queerly yellow skin, and flowing down to encounter a plain, stained mattress.

The first thing Colbie did was to snap off that venomous, killing fan. In fact, to sweep it from the table with one blow of his open palm. The next was to take Deverel's pulse. It was quick, dangerously high, but certainly none predicting the close approach of death. In another day it might have ceased altogether, but at present there was plenty of chance.

Deverel's eyes lolled over to Colbie's, and his lips drew back painfully over handsome white teeth.

"Glad you came," he whispered, and then his head dropped back and his eyes closed. He was not asleep; the knowledge that he was now in the hands of a competent person sent him into a dead faint.

Colbie knew what to do in cases like this. He went forward to the control room, manipulated oxygen tank valves, and increased the quantity of oxygen in the air. He got all the clean linen he could find, and bathed Deverel from head to foot in luke-warm water. He turned the mattress over, put on clean sheets, and then lifted Deverel lightly as a baby back onto it. Then he stuck a thermometer into the outlaw's mouth.

He cleaned the room, occupying a full hour in washing dishes with a minimum of valuable water. Then he took meats and vegetables from the refrigerator, where they had doubtless reposed for months perfectly frozen, and started a pot of soup.

And that was all he could do for a while.

He sat down and waited, taking many readings on the thermometer.

And Deverel's temperature went down. His breathing became even, and then he slept. Thirteen hours later he awoke.

"Hi, Lieutenant," he said.

"Hi, yourself!" Colbie put down the magazine with which he had been really enjoying himself for the first time in months. "How's the temperature?" he enquired.

"Gone. Thanks a lot," he added carelessly, but he was serious. "You know I mean it, too."

"Sure." Colbie waved it aside. "A pleasure—I was glad to do it, y' know." He fingered the pages of the magazine abstractedly. He jerked a thumb. "How'd you know I was out there?"

"Didn't *know* it." Deverel laughed. "It's a cinch if you weren't out there you wouldn't have heard me say I knew you were."

"That's right." Colbie laughed, too, and blue eyes and gray met each other in mutual amusement. "Like some soup?"

Deverel said enthusiastically that he did. So that these two men, mutually respecting enemies of each other, sat down and ate for all the world as if each was an affectionate friend of the other.

## III.

FOR MANY DAYS life was easy. No grueling flights through harsh space. No anxieties. No dread of death to come. No fear of insanely impersonal meteors. Here on Cyclops, the planet of the great mirror, living was a pleasure.

Deverel regained his health. He was

finally able to get out of bed and walk around. With that done, it was not long before Deverel was considered a well man once more. Of course, the old life then had to be recognized. There had been a tacit understanding between the two men—for a little while their personal relationships did not stand. That was fair.

But that understanding had to be sundered eventually, and Deverel did not put the time off. The moment he felt his strength had returned in full measure, he said: "Well, it's been fun while it lasted. But it's time for us to sort of assume our natural antagonisms. So you put me in irons—right away. Or I'll give you a swift, underhanded poke to the jaw."

Colbie regarded him judicially. "Fair enough," he conceded. "You wouldn't mind getting me about the heaviest pair of leg and arm irons from the lazarette, would you?" he enquired quizzically.

"Not at all," murmured Deverel politely.

"Wait a minute," Colbie said uneasily. He leaned forward. "Now look. Did you notice the mirror?"

"Certainly. And damned curious about it, too."

"And I. Now suppose we let this unwritten pact of mutual non-interference drag on for a while, just enough to allow us to explore? Y'know, I haven't got a time limit on me——"

"Oh," Deverel waved a scornful hand, "neither have I. Let's let it drag on, shall we?" he said in the unconscious manner of a youngster excited over the prospect of a pleasing new toy. "You've got my promise, Colbie—I won't try to get away."

They saluted each other with a grin, and forthwith made ready for their adventure in exploration.

SLEEP WAS THE first preparation. After a good many hours, they set off across the gouged, forbidding plain. The stars looked down at them unwinkingly through the vacuum separating them from Cyclops' harsh terrain. Behind the men loomed the sharp, high peaks of the mountain in whose proximity Deverel had put down his stolen cruiser.

They were decked out as completely as they deemed advisable. They had oxygen, water, and food for at least a day. Colbie had decided not to carry his projector. It was a clumsy weapon, and he saw no possible use for it. Thus, attached by a two-hundred-foot hank of rope, which was suited in composition to the demands the cold and vacuum of space might make upon it, they wended their starlit way across Cyclops. When they were not using the rope fording dangerous chasms, they wound it up about them. They progressed steadily toward the rim of the reflector which probably had been constructed long before man had made the first full stride toward harmonized society.

Twice, Colbie slipped at the termination of a leap which taxed all his physical powers, and twice would have plunged into the apparently bottomless gorges below; and twice Deverel braced himself against the rims of the pits, and pulled the Interplanetary man back to safety. In both cases they made extended searches for narrower crevices.

Slowly but surely they worked their way to the rim, and finally struck level country. The last mile was a true plain, so unmarred that they suspected it must have been smothed over artificially at some long-gone period. It struck Colbie that this would have been a much better place for Deverel to have put his ship down. Deverel explained that at the moment the first spasm of sickness had hit him, he was not in a frame of mind to care where he landed.

They came, then, to the rim.

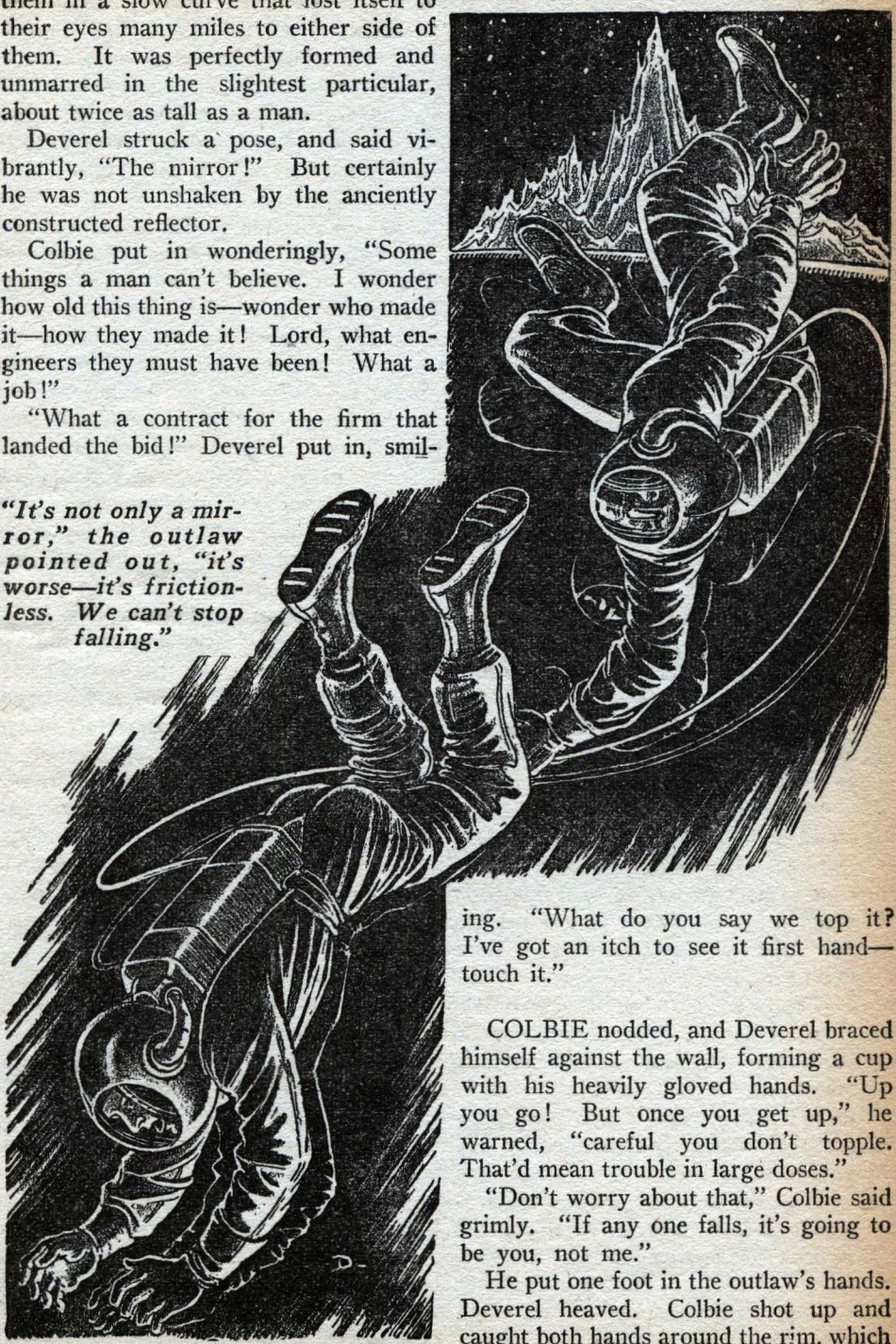
They regarded with awe the black wall. It was composed of some dully hued metal. It stretched away from

them in a slow curve that lost itself to their eyes many miles to either side of them. It was perfectly formed and unmarred in the slightest particular, about twice as tall as a man.

Deverel struck a pose, and said vibrantly, "The mirror!" But certainly he was not unshaken by the anciently constructed reflector.

Colbie put in wonderingly, "Some things a man can't believe. I wonder how old this thing is—wonder who made it—how they made it! Lord, what engineers they must have been! What a job!"

"What a contract for the firm that landed the bid!" Deverel put in, smiling. "What do you say we top it? I've got an itch to see it first hand—touch it."



*"It's not only a mirror," the outlaw pointed out, "it's worse—it's frictionless. We can't stop falling."*

COLBIE nodded, and Deverel braced himself against the wall, forming a cup with his heavily gloved hands. "Up you go! But once you get up," he warned, "careful you don't topple. That'd mean trouble in large doses."

"Don't worry about that," Colbie said grimly. "If any one falls, it's going to be you, not me."

He put one foot in the outlaw's hands. Deverel heaved. Colbie shot up and caught both hands around the rim, which sloped inward. That done, he drew

himself upward so that he was sitting carefully on the rim, facing Deverel.

With much effort and care, he drew Deverel beside him, and then, as if with mutual consent, they twisted their heads and sent their eyes out over the great mirror.

At once, all sense of perspective and balance left them. Light from all directions smote them, blinded them, sent a haze into their minds. Downward and to all sides and above, there was light. In fact, the light of the stars and the light of the mirror were indistinguishable in the split second when that bewildering sensation of instability struck them. Colbie thought fleetingly and in panic that he was poised upside down on the most insecure foothold in the universe. He could not decide, in that split second, which was the true sky.

So—he clutched at the wrong sky, and toppled over the rim.

Deverel, feeling precisely the same sensations, would have recovered in time had not the rope attaching him to Colbie forcefully jerked at him a second before he had fully decided which way was up. So they both fell down the angle of the mirror, and were, in a second, shooting haphazardly, horridly, through an interminable pressing mist of light and nothing but light.

They they plunging downward so swiftly, and yet so lightly, that they might have been wafted along on an intangible beam of force. For they felt nothing. Not the slightest sensation of *sliding*—only a sense of acceleration *downward*.

After that first moment of heart-stopping horror, after the first panic, the first moment of unutterable vertigo had passed, Colbie's nerves started quivering violently. Deliberately he quieted them by closing his eyes and clenching his fists. Then he opened fists and eyes both, and looked around for Deverel. Deverel was about five feet behind him.

Deverel was looking at him from eyes that were extremely concerned.

"And I said be careful," he snapped angrily. Colbie started to open his lips with hot words, but Deverel waved a hand disgustedly. "I know, I know. My fault, too." He drew a long breath, and occupied himself putting his head where his feet were.

Colbie did the same, and then very gingerly tried to stay his fall, by pressing his hand and feet on the surface of the mirror. This had not the slightest effect on his position or his velocity. He found that it was extremely difficult to twist his body except by flinging his arms around, but he accomplished this not by any aid the mirror gave him. His hands in no slightest degree rubbed against the mirror's surface. In fact, he felt no sensation which told him that his hands might have touched a surface. It was as if he had run a finger over a vat of some viscous slime, as if the slime had imparted no heat, no cold, had not adhered to his finger, had not impeded its motion in any way, had merely guided it along a path determined by its own surface!

HE CLOSED his eyes painfully. The trend of his thoughts hinted of insanity. He tried to analyze his sensations. He was falling. Falling straight down, at the acceleration the gravity of this planet gave his body. But he knew he was merely gliding along at a downward angle. He was simply being guided by a substance which in no degree impeded the action of gravity. That must mean——

*No friction!*

The words exploded in his brain—and exploded crazily from his mouth. *"No friction!"*

Deverel stared at him, and then frantically made tests. He tried to rub that surface. He felt nothing, nothing that held his hand back—as if it had slid along infinitely smooth ice.

"You're right," he said, staring stu-

pidly. "That's what it must be. Hell—it's frictionless!" And then he cried, "But that can't be!" and his lips twitched. "There can't be anything that's frictionless. You know that. It can't be done!"

Colbie shook his head as one speaking to a child. "No, Deverel," he found himself saying in a kindly voice, an insistent but pitying voice, "it has no rub. You put your hand on it and push. And does it hold your hand back? No," he shook his head sadly. "They made this stuff frictionless."

And as they shot downward into the sea of light, they held each other with their dumfounded eyes.

The outlaw sharply shook his head. "We're making fools of ourselves. Let's face it. There isn't any friction. Now—now we're up against something."

"I know it."

Colbie almost drunkenly squirmed around, and finally maneuvered until he was sitting, his feet crossed under him, his eyes trained hypnotically into the downward distance. Or was there any distance? There was no horizon. The stars, and the conglomerate glow of the mirror that was the absolute reflection of the stars, merged with each other.

"We've got to pull ourselves together," he said stubbornly. "Let's think this out. We've got to get used to it."

"Right." And Deverel did the first sensible thing by twisting and looking behind him. They had toppled over the rim of the mirror almost exactly two minutes ago, and though their velocity had steadily been mounting, there was a horizon back there which could be seen. It was mainly indicated by that lofty, slowly rising mountain which loomed up against the rim of the mirror. He felt that it was a good landmark—somehow, that was the place they had to get back to.

"Now look," he said seriously to Colbie, "let's talk this over." His voice was slightly metallic as it came through Colbie's earphones. "Before I landed on this planet I took some readings on that mirror same as you, and I guess I came to the same conclusions."

## IV.

"LONG AGO, maybe a million years, there was a race of men—or beings—who lived on a planet that circled a sun just like ours, perhaps. They had a satellite, this planet we're on. They were engineers on a monster scale. I have no doubt they could have remade their planet, and even their solar system, exactly to suit themselves—and maybe they did. But they made this satellite over to suit themselves, that's certain. They gouged out—how I wouldn't know—a section of this planet that corresponded to the bottom part of a sphere. The radius of that sphere—I figured it—is about 1600 miles out in space. Then, so help me—I wouldn't know this, either—they coated that gouged-out surface with some substance which, when it hardened, formed an absolutely smooth surface. You came to the same conclusions I did, didn't you? That it was such a perfect reflector you couldn't measure the amount it didn't reflect?"

Colbie, listening with interest, nodded. "And we should have seen that such a good reflector would be frictionless, too. Couldn't be any other way. And say!" he exclaimed. "This stuff can't be frictionless. We knew it couldn't reflect *all* light. It simply reflects all but a negligible amount of light, and it's got a negligible amount of friction, too!"

"That's right!" Deverel was genuinely relieved. "That idea of no friction at all had me going cuckoo. 'Course not—there can't be any surface that's got no friction at all. The molecular state of matter forbids it. No matter how close you crowd the molecules, they

still make an infinitesimally bumpy surface.

"Now why did they make the mirror? Only reason I can see—power. They must have had a heat engine. It generated power in huge amounts, undoubtedly, and perhaps the power they took in that way was broadcast back to their planet. Or perhaps it was a weapon—another mirror, plane this time, which could rotate and train a searing beam of heat on an enemy ship. Would that ship blister! And they might have been able to rotate this satellite at will, too——

"Then something happened. Those people lost their satellite. Maybe their own planet exploded. Maybe their sun exploded, and this planet went shooting away, and finally our Sun grabbed it.

"And that's a fair explanation—the only one, as far as I see. Unless, of course, it was meant to be something that was in the experimental stage and was never completed."

"The magical mirror," Colbie interspersed softly. But neither of them then knew exactly what magical characteristics it did possess.

FOR A MOMENT they were silent. "Well," Deverel had a shrug in his voice, "we can't do anything now—can we? Shall we eat?"

"Why not?"

They ate in the strange manner necessitated by spacesuits. By buttons in a niche outside their suits they manipulated levers which reached into a complicated mechanism, pulling out food pills—tasteless things—and water, which they sucked through a tube.

"Now," said Deverel, smacking his lips as if he had just eaten a square meal, "this is just another situation, and not a fairy tale. Proved it by eating, which is so mortal it's disgusting. Where we bound?"

"For the bottom——"

"Ho—not at all! We're almost at bottom now—notice how the angle's been straightening out? It's almost 180° now. Let's see. Phew!" He had looked at his chronometer. "We've fallen three hundred miles in something like eight or nine minutes." Colbie started to protest, but the outlaw said, "Sure, to all intents and purposes we've simply fallen three hundred miles—the depth of the mirror. Remember, there isn't any friction that'd hold us back, and the inclined surface we came down on just guided us. And that means we're going to bounce right back to the other rim—see?"

"Ye gods, yes!" yelled Colbie, then grimaced. "But we won't quite reach the rim. Just that damnably small amount of friction will hold us back fifty or some feet. If there weren't any friction things would be simple—we'd reach the other rim exactly."

"Sure. And climb over. Gravity gave us the momentum going down, but she'll occupy herself taking it away at the same rate going up."

While they had been talking, they had passed bottom—quite definitely. They were going up, for the angle was slowly but surely increasing.

"We won't make it," Colbie said disconsolately. "There's the rub."

In the thoughtfully melancholy voice of the Danish prince, Deverel muttered, "Aye, there's the rub; for in that sleep of death, what dreams may come, when we have shuffled off this mortal coil, must give us pause."

"And that's appropriate, isn't it!" Colbie sneered.

"I played Hamlet once. Long time ago, of course, but I was pretty good. You know that second act scene where he——"

"Skip it! Forget it—I don't want to hear it. Let's get on. There is this friction—infinitesimal. It doesn't help at all when you try to change or retard your motion; but in the long run, it'll build up a total resistance great enough

to keep us from the rim."

"Check, check, and check," agreed the outlaw, touching the fingers of his left hand with the index finger of his right.

"That's our situation. Looks hopeless."

"Maybe," Deverel declared. "Let me add some further facts. We're dropping down at an acceleration of twelve feet a second per second. At bottom, 300 miles down, we had a terrific final velocity. Don't know exactly what it is, but there's a formula for it. Going up, gravity will be right on our tails, lopping off twelve feet of speed for every second. Notice I say up and down. I mean it. Our angular speed is something else again, and is certainly much greater."

Then, as he saw Colbie's impatient look, "I don't know how we get out. Normally, when you get in some place, you go out the same way—but they closed the door on us. And, of course, I don't see how we can change direction."

THE IP MAN crossed his legs under him the other way for a change. He squinted upward. "Getting near top again. Damn that light. After a while, I'll go blind."

"Shut your eyes," Deverel told him callously, then, "Lord," he remarked whimsically, his cynical, yet friendly, eyes crinkling, "I'm glad we're what we are, Colbie. You have to chase me and I always feel obliged to run. Then we run into the most interesting experiences. I've had plenty of good times looting canal boats on Mars—did I ever tell you how hard it was squeezing the rings off the Empress' fingers? I used plenty of soap and water—and she was horrified at the way I wasted the water—but somehow I'm glad they got after me. And you are, too," he added as if in self-defense.

"Sure," Colbie remarked. "But in a way I'm not. You're a likable fellow. I admit it. But you haven't got the instinct to help make an organized unit of society—you're a gear out of mesh. 'Course, there's others like you—but it's you I have to take in. I suppose I'll do it, too."

"Forgetting the mix-up we're in?"

"No. Just trying to match your own superb confidence in crises like this one."

"*Touché.*" The outlaw grinned. "Any ideas to match your confidence?"

"Not a shard."

"Me either—yet. By the way"—and here Deverel regarded Colbie thoughtfully—"I'm keeping anything I learn to myself—anything that might get us out, I mean."

"Meaning?" Colbie's eyes hardened.

"I'll sell what I know for a price."

"Ho! Freedom, I guess!" Colbie said sardonically.

"Well—not that, exactly. I'll tell you what it is, if I ever get anything to sell."

Colbie studied him, shrugged his shoulders carelessly. He looked over his shoulder, but he didn't yet see the approaching rim.

"Our angle's much steeper," Deverel followed his thought. "The rim isn't far away. Couple minutes yet."

"We won't make it though," Colbie said regretfully, "unless there's something else we don't know anything about."

In a few minutes, they saw the rim outlined against the black sides of an uneven mountain range which might have been set back from the rim anywhere from ten to twenty miles. They regarded its stubborn approach with anxiety.

SO SLOWLY it came toward them—and so rapidly their velocity was being decreased to the zero point! Nerves tensed, fists clenched, eyes strained. But intuitively, rather than from any deliberate mental calculation, they felt that

they would not reach it. Their velocity was simply not enough.

And it wasn't. Slowly—compared to their earlier enormous velocities—they rose toward the rim which was so painfully near, yet so infinitely difficult to reach. One moment, then, they were rising; the next, falling. There had been no pause, or if there had been it was nestled close to that infinitesimal space of time which man will never measure. They began to fall.

In a voice that held worlds of chagrin—true to human nature, he had not given up hope—Colbie said. "Missed it—by about ten vertical feet, as a close guess. Next time we swing across this damned mirror we'll miss it by twenty feet."

"Something like that," Deverel agreed abstractedly. At the moment they had fallen, he had noted the time down to the exact fraction of a second. And he kept it in mind. Not that he had any idea of its ultimate benefit then, but he felt it might be a good thing to know. "Let's see," he was muttering to himself, and using Colbie's phrase, went on, "the time for one swing across——"

And he didn't finish the sentence. For an idea, a conception so alluring, so utterly startling, leaped into his mind, that he drew his breath inward through his suddenly meeting teeth. "Lord!" he whispered, and almost as if he were stunned, he dropped back, lying full length, his head cupped in the palms of his joined hands. And he saw the stars.

The two men were zooming along at a good fast clip that was building on itself. They were guided by the frictionless stuff of the mirror, and pulled by the force of gravity.

And above were the stars. So cold, so remote, so harshly, quietly beautiful. Deverel was looking at them, hard. They were exciting stars. They never changed their position as a whole. They looked the same as when they—the men—had gone plunging down the curve of the mirror.

## V.

WHILE DEVEREL lay there on his back, his brow wrinkled in thought, Colbie watched him, watched him for a good many minutes, while they plummeted into the depths of the shining bowl. In an incredibly short time, they reached bottom—and Colbie grew tired of trying to read the outlaw's thoughts. He tried to rise to his feet. He went through a number of gyrations, which left him lying face down, looking at his own reflection.

Deverel had come out of his brown study, and was watching amusedly. "If there were a large enough area on the soles of your feet, m'lad, you could stand easily enough. But when you sit down, the center of gravity of your body is considerably lowered, and it's easy. So you'll never stand up unless by some miracle of balance."

This bit of wisdom was apparent. Colbie sat down, drew the water tube into his mouth, and sucked with abandon. Then he regarded Deverel knowingly. "Been thinking, eh? What about?"

"The mirror," Deverel replied solemnly. "I have to keep it to myself, though—sorry!"

"Likely!" There was a tigerish snarl implied in Colbie's voice overtones.

Deverel's worldly wise eyes grew sardonic. "Sure—I've been doing a lot of figuring, and I've found out a lot of stuff. Interesting, unusual. But there's something missing, Colbie—something I can't put my finger on. If I had it—and I will get it—I could get us out of here. Any suggestions?" he concluded, regarding Colbie sidewise out of a laughing eye.

"If I had them," pointedly, "I'd keep 'em. By the way, are you being fair? Withholding imformation? I'm referring to your promise—that you wouldn't try to get away."

"I did make a promise, just as you said—that I wouldn't try to get away. And I haven't. And I won't until you tell me it's all right if I try. Get it?" He fixed Colbie with a rigidly extended index finger, and went on in tight tones of significance. "Let's be ourselves from now on, Colbie—outlaw and cop! Right now, we're just partners in adventure. But you, just by saying so, can make us what we really are—and I'd be your prisoner. D'you see? Do that, Colbie, and I'll get us out of here!"

Colbie felt a slow flush rising to his face. Suddenly he felt utterly humiliated; felt as if his intelligence had been insulted and mocked at. Colbie's voice exploded, an eruption of searing wrath. "No! Listen," he went on in a low, deadly, flat voice, "the answer is no. No from now on. I don't give a damn. I don't give a damn if we slide back and forth here for eternity—that's what we'll do if you wait for me to give in to you and your damned insulting demand. You've got the brass——" Colbie choked apoplectically, and stopped. He waved his arms helplessly, glaring at the other man. After a while he went on, his voice now even, "You suggest I haven't got the mentality or the resource to find my—our—way out of here. Maybe I haven't. Maybe I'm a damned dummy. But I'll tell you something that's going to make you squirm; you're going to see *me* out-bluff *you!* And *you*'re going to give in to *me!* Remember it."

He sank back, glaring.

DEVEREL'S eyes were popping. "Well!" he exclaimed in astonishment. "Phew! Glad you got that off your chest—you sure take the fits!"

A lot of thought went on under Deverel's helmet, and in a way they amused him. But they were all directed toward one end—escape. This was a new Colbie, an undreamed-of Colbie, he saw here, and he was going to be a tough nut to crack! So Deverel finally said, "You're going to out-bluff me, you said."

"Sure. Now, ever, and always. Something else, my dear mental marvel—it's you that's going to do the thinking." His voice was contemptuous. "Now, go ahead and use that so superior gray matter you're claiming."

Deverel's lips twitched. He said, shrugging, "If that's the way you want it. But you're crazy."

Colbie refused to answer.

"Well," the outlaw laughed lightly, "Now we've got our own personal feud mapped out. We won't be on speaking terms for maybe two or three hours. Incidentally, we'll be bored to death. We won't even enjoy ourselves the least bit. That's the way people do when they're mad at each other. If I were a kid, or if we were medium-close relatives, I'd say all right—but we're two grown men."

"I get it." Colbie put a grin on his face.

"Good!" Deverel exclaimed. "Now where are we, Colbie? Near the top again. There's the rim, too!"

It was true. The rim was there—but it was not the same section of the rim from which they had dropped. Deverel realized it. That mountain, that landmark, did not show up against the rim. They had gone across the mirror twice. By common sense, they should have returned to their starting point. But had they returned, Deverel would have been startled indeed.

They came to the apex of the second trip across—and dropped back, once more missing it by an additional ten vertical feet. Once more they plunged downward into the depths of the shining bowl.

On the way down, Colbie was silent. Unable to help himself, his thoughts began to revolve. How could they get out? But his thoughts revolved futilely. He was unable to look at the matter objectively. Had he been solving a puz-

zle on paper, the answer would have come soon enough. He was well enough equipped on the laws of motion to have solved it. But, being a part of the brain-teaser himself, he was helpless.

But undoubtedly he should have noticed that the position of the stars in the heavens never changed.

THEY PASSED bottom, went sloping upward again, in a monotony of evenly decreasing speed that was maddening, at least to Colbie.

Deverel was not silent. He occupied himself in a frivolous manner, talking, laughing, cracking jokes. He enjoyed himself thoroughly. He could make himself at home anywhere, and in the strangest circumstances. It was one of his admirable qualities.

Finally he called, "How about it, Lieutenant? Making any headway?"

Colbie came out of it. "Know less than I did before," he admitted sadly. The light of the stars, and the light which the mirror so faithfully threw back into space, were beginning to irritate him, too.

"Damn shame." Deverel sounded regretful. "I've got a lot of dope on this strange vale o' paradise," he added sadly, "but I can't find the missing link that'd put it to some advantage. And to be frank, the time to put it to the best advantage will be in less than an hour. A crucial moment, I mean." He was staring intently at Colbie.

"Damn the crucial moment," Colbie said coldly.

"Well, there'll be several crucial moments," Deverel said, laughing softly. "The best possible times for us to get out—but I don't know yet how we'll get out. You say I have to do the thinking? But it won't hurt if we talk things over a little, will it?"

Colbie said it was all right with him. After all, the whole thing was up to Deverel from now on. No number of solutions would help if Deverel didn't give in.

They discussed the color of the strange substance. Did it have one? No, certainly not; it absorbed no light, hence was the color of any light it reflected. Could they, as a single system of two bodies, change their direction of motion? No. They were a closed system, and as such had a single center of gravity which would continue on its present course forever, unless some outside force intervened. They could jerk, they could squirm, but for every action in one direction, there would be equal reaction in the other. Was this substance either hot or cold as determined by human senses? No. For it could absorb no heat, nor could it, therefore, transmit heat. The first would convey the impression of coldness, the second that of warmth——

IT WAS AN amusing subject, and exhaustless. But Deverel plucked no fruit from its many branches. They were still hopelessly marooned within the bowl of the incredible mirror.

They hit the apex of the third swing across the great mirror—and fell downward again. They bounced back up from the bottom, zoomed upward through the sea of luminescence, fell downward again the fifth time.

And Deverel said, "It's coming. It's here. The first Crucial Moment. But we have to pass it up."

The sixth apex dwindled away, found Deverel looking longingly at the sharply rising mountain which he had placed in his head as a landmark, "the place they had to get back to".

"I know when we have to get out," he told Colbie anxiously, "but the how of it knocks me! Every trip across we take, we fall nearer the bottom by ten feet. Right now we're about sixty feet below the plane of the rim of the mirror. How are we going to rise that sixty feet?"

"You have me there," said Colbie nonchalantly.

Deverel regarded him seriously. Colbie was an uncaring idiot—didn't seem to give a damn whether they got out or not. But Deverel was beginning to feel whole new quantities of respect for the IP man. There was certainly more to him than he had hitherto suspected. He smiled. "Still holding out?"

Colbie said he was.

"Well, you know *I* won't give in." Deverel said harshly, "I'm supposed to be damned fool enough to think my way back to Earth with you, back to jail. I've out-bluffed better men than you, Colbie, and I'll stick this one out, too. Are we going to be damned fools? You know, if this was off my mind, I could devote myself a lot better to the one problem that fuddles me up."

But Colbie said that he was sorry he couldn't help the outlaw get the suspense off his mind. And Deverel's teeth closed with a snap. Colbie, looking at the hard sardonic features, wondered vaguely, perhaps with a slight inward shudder, what would be the outcome of it all.

## VI.

THEN ENSUED utter weariness. For interminable minute after interminable minute, they swept dizzyingly down and up through the pressing, aching mist of light. Their eyes became tortured, their brains became inflamed, their muscles stiffened, their nerves jangled. They became irritable and touchy. The monotony was man-killing, especially in view of the fact that the manner of their salvation was yet a thing of the future—or perhaps a thing of no solution.

Deverel was up against a blank wall, and his every word had a snarl in it. "There's some way it can be done," he insisted, as they were dropping down after the tenth plunge across the great mirror. "And I have to find it soon. We're a hundred feet below the rim now. You could help me, Colbie—you've the brains for it, I know you have. But you're lazy, damn it. You insist on sitting back there and letting me do all the thinking. Suggest something, won't you?"

Colbie answered seriously, "Deverel, I have been thinking. But it's no good. What is it you know? What strange characteristics has the mirror got that both you and I don't already know?" He paused, shaking his head, "I can't see the trees for the forest—I'll admit it." He was genuinely sorry he couldn't help, and was more than a little touched by the outlaw's desperate search for the final link in the chain he had evidently fabricated. "Why not tell me what it's all about?" he suggested. "Maybe I can go on from what you've found out."

"No sale!" Deverel snorted angrily. "What I know is my trump card—you'd know as much as I do. Wouldn't do me any good."

"Won't do you any good, anyway—unless you give in." Colbie grinned easily.

"And you can bet everything you've got I won't!" Deverel snapped. And then looked queerly at Colbie. "You really have made up your mind, haven't you?" he demanded. He shrugged his shoulders sulkily. "But maybe you'll change it. That's what I'm banking on, anyway. You're not the type that can hold out forever."

Colbie shrugged his own shoulders in indifference, and then crossed his legs a different way. Thinking better of it, he lay flat on his back, and by virtue of swinging his arms one way and his legs the other, started to whirl about. Elsewhere, the action might have seemed childish, but here it was one of a strictly limited number of amusements.

While this aimless gyration, which, once started, continued unabated, may have amused Colbie at first, it very soon had a much different effect. Abruptly

he sat up—still spinning lazily—and stared at Deverel. A slow grin appeared on his lips, went into temporary eclipse as he turned around, and appeared again as the rope holding them together wound up about him. "Your difficulty," he asked judiciously, "lies in being unable to make up for that 100 feet or so we've lost to friction, I take it?"

Deverel looked at him keenly and nodded.

COLBIE'S FACE split in a slow, broad grin. "I haven't got it all figured out. I said I'd let you do that. But I know how to make up for that difference. It takes coöperation, and maybe if you know how to do it, you'll give me the rest of that information sooner. Because I won't coöperate till you do. You think what I was doing, and you'll get it."

Deverel looked at him blankly. Then —"I've got it!" he gurgled. "I knew it could be done—and it's easy!"

He was talking rapidly, excitedly. "I've got the whole thing worked out, now. Everything I need! It's only a question of waiting. Two or three more times across the mirror—— Now listen," he went on rapidly. "You have to tell me it's all right. This'll get us out, both of us. You will, won't you?" he demanded anxiously.

Then he saw Colbie's mask of a face and shouted furiously, "Don't be a damned fool, Colbie! You don't want to die, do you? You know you won't be able to stand death from lack of water and food—you know it! Now's the time to make up your mind." He was feverish.

"I made up my mind quite a while ago," Colbie pointed out. "If I hadn't, I wouldn't have contributed your clinching link just now."

Deverel laughed harshly. "You're going to stick with it," he jeered. "You're going to let a principle kill you! Well, I'm going to let it kill me, too—and I'm not as scared of death as you are. In fact, it'd be better if I did die; I've got too much hell in store for me, one way and another. So I don't really care. How do you like that?" he ripped out savagely.

"It's all right with me—I always knew you didn't give much of a damn about anything, Deverel." He smiled disarmingly.

Deverel regarded him in blank amazement, an amazement that swiftly turned into sheer, obvious admiration. Until that moment, Deverel had doubted that Colbie was sure of his intentions; now he knew it, and the knowledge gave him a new picture of Colbie.

Colbie yawned; and then Deverel's rage apparently broke all bounds. He called Colbie every foul name under the Sun, reviled him with the unprintable verbal scum of innumerable space ports —and then stopped short.

"Hell, I didn't mean that," he muttered. He waved a hand. "Sorry—I mean it. It's just that"—he summoned a grin—"there went the second Crucial Moment. Rather, the minute we drop down from the eleventh apex—there it goes. It's about a minute away. We're now, to all intents and purposes, a mean one hundred ten feet below the rim. Phew!"

"What are these crucial moments?" Colbie enquired in genuine bewilderment.

Deverel laughed in amused disgust. "There are several of them—I think. And the more of them we pass up, the more crucial the next one is. Get it? At last we come to the Final Crucial Moment! And after we pass that up ——" Deverel shook his head. "After that, there's no more hope. No more Crucial Moments." After a while, he said listlessly, "I'll tell you when they come around."

THEY SWEPT DOWN and they swept up. Angles decreased and angles increased. The rim loomed up through the gloom of light, and dropped away. Constant acceleration, followed by just as constant deceleration. And light and still more light and nothing else but light.

Two men against the magical mirror!

Seventeen times the rim dropped away, and each time they approached it was farther away—ten feet higher than before. And then Deverel remarked wearily, "The third Crucial Moment—one hundred seventy feet below the rim." He cocked an eye—a bleary eye—at Colbie, who was so exhausted and blinded by the incessant play of light from the mirror that he was apathetic. "What are you thinking about?"

"Just waiting," Colbie returned tiredly, "for you to give the word!"

Deverel laughed harshly. "And I'll never give it. Listen. In less than an hour comes the——"

"The fourth Crucial Moment," put in Colbie acidly.

"Wrong. The final." He waited for this to take effect, but it had none at all. Then he snarled, "You're going to hold out—good Lord!" For a moment he was speechless, glaring at the other man. Then unaccountably, he laughed. "We're two of a kind—two stubborn fools. I didn't know you had it in you," he remarked frankly. "I really believe you're going to——" and he broke off.

"That I'm going to hold out past the time that really means something to us?" Colbie asked him quizzically. He nodded slowly.

Deverel sank back in disgust.

They topped the eighteenth, the nineteenth, the twentieth apex. Deverel was jumpy, irritated. "About half an hour," he said nervously. "That's all we've got. I mean it. When that time goes, then we kiss life good-by. I wish you'd see reason, Colbie. Either we both die —or I go free, and you live, too, and we're just as if we never came to this planet. Just think of that—life again!"

Deverel watched Colbie intently, but the IP man was absolutely unaffected. The outlaw had been hoping against hope that Colbie would, in the last vital moments, give in. He had determined to wait that long, just on the chance. Now that chance was definitely out, and Deverel had to play a card he had long ago decided to use if worst came to worst. It might win—and it might lose.

So in the next few moments—with the verve and ability of a natural actor (he *had* played Hamlet when he was a younger man)—he increased his nervousness, the desperation of his manner, the snarl in his voice.

"Twenty-five minutes, Colbie. Give us plenty of time." Colbie was obdurate. They were on the twenty-second trip across. Deverel's rasping voice went on later, "Twenty minutes. And here comes the rim."

THE RIM CAME toward them, slowly. More and more slowly, and then gently started dropping away. The twenty-third trip.

"Fifteen minutes, Colbie." Deverel's voice had the rasp of a buzz saw in it. He was actually nervous now. The amount of time was pretty small. So that suddenly he said in a tone of voice that was deprived of every trace of moisture, "Colbie."

Colbie met his eyes, and what he saw there made his own open wider.

"You guessed it, Colbie." The outlaw's tone was dull. He spread his hands. "I'm done. I've cracked. Good Lord!" he burst out. "You don't give a damn! That's what gets me—I can't understand it. Listen—you may think I'm scared to die, that I'm not the kind of fellow I've painted myself to be—but I am. I'm careless with my life. I won't care at all when my number's due. What I can't stand is the fact that

it isn't due! There's a way out. And it's only your stubborn refusal that's blocking the way. But I guess when you come down to it, it's me——"

"It's I——" Colbie corrected mildly.

"It's I that's blocking the way. So I give up. You win. You're the world-beater of this crowd. You're the champion holder-outer, the prince of don't-give-a-damners! Colbie, you've got me in tears. Honest, I feel like blubbering like a kid. I can't understand you—sitting there——" he groped.

The IP man regarded Deverel steadily. "You're funny," he muttered. "I knew you'd give in, just because of that. You have dash—impulsiveness—a quick love of life. I'm just a stolid space-cop."

And Deverel suddenly thrust out his jaw angrily. "I gave in, didn't I. And don't think I haven't got half a notion to take it back. I'm capable of it." His eyes challenged the other's.

Colbie said slowly, "No. Don't do it—forget it. We were fools—you decided not to be one. That's all there is to it." Once more he met the eyes of the other man, this time thoughtfully, then he nodded his head in slow determination. His head came up, and a sparkle entered his eyes.

"What do we do?" he demanded. "Spill it—let's get out of this forsaken place. I don't like the lighting arrangements! Come on!"

Deverel went into action.

"Wind yourself up on this rope," his voice cracked out, full of the energy of real desperation now. "Closer—come on! All right." He braced his feet against Colbie, and pushed. Colbie went whirling dizzily away, the rope uncoiling. He came to the end of the rope. Deverel then pulled in such a manner that he utilized to the fullest extent Colbie's rotatory motion. Colbie came spinning back, winding up. Deverel lashed out with his feet. Colbie unwound again, this time in a new direction. Time after time he came back, whirled away again. Deverel manipulated Colbie in the same way a small boy does a certain toy called the jo-jo.

Swiftly, each was swinging around the other in an ellipse with a shifting axis.

"GET IT?" panted Deverel. "We've got a circular motion started. It isn't affecting our course in the slightest, though. We're a closed system. For every action a reaction. I'm swinging around you, too. Now, you stop spinning—it isn't necessary now." Colbie flailed about with his arms and, in the course of two revolutions, swung around Deverel in a true circle. And all the while they were hurtling up the slope of the mirror, at a rate dictated by no other force than the retarding power of gravity.

Deverel was gasping. "Now—draw up on the rope. Pulls us nearer the center of the circle we're making and we go faster—our angular velocity increases. Now we're going."

And they were. By dint of prodigious exertions, they worked their angular velocity up to such a point that the centrifugal force was putting a terrific strain on their laboring lungs.

And finally the outlaw gasped, "Enough! We're going plenty fast. If we go any faster, we'll split wide open. We'd keep on whirling like this until the slight bit of friction wore it down—that is, if we didn't use it to escape this trap. And we're going to use it, too! The rim should be along in—two minutes, seventeen seconds flat. Oh, yes, I figured that out to the hair's breadth."

Suddenly he was shouting out loud, "And there it is—the rim! Now, look, honest to God, I don't know which of us is going over." His eyes feverishly watched the approach of the rim, whenever it swung into his line of vision. It was etched against the mountains. Throbbing seconds beat away into the

past. Colbie's pulses were hammering. How often afterward he thought of the snapping suspense the looming mirror engendered in him then! It was like a monster—mysterious and brutal. Deverel's voice came again, "I think it's going to be you. It *has* to be you! Yes!

"We're a closed system, remember. Now say we have an explosion. You fly that way, I fly the other. But we each retain the kinetic energy given us by centrifugal force."

Cocking a wild, red-rimmed, bleary eye on the approaching rim, he coiled himself up two feet nearer Colbie. They gyrated more swiftly. Colbie shouted in protest.

Deverel snarled, "Can't help it. The rope has to be parallel to the rim the minute we hit the apex." He blinked his eyes to get the sweat out, looked at the chronometer above his eyes. Seven seconds to go. Deverel was shuddering—he had so damned many things to do at once. He had to regulate their angular velocity—his timing sense—the sense which tells us how many whole steps we can make to reach a curb exactly—was telling him how many gyrations they would make in order to hang poised, for an infinitesimal second, parallel to the rim. With one hand, he had to extract a razor-sharp knife from an outside space kit. And he had to keep an eye on his chronometer, for he had to know exactly when they reached the apex of this, the twenty-third trip across the great mirror.

And perhaps the greatest miracle of that whole insane adventure was that everything worked itself out just as Deverel was planning. The rope, its human weights swinging dizzily at its ends, came parallel to the mirror's rim on the exact, non-existing moment they reached the climb's apex. And in that exact moment, Deverel slashed at the rope close to where it was fastened about him.

## VII.

COLBIE experienced no change of pace—simply a sudden release of pressure. The operation had been smoothly performed. At the exact moment when they, as a single system, had no upward and no downward motion, Deverel had severed the rope. Colbie simply shot straight toward the rim at the velocity he had been rotating at that particular moment.

He plummeted up the slope of the mirror, gravity now definitely fighting him. He lost twelve feet in upward velocity every second. Would the kinetic energy his body now contained be sufficient to stave off that deadly deceleration? Would gravity whittle it down to zero, somewhere below the rim.

"Colbie," he gritted, speaking softly to himself, "if you've never prayed before, try it now!"

And perhaps the prayers did the trick, or it might have been the computations Deverel's keen brain worked out. Using the factors of their individual weights on this planet, and the two-hundred-foot-length of rope, and the time for one revolution, he had known the approximate kinetic energy each man would develop, had known that Colbie would go over the rim with a liberal margin to spare.

Up past the rim Colbie shot. Over the rim—and up into space. And there, fifty feet above the planet, he stopped rising. The moment of falling was heart-stopping. His space suit was tough—but would it stand the strain? He didn't have much time to theorize about it. He hit, and he hit hard. He felt as if every bone in his body was crushed in the moment before his consciousness faded away.

When he came back to consciousness, he knew a sharp, agonizing pain below the knee of his right leg. "Broken," he thought dismally, and grimaced as he almost involuntarily tried to move the

injured member. He couldn't move it at all.

Then the thought of Deverel came back. Good Lord, he was still on the mirror!

"Deverel!" he shouted.

A cheery voice came back. "All here and right as rain." Then the voice became anxious. "What's wrong? I was trying to get in touch with you."

"Broken leg, I guess."

"Hurt?"

"Damnably!" Colbie gritted his teeth.

"I was afraid something like that would happen," the outlaw answered with sympathy. "I'm sorry it had to be you—I would have taken the rap if we'd have swung around right. But we didn't. That was my gamble for escape."

"How are you getting out?" Colbie demanded. Then in sudden panic, "And what if *you* break a leg?"

"Ho! I'll get out, and I won't break a leg either. I have to travel across the mirror you know, and I'll lose ten vertical feet. How far did you fall?" he asked anxiously. Colbie told him. "Fine! Not bad at all for a rough calc."

"You did a fine job all around," Colbie told him feelingly. "That's right, you'll go over the rim, too. You've got gravitational *and* centrifugal force acting on you."

"NOW LISTEN, Colbie, you're on the wrong part of the rim, d'you know that?"

No, Colbie hadn't known it. So their ships were on the other side?

"No, not on the other side. About a sixth of the circle of the rim around from where you are."

"Well, then, where are you bound?"

"For the ships."

Colbie gasped. "You're crazy! You're headed directly opposite from where I am."

"Oh, no, I'm not," Deverel sang sweetly. "I'm headed right for a point on the mirror a sixth of its rim removed from you in the direction the planet rotates. Now quit gasping like a fish, and listen to the most gorgeous and unbelievable part of this whole adventure. Do you think we went straight across the mirror?"

"Certainly!"

"We didn't! Now here's the bombshell——" He paused, and then said, *"We were the bob of a pendulum!"*

"What?" Colbie shouted it in dismay. "Lord, Deverel, you're crazy, crazy as a loom! A pendulum! We weren't hanging from anything, from a string, or cable or—Lord!"

"Getting it?" The voice was sympathetic. "Don't you see? We *were* a pendulum. And the beautiful part was that we didn't need to hang from anything so we could vibrate. A string, or something like that, would have ruined the effect entirely. As it is, we were a perfect, simple pendulum, the which that has, so far, existed only in theory! See, there wasn't any friction, and there was a perfect vacuum. There was just gravity. It pulled us down and up and down and up and down and up. And there was a force which wouldn't let us travel in any path except a perfect curve, the path a pendulum takes!

"And what is so characteristic of the pendulum? Why, the periods of vibration are the same! Do you think that knowledge didn't come in handy when I wanted to know *to the dot*, exactly when we'd reach the apex? You bet it did! And then there's something else about a pendulum—I'm surprised you didn't notice. At the Earth's pole the plane of vibration of a pendulum turns around once every twenty-four hours, in a direction opposite to that at which the Earth rotates. Rather, it appears that way. Actually, it is the Earth that turns around under the pendulum! And that's what happened to us. Didn't you notice

that the stars as a whole never changed positions all during the time we were on the mirror? They didn't. We were a pendulum. The plane of our vibration was fixed in relation to space. This crazy planet revolved around under us because there wasn't any friction to say 'no'! So I figured it out diagramatically —right! In my head! And if you think that wasn't a brain-twister——!

"I timed the first two or three vibrations after this pendulum stuff came up and hit me. I found each trip across took 17 minutes, 45 4/10 seconds. And I knew the period of rotation of this planet—52 minutes, 25 and a fraction seconds. Notice anything about those figures, any general relation?"

"I get it," Colbie replied. He was sweating. His leg felt numb from the hip down. "One vibration took about one-third as long as the planet takes to make a revolution."

"Exactly! I'll keep talking, Colbie, help you forget the leg. And not only that, but the bottom of the mirror is a pole of the planet! So we were a true pendulum, vibrating at a planet's pole. And the length of our 'string', the radius of the sphere, of which the mirror is a part, was out in space about 1600 miles!

"NOW IN OUR vibrations, we always went through the center of the mirror, but we never went across to the other side. That is, one swing always began and ended in one-half the mirror. In relation to space, our plane of vibration was always the same; in relation to the mirror, it was a curve which crept around the mirror, touching the rim six times.

"I had the devil of a time!" Deverel exclaimed. "I had to formulate a law which would tell me absolutely where each vibration would end, on the mirror, and thus how many times we'd have to swing across before we got back to our starting point—our original starting point. And finally I got this: One swing from rim to rim ends at that point on the rim which is opposite its starting point at end of swing. Get it? Well, if you don't, draw a diagram of a circle divided into six sixty-degree wedges—and follow the law out." And Colbie actually did draw such a diagram later. "In other words, it took us six swings from rim to rim to bring us back to our starting point. Those were the Crucial Moments. If we'd have got out at the wrong places. Colbie, we'd have starved before we travelled the distance back to the ships—if we knew where they were. Then, too, there was a chance one of us would end up pretty badly hurt! And one of us did —you had to drop back further than I'll have to.

"And that's all there is to it. I let you out at the end of the twenty-third trip from rim to rim. I'm getting out at the end of the twenty-fourth—what I really believe would have been the Final Crucial Moment. We couldn't have developed enough centrifugal force to send us over the rim if we'd gone around the mirror six more times, and fallen, as a consequence, sixty additional feet farther away from it. How's your leg?" he inquired.

"Rotten!" Colbie muffled a groan.

"Keep your chin up!" Deverel snapped. "Seven minutes and I'll be over the rim, and I'll hot-foot it back to the ships. It may take several hours before I get back here," he added in anxiety.

"I'll be all right," Colbie mumbled.

In the next few hours they kept in constant touch. Deverel made the rim, landed unharmed. He set off across the gouged plateau with both speed and care. He made the ships unharmed; and less than fifteen minutes later, the most beautiful sight in the world for Colbie was the sight of that slim, black

IPF cruiser as it came zooming above Cyclops straight toward him.

It landed. Deverel stepped out. He picked Colbie up in his strong arms, carried him inside the ship, took off his space suit, and bared his broken leg. It was a simple fracture, and was still in a healthy condition. Deverel went to work on it, put it in splints after having given it a wrench which accomplished the dual purpose of sending Colbie into a faint and setting the broken bone. Deverel put it in splints, and then bundled the IP man into bed.

SIX WEEKS LATER, when Colbie was able to hobble around on a makeshift crutch, Deverel was still there.

"You make a nice nurse," Colbie told him over a meal one day. "Thanks—a lot."

"Skip it!" the outlaw grinned. "You weren't such a bad nurse yourself. I'd have been gone before now if you hadn't stepped in." He gulped a cup of coffee. "You're well enough, I figure," he said uneasily. "'Bout time to go?"

Thoughtfully, uneasily, Colbie said, "Sure—I guess it is."

So that the next day Deverel sat down at the controls and touched them lightly. The ship shot upward into the eternal night of Cyclops, zoomed feather-light out over the strangest, most magical mirror ever to exist. And Colbie, looking at it, knew that he would always think of it with more affection than fear. He would always think of it as a child's colossal toy. It had so many amusing characteristics that he half-way felt it'd be a pleasure to go zooming down its infinitely smooth surface once again.

A dream world, he thought, if there ever was one.

Once landed near Colbie's ship, the outlaw said sardonically, "I guess we transfer from this ship to yours?"

Colbie met his eyes seriously for a moment, then got up from where he was sitting, and limped back and forth in the close confines of the cabin. His teeth were set, his eyes frowning, his fists opening and closing. He sat down again and got up. The look on his face was almost savage.

Suddenly he waved a hand violently, and a snarl contorted his features. He swung around, looking at the outlaw with hot, gray eyes. "I can't do it!" he snapped. He shoved out his jaw. "Not after what we've been through. Damn it, Deverel," he panted, "I don't like this job. I feel too friendly for you. I like you too damn much. You're a real guy. Hell, you could have run out any time you wanted to in the past six weeks.

"No. No, I can't do it. It'd be like"—he groped—"like taking unfair advantage, somehow. So," he said bitterly, "you're free." He forced a smile onto his face. "I'll write it in my report like this—'Captured outlaw, but he put one over on me and escaped.'"

"Right," Deverel agreed steadily.

"So I'll be going. I'll be here for, oh, about twenty-four hours. You going any place in particular?" he enquired politely.

"No-o-o," Deverel replied thoughtfully. "Don't know as I have any particular destination. Drop you a postcard? I will, if you think you need me for anything."

"Don't bother. I never have much trouble finding you," Colbie said airily. Then he put on a space suit. Deverel worked the valves, and a moment later Colbie stood in the air-lock. For a moment the two men stood there, saluting each other with grave eyes. Then the inner door closed and the outer opened.

Deverel watched Colbie enter his ship.

Then he sat down and, incandescent gases flaring from her stern jets, the slim cruiser accelerated until it was swallowed up in the trackless, illimitable wastes of space.

# IN TIMES TO COME

***THE Analytical Laboratory*** requires a little comment this time. ***The Legion of Time*** was an easy first place. ***Three Thousand Years!*** was second. Then the fight began. Furthermore, ***Catastrophe*** was not listed, since it was not a story but an article. But—it just barely nosed out ***Island of the Individualists*** in actual comments! The first time an article has rated anything like that.

BUT equally interesting was the reaction on ***RA for the Rajah.*** That was printed experimentally, to find how readers liked that genuinely unusual method of treatment. Actually, ***Legion of Time*** alone got more comment—but the comment on ***RA for the Rajah*** was neatly and exactly divided between a row of O's and —'s and a row of +'s and √'s. It was definitely a mixed reaction—but it was noticed and commented on. Thank you!

AND for August. Burks is back—but with a completely new kind of story-treatment. ***Hell Ship*** concerns a spaceship—operating, incidentally, on a wholly new type of driving theory—but more particularly, a man. Meet Josh McNab, Scotch engineer of the good ship **S.S. *Arachne*.** You'll see the engineroom of the ***Arachne*** on the cover, incidentally.

DON A. STUART has a long novelette. It's placed in Antarctica—for a reason. It had to be there for that is the only place on the face of the Earth where there is no animal life whatever—and Stuart discusses a thing that must be isolated. A deadly imitation. The story's problem lies in the title—***Who Goes There?***

FOR one of the high places on a coming ***Analytical Laboratory***, I nominate A. B. L. Macfadyen's ***Jason Comes Home***, also in the August issue. You'll find it unusual and good. Warner Van Lorne's ***Resilient Planet*** will appear in August, and an exceedingly interesting article on rocketry by Willy Ley—***Orbits, Take-offs and Landings.*** Rockets are based on Newton's Second Law, but I can't remember any writer who has pointed out and stressed the First Law of Rockets, brought out in this article.

FINALLY, there will be a new author with us next month. Royal S. Heckman starts with ***Asteroid Pirates*** and the bullet-proof, highly intelligent Saturnian Apes.

**THE ANALYTICAL LABORATORY**

| | | |
|---|---|---|
| 1. | The Legion of Time | Jack Williamson |
| 2. | Three Thousand Years! | Thomas Calvert McClary |
| 3. | Static | Kent Casey |
| 4. | The Brainstorm Vibration | M. Schere |
| 5. | Island of the Individualists | Nat Schachner |

# The Dangerous

## By L. Ron

***A name well-known to adventure in ASTOUNDING—with a tale to move bodily on the wings of***

*(Author's Note: For reasons pertinent to the happiness of Mankind, by request from the United States Philosophic Society and the refusal of Dr. Henry Mudge, Ph. D., of Yamouth University, the philosophic equation mentioned herein is presented only as Equation C without further expansion. LRH)*

THE room was neither mean nor dingy. It was only cluttered. The great bookcases had gaps in their ranks and the fallen members lay limp-leaved on floor and table. The carpet was a snowdrift of wasted paper. The stuffed owl on the mantel was awry because the lined books there had fallen sideways, knocking the owl around and over to peck dismally at China on the globe of the world. The writing desk was heaped with tottering paper towers.

And still Dr. Mudge worked on.

His spectacles worried him because they kept falling down in front of his eyes; a spot of ink was on his nose and his right hand was stained blue-black.

The world could have exploded without in the least disturbing Yamouth's philosophic professor. In his head whirled a maelstrom of philosophy, physics and higher mathematics and, if examined from within, he would have seemed a very brave man.

Examined from without it was a different matter. For one thing, Dr. Mudge was thin. For another, he was bald. He was a small man and his head was far too big for his body. His nose was long and his eyes were unusually bright. His thin hands gripped book and pen as every atom of his being was concentrated upon his work.

Once he glanced up at the clock with a worried scowl. It was six-thirty and he must be done in half an hour. He had to be done in half an hour. That would give him just time enough to rush down to the University and address the United States Philosophic Society.

He had not counted on this abrupt stab of mental lightning. He had thought to deliver a calm address on the subject, "Was Spinoza Right in Turning Down the Professorship of. . . ." But when he had begun to delve for a key to Spinoza, a truly wonderful idea had struck him and out he had sailed, at two that day, to dwell wholly in thought. He did not even know that he was cramped from sitting so long in one place.

"Hen-r-r-r-e-e-e-e!" came the clarion call.

Henry failed to hear it.

"HEN-r-r-r-ry!"

Again he did not look up.

"HENRY MUDGE! Are you going to come in here and eat your dinner or not?!"

He heard that time, but with less than half an ear. He did not come fully back to the world of beefsteak and mashed potatoes until Mrs. Doolin, his housekeeper, stood like a thundercloud in the study door. She was a big woman with what might be described as a forceful personality. She was very righteous, and when she saw the state of that study she drew herself up something on the

# Dimension

## Hubbard

***readers makes its first appearance of a philosopher who learned thought—and couldn't stop moving.***

*Blinded by the brilliant sheen of the floor—numbed by the bombarding thought-waves of the Martians, Mudge stumbled and fell to his knees.*

order of a general about to order an execution.

"Henry! What have you been doing? And look at you! A smudge on your nose—and *an ink spot on your coat!*"

HENRY MIGHT fight the universe, but Mrs. Doolin was the bogey-man of Henry's life. Ten years before she had descended upon him and since that time there had been for him——

"Yes, Lizzie," said Henry, aware for the first time of his stiffness and suddenly very tired.

"Are you coming to dinner or aren't you? I called you a half hour ago and the beefsteak will be ruined. And you must dress. What on earth's gotten into you, Henry Mudge?"

"Yes, Lizzie," said the doctor placatingly. He came slowly to his feet and his joints cracked loudly.

"What *have* you done to this place?"

Some of the fire of his enthusiasm swept into Henry. "Lizzie, I think I have it!" And that thought swept even Lizzie Doolin out of the room as far as he was concerned. He took a few excited steps around the table, raised his glasses up on his forehead and gleamed. "I think I've got it!"

"What?" demanded Lizzie Doolin.

"The equation. Oh, this is wonderful. This is marvelous! Lizzie, if I am right, there is a condition without dimension. A negative dimenson, Lzzie. Think of it! And all these years they have been trying to find the fourth positive dimension and now by working backwards——"

"Henry Mudge, what *are* you talking about?"

But Henry had dived into the abstract again and the lightning was flashing inside his head. "The negative dimension! Epistemology!"

"What?"

He scarcely knew she was there. "Look, think of it! You know what you can do with your mind. Mentally you can think you are in Paris. *Zip*, your mind has mentally taken you to Paris! You can imagine yourself swimming in a river and *zip!* you are mentally swimming in a river. But the body stays where it is. And why, Lizzie? *Why?*"

"Henry Mudge——!"

"But there is a *negative* dimension. I am sure there is. I have almost formulated it and if I can succeed——"

"Henry Mudge, your dinner is getting cold. Stop this nonsense——"

But he had not heard her. Suddenly he gripped his pen and wrote. And on that blotted piece of paper was set down *Equation C.*

He was not even aware of any change in him. But half his brain began to stir like an uneasy beast. And then the other half began to stir and mutter.

And on the sheet before him was *Equation C.*

"Henry Mudge!" said Lizzie with great asperity, "if you don't come in here and eat your dinner this very minute ——" She advanced upon him as the elephant moves upon the dog.

Henry knew in that instant that he had gone too far with her. And half his brain recognized the danger in her. For years he had been in deadly terror of her——

"I wish I was in Paris," Henry shivered to himself, starting to back up.

*Whup!*

"Cognac, m'sieu?" said the waiter.

"Eh?" gaped Henry, glancing up from the sidewalk table. He could not take it in. People were hurrying along the Rue de la Paix, going home as the hour was very late. Some of the cafés were already closed.

*"Cognac o vin blanc, m'sieu?"* insisted the waiter.

"Really," said Henry. "I don't drink. I—is this Paris?"

"Of a certainty, m'sieu. Perhaps one has already had a sip too much?"

"No, no! I don't drink," said Henry, frightened to be in such a position.

The waiter began to count the saucers on the table. "Then, m'sieu has done well for one who does not drink. Forty francs, m'sieu."

Henry guiltily reached into his pocket. But his ink-stained jacket was not his street coat. He had carpet slippers on his feet. His glasses fell down over his eyes. And his searching hands told him that he possessed not a dime.

"Please," said Henry, "I am out of funds. If you would let me——"

"So!" cried the waiter, suavity vanishing. "Then you will pay just the same! *Gendarme!* GENDARME!"

"Oh," shivered Henry and imagined himself in the peaceful security of his study——

*Whup!*

LIZZIE WAS gaping at him. "Why—why where—where did you go? Oh, it must be my eyes. I know it must be my eyes. These fainting spells did mean something then. Yes, I am sure of it." She glanced at the clock. "Look, you haven't eaten dinner yet! You come right into the dining room this instant!"

Meekly, but inwardly aghast, Henry tagged her into the dining room. She set a plate before him. He was not very hungry, but he managed to eat. He was greatly perplexed and upset. The negative dimension had been there after all. And there was certainly no difficulty stepping into it and out of it. Mind was everything, then, and body nothing. Or mind could control body—— Oh, it was very puzzling, he decided at length.

"What are you dreaming about?" challenged Lizzie. "Get upstairs and get dressed. It's seven this very minute!"

Henry plodded out into the hall and up the stairs. He got to his room and saw that all his things were laid out.

Oh, it was very puzzling, he told himself as he sat down on the edge of the bed. He started to remove one carpet slipper and then scowled in deep thought at the floor.

Twenty minute later Lizzie knocked at his door. "Henry, you're late already!"

He started guiltily. He had not even taken that slipper off. If Lizzie found him in here—— She was starting to open the door.

"I ought to be there this very minute," thought Henry, envisioning the lecture hall.

*Whup!*

It startled him to see them filing in. He stood nervously on the platform, suddenly aware of his carpet slippers and ink-stained working jacket, the spot on his nose and his almost black hand. Nervously, he tried to edge back.

The dean was there. "Why—why Dr. Mudge. I didn't see you come in." The dean looked him up and down and frowned. "I hardly think that your present attire——"

Henry visualized the clothes laid out on his bed and started to cough an apology.

"I—er——"

*Whup!*

"What's that, Henry?" said Lizzie. "My heavens, where are you?"

"In here, Lizzie," said Henry on the edge of his bed.

She bustled into the room. "Why, you're not dressed! Henry Mudge, I don't know what is happening to your wits. You will keep everybody waiting at the University——"

"O-h-h-h," groaned Henry. But it was too late.

"My dear fellow," said the dean, startled. "What—er—what happened to you? I was saying that I scarcely thought it proper——"

"Please. I——" But that was as far as Henry got.

"I KNOW it's my eyes," said Lizzie.

"Stop!" wailed Henry. "Don't say anything! Please don't say anything. Please, please, *please* don't say anything!"

She was suddenly all concern. "Why, you're pale, Henry. Don't you feel well?"

"No—I mean yes. I'm all right. But don't suggest anything. I——" But how could he state it? He was frightened half to death by the sudden possibilities which presented themselves to him. All he had to do was visualize anything and that scene was the scene in which he found himself. All anybody had to do was suggest something and *zip!* there he was.

At first it had been a little difficult, but the gigantic beast Thought had risen into full power.

"Your dress," said Lizzie.

But he was afraid to start disrobing. What if he thought——

No, he must learn to control this. Somehow he had missed something. If he could get the entire equation straight and its solution, he would have the full answer. But Thought was drunk with power and would not be denied.

Henry rushed past Mrs. Doolin and down the steps to his study. He quickly sat in his chair and gripped his pen with determination. There was Equation C. Now if he could solve the rest of it he would be all right. He only had to substitute certain values——

Lizzie had followed him up. "Henry, I think you must be going crazy. Imagine keeping all those men waiting in the lecture hall——"

*Whup!*

Henry groaned and heard the dean say, "It was to be our pleasure this evening that we hear from Dr. Mudge on the subject——"

Somebody twitched at the dean's sleeve. "He's right beside you."

The dean looked and there was Henry, tweed jacket, ink stains, carpet slippers and all. Beads of perspiration were standing out on Henry's bulging forehead.

"Go right ahead," whispered the dean. "I do not approve of your attire, but it is too late now."

Henry stood up, fiery red and choked with stage fright. He looked down across the amused sea of faces and cleared his throat. The hall quieted slowly.

"Gentlemen," said Henry, "I have made a most alarming discovery. Forgive me for so appearing before you, but it could not be helped. Mankind has long expected the existence of a state of mind wherein it might be possible to follow thought. However——" His lecture presence broke as he recalled his carpet slippers. Voice nervous and key-jumpy, he rushed on. "However, the arrival at actual transposition of person by thought alone was never attained, because mankind has been searching forward instead of backward. That is, mankind has been looking for the existence of nothing in the fourth dimension instead of the existence——" He tried to make his mind clear. Stage fright was making him become involved. "I mean to say, the negative dimension is not the fourth dimension, but no dimension. The existence of nothing as something——"

Some of the staid gentlemen in the front row were not so staid. They were trying not to laugh because the rest of the hall was silent.

"What idiocy is that man babbling?" said the dean to the University president behind his hand.

DR. MUDGE'S knees were shaking. Somebody tittered openly in the fourth row.

"I mean," plunged Mudge, desperately, "that when a man imagines himself elsewhere, his mind seems really to be elsewhere for the moment. The

Yogi takes several means of accomplishing this, evidently long practiced in the negative dimension. Several great thinkers such as Buddah have been able to appear bodily at a distance when they weren't there but——" He swallowed again. "But elsewhere when they were there. The metaphysicist has attributed supernatural qualities to the phenomenon known as an 'apport', in which people and such appear in one room without going through a door when they were in the other room——"

Dear me, he thought to himself, this is a dreadful muddle. He could feel the truth behind his words, but he was too acutely aware of a stained jacket and carpet slippers and he kept propping up his glasses.

"If a man should wish to be in some other place, it is entirely possible for him to imagine himself in that place and, diving back through the negative dimension, to emerge out of it in that place with instantaneous rapidity. To imagine oneself——"

He swallowed hard. An awful thought had hit him, big enough to make him forget his clothes and audience. A man could imagine himself anyplace and then be in that place *zip!* But how could a man exert enough will power to keep from imagining himself in a position of imminent destruction? If he thought—— Mudge gritted his teeth. He must *not* think any such thing. He must *not!* He knew instinctively that there was one place he could not imagine himself without dying instantly before he could recover and retreat. He did not know the name of that place at the instant, would not allow himself to think of it——

A ribald young associate professor said hoarsely to a friend, loud enough for Dr. Mudge to hear, "He ought to imagine himself on Mars."

Mudge didn't even hear the laugh which started to greet that sally.

*Whup!*

He examined the sandy wastes which stretched limitlessly to all the clear horizons. Air whooshed out of his lungs and he gasped painfully. Bewildered, he took a few steps and the sand got into his carpet slippers. A thin, cold wind cut through the tweed jacket and rustled his tie.

"Oh, dear," thought Mudge. "Now I've done it!"

A high, whining sound filled the sky and he glanced up to see a pear-shaped ship streaking flame across the sky. It was gone almost before it had started.

Dr. Mudge felt very much alone. He had no faith in his mental behavior now. It might fail him. He might never get away. He might imagine himself in an emperor's palace with sentries——

*Whup!*

THE DIAMOND floor was hard on his eyes and lights blazed all around him. A golden throne reared before him and on top of it sat a small man with a very large head, swathed in material which glowed all of itself.

Mudge couldn't understand a word that was being said because no words were being said, and yet they all hit his brain in a bewildering disarray.

Instantly he guessed what was happening. As a man's intention can be telepathed to a dog, these superior beings battered him mentally as he had no brain wave selectivity. He had guessed the human mind would so evolve, and he was pleased for an instant to find he had been right. But not for long.

He began to feel sick in the midst of this bombardment. All eyes were upon him in frozen surprise.

The emperor shouted and pointed a small wand. Two guards leaped up and fastened themselves upon Mudge. He knew vaguely that they thought he was an inferior being—something like a chimpanzee, or maybe a gorilla, and, in-

deed, so he was on their scale of evolution.

The ruler shouted again and the guards breathed hard and looked angrily at Mudge. Another man came sprinting over the diamond floor, a flare-barreled gun gripped in his hand.

Mudge began to struggle. He knocked the guards aside with surprising ease.

Wildly he turned about, seeking a way out, too confused by light, thought waves and sound to think clearly and remember.

The man with the lethal-looking weapon braced his feet and leveled the muzzle at Mudge's chest. He was going to shoot and Mudge knew that he faced a death-dealing ray. He was getting no more consideration than a mad ape like that one in the Central Park Zoo—— The guard was squeezing the trigger——

*Whup!*

Weakly Dr. Mudge leaned on the railing of the Central Park Zoo in New York. He took out his handkerchief and dabbed at his forehead. Dully he gazed up, knowing he would see an orangutan in the cage. It was late, and the beast slumbered in his covered hut. Mudge could only see a tuft of fur.

"Thanks," he whispered.

The night air was soothing. He took a deep, refreshing breath. He was exhausted with all the cross-currents which had battered his poor, human mind, and the thin air of Mars.

He moved slowly along the rail. There was a sign there which said, "Gorilla. Brought from the Mountains of the Moon by Martin——"

*Whup!*

"O-h-h-h," groaned Mudge pitifully as he sank down on a rock in the freezing night. "This can't keep up. I would no more than start to eat when something would yank me away. I'd starve. And sooner or later I'll think of a very dangerous place and that will be the end of me before I can escape. There's one place in particular——

"NO!" he screamed into the African night.

The thought had not formed. One place he must never, never think about. NEVER!

From this high peak, he could see all Africa spread before him. Glowing far off in the brilliant moonlight was Lake Tanganyika.

Mudge was a little pleased with himself just the same. The people back at the lecture——

*Whup!*

"I AM SORRY and very puzzled," the dean was saying, watch in hand. "Why Dr. Mudge should see fit to use a magician's tricks, to appear in such strange attire and generally disport himself——"

"I can't help it!" wailed Mudge at his side.

The dean almost jumped out of his shoes. He was annoyed to be startled out of his dignity, and he scowled harshly at Mudge. "Doctor, I advise you strongly that such conduct will no longer be tolerated. If you are trying to prove anything by this, an explanation will be most welcome. The subject is philosophy and *not* Houdini's vanishing tricks."

"O-h-h-h," moaned Mudge, "don't say anything. Please *don't* say anything more. Just keep quiet. I mean," he said hastily, "I mean, don't say anything else. Please!"

The young man who had suggested Mars was not quite so sure of himself, but the dean's handy explanation of magic without paraphernalia restored his buoyancy.

"It was just——" began Mudge. "No, I can't say where I was or I'll go back, and I won't go back. This is very terrifying to me, gentlemen. There is one certain place I must *not* think about.

The mind is an unruly thing. It seems to have no great love for the material body as it willfully, so it seems, insists in this great emergency on playing me tricks——"

"Dr. Mudge," said the dean, sternly. "I know not what you mean by all this cheap pretension to impossibilities——"

"Oh, no," cried Mudge. "I am pretending nothing. If I could only stop this I would be a very happy man! It is terribly hard on the nerves. Out of Spinoza I wandered into Force equations, and at two today I caught a glimmer of truth in the fact that there was a negative dimension—a dimension which had no dimensions. I know for certain that mind is capable of anything."

"It certainly is," said the dean. "Even chicanery."

"No, no," begged Mudge, pushing his glasses high on his forehead and fishing in his pockets. "In my notes——" He looked squarely at the dean. "Here! I have proof of where I have been, sir." He stooped over and took off a carpet slipper. He turned it upside down on the lecture table and a peculiar, glowing sand streamed out.

"That is Martian sand," said Mudge.

"Bosh!" cried the dean. He turned to the audience. "Gentlemen, I wish you to excuse this display. Dr. Mudge has not been well, and his mind seems to be unbalanced. A few hours' rest——"

"I'll show you my notes," said Mudge, pleading. "I'll show you the equation. I left them home in my study——"

*Whup!*

Lizzie Doolin was muttering to herself as she picked up the papers from the floor and stacked them. The professor was certainly a madman this evening. Poor little man—— She was turning and she almost fainted.

Dr. Mudge was sitting in his chair getting his notes together.

"Doctor!" cried Lizzie. "What are you doing there? How did you get in the house? The doors are all locked and—— Oh-h-h-h-h, it's my eyes. Doctor, you know very well that you should be at that lecture——" She started at him.

He barely had time to cram the papers in his pocket.

*Whup!*

THE DEAN was fuming. "Such tricks are known—— Oh, there you are! Doctor, I am getting very sick of this. We are too well versed in what can be done by trickery to be at all startled by these comings and goings of yours."

"It's *not* a trick!" stated Mudge. "Look, I have my notes. I——"

"And I suppose you've brought back some vacuum from the Moon this——"

*Whup!*

It was so cold that Mudge was instantly blue all over. He could feel himself starting to blow up as the internal pressure fought for release. His lungs began to collapse, but his mind raced, torn between two thoughts.

Here he was on the Moon. Here he was, the first man ever to be on the Moon!

And all the great volcanoes reared chilly before him, and an empty Sea of Dreams fell away behind him. Barren rock was harsh beneath his feet and his weight seemed nothing——

All in an instant he glimpsed it because he knew that he would be dead in another second, exploded like a penny balloon. He visualized the thing best known to him—his studio.

*Whup!*

Lizzie was going out the door when she heard the chair creak. She forgot about the necessity for aspirin as she faced about.

Mudge was in again.

"Doctor," stormed Lizzie, an Amazon of fury, "if you don't stop that, I don't

know what will happen to me! Here a minute, gone again, here and gone, here and gone! What is the world coming to! It is *not* my eyes. It can't be my eyes. I felt over the whole room for you and not so much as a hair of your head was here. What kind of heathen magic have you been stirring up? You've sold your soul——"

"STOP!" screamed Mudge. He sank back, panting. That had been close. But then, that had not been as close as that other THING which he dared *not* envision. He chopped the thought off and started back on another.

"Maybe," said Mudge, thoughtfully, "maybe there isn't—— Oh, I've got the test right here. Can I throw myself back and forth between life and death?"

He had said the word.

"Death," he said again, more distinctly.

And still nothing occurred. He breathed easier. He could not go back and forth through Time, as he had no disconnection with the Time stream. He could whisk himself about the universe at will—or against his will—but he was still carrying on in the same hours and minutes. It had been dark in Africa, almost morning in P——

"NO!" he yelled.

Lizzie jumped a foot and stared to see if Mudge was still in his chair.

"Whatever are you up to?" demanded Lizzie, angrily. "You frighten a body out of her wits!"

"Something awful is going on," said Mudge, darkly. "I tried to tell you before dinner, but you wouldn't listen. I can imagine I am some place and then *be* in that someplace. This very instant I could imagine something and *zip!* I'd be someplace else without walking through doors or anything."

LIZZIE almost broke forth anew. But it awed her, a little. She had seen Mudge appear and disappeared so often this evening that this was the only explanation which she could fit.

Mudge looked tired. "But I'm afraid, Lizzie. I'm terribly afraid. If I don't watch myself, I might imagine I was in some horrible place such as——

"NO!" shouted Mudge.

"I might imagine I was some place where I——

"NO!" he yelled again.

Those shouts were like bullets to Lizzie Doolin. But she was still awed—a little.

Mudge held his head in his hands. "And I'm in trouble. The dean will not believe what is happening to me. He calls me a cheat——

"NO!" he cried.

"What do you keep yelling for?" complained Lizzie.

"So I won't go sailing off. If I can catch a thought before it forms I can stay put." He groaned and lowered his head into his hands. "But I am not believed. They think me a cheat. Oh, Lizzie, I'll lose my professorship. We'll starve!"

She was touched and advanced slowly to touch his shoulder. "Never you mind what they say about you. I'll beat their heads in, Henry, that I will."

He glanced up in astonishment at her. She had never shown any feeling for him in all these ten years. She had bullied him and driven him and terrified him for years——

She was conscious of her tenderness and brushed it away on the instant. "But don't go jumping off like that again! Drive over to the University in your car like a decent man should."

"Yes, Lizzie."

He got up and walked toward the door. Her jaw was set again.

"Mind what I tell you," she snapped. "Your car, now! And nothing fancy!"

"Yes, Lizzie. They're waiting. . . ." He didn't, couldn't stop that thought and the hall was clearly envisioned and there he was, *whup*.

The dean had his hands on both hips as he saw that Mudge was here again. The dean wagged his head from side to side and was very angry, almost speechless. The audience tittered.

"Have you no respect?" cried the dean. "How dare you do such things when I am talking to you. I was saying that the next time you'll probably say——"

"SHUT UP!" shouted Mudge in desperation. He was still cold from his trip to the Moon.

The dean recoiled. Mudge was a very mild little fellow, with never anything but groveling respect for everybody. And these words from him——

"I'm sorry," said Mudge. "You mustn't say things or you'll send me off somewhere again. Now don't speak."

"Mudge, you can be assured that this performance this evening will terminate your——"

Mudge was desperate. "Don't. You might say something."

The audience was delighted and laughter rolled through the hall. Mudge had not realized how his remark would sound.

The dean had never been anything but overbearing and now, with his dignity flouted, he turned white. He stepped stiffly to the president of the University and said a few words in a low voice. Grimly the president nodded.

"Here and now," said the dean, stepping back, "I am requesting your resignation, Mudge. This Houdini buffoonery——"

"Wait," pleaded Mudge, hauling his notes from his pocket. "First look at these and maybe you will see——"

"I care to look at nothing," stated the dean frostily. "You are a disgrace. To employ common stage magic——"

"Look," pleaded Mudge, putting the papers on the lecture stand. "Just give me one minute. I am beside myself. I don't mean what I say. But there is one think I must *not* think about—one thing I can't think to think about but which I —— Look. Here, see?"

The dean scowled at the sheets of scribbled figures and symbols. Mudge talked to him in a low voice, growing more and more excited.

The dean was still austere.

"And there," said Mudge, "right there is Equation C. Read it."

THE DEAN thought Mudge might as well be humored as long as he would be leaving in the morning for good. He adjusted his glasses and looked at Mudge's reports. His glance fastened on Equation C.

The dean was startled. He stood up straight, his logical mind turning over at an amazing pace. "That's very strange," said the dean, bewildered. "My head feels——"

"Oh, what have I done?" cried Mudge, too late.

The assistant professor in the front row, a man of little wit but many jokes, chortled, "I suppose *he* will go to Mars now."

*Whup!*

Mudge was almost in control by now. He knew that a part of Equation C was missing which would make it completely workable and useable at all times without any danger. And he also knew that being here on this sandy plain was not very dangerous unless one happened to think——

"NO!" he screamed into the Martian night.

It was easy. He was even used to Martian air now. All he had to do was visualize the classroom——

*Whup!*

Mudge took off his glasses and wiped them. Then he bent over and emptied the sand from his slippers. The hall before him was silent as death and men were staring in disbelief at the little man on the platform.

Mudge replaced the slipper. He took up a pencil and bent eagerly over his notes. He had to work this thing out before he imagined——

"NO!" he roared.

It would be awful if he dreamed it. Dreaming he would have no real control and things would happen to him.

The president rose cautiously and tapped Mudge's shoulder. "W-w-w-w-where is the dean?"

Mudge glanced around. True enough, the dean was not there. Mudge chewed at the end of his pencil in amazed contemplation.

"Do you mean," ventured the president, "that that statement about——"

"SHUT UP!" cried Mudge. "The dean may find out how to get back unless he thinks of something he——" He swallowed hard.

"Dr. Mudge, I resent such a tone," began the president.

"I am sorry," said Mudge, "but you might have said it, and the next time I might fall in a Martian canal——"

*Whup!*

HE WAS strangling as he fought through the depths. He broke the surface like a porpoise and swam as hard as he could, terror surging within him as these dark waters lapped over him.

Ahead he could see a houseboat with a beautiful lady sitting at the rail. He swam breast stroke, raising himself up to shout for help. The cold suddenness of the accident had dulled his brain and he could not know what monsters lurked in these Martian depths.

The woman was strangely like an Earth-woman for all that. Perhaps there were colonies of these people much as there were colonies of chimpanzees on Earth. But the houseboat was silvery and the woman dressed in luminous cloth.

Strong hands yanked Mudge from the water and he stood blowing upon the deck, water forming about his feet in a pool. The woman was staring at him. She was a beautiful thing, and Mudge's heart beat swiftly. She spoke in sibilant tones.

He bowed to her. "No, I haven't time for a visit or tea or anything," said Mudge. "I am sorry, but I am busy at a lect—— No!—I am busy on Ea—— NO! I am busy."

Oddly enough he knew that he could not speak her language, and yet he understood her perfectly as she placed her hand on his arm. It must be more telepathy, he thought.

"Yes, it is telepathy," said her mind. "Of course. But I am astonished to see you. For years—ever since the great purge—no humans of our breed have been here. Alone with these yellow men as servants I am safe enough. My parole was given because of certain favors——"

"Excuse me," said Mudge. "I have an appointment. Don't be alarmed if I vanish. I'll be back someday." He looked around to fix the spot in his mind, feeling devilish for an instant.

He bowed to her. "I must leave——"

"But you'll take cold," she said, picking up a shawl of glowing material and throwing it about his shoulders.

"Thank you," said Mudge, "and now I really must go."

Again he bowed, and envisioned the classroom deliberately this time.

*Whup!*

The water dripped to the lecture platform and Mudge was really getting cold by now. He hauled the shawl more tightly about his arms and was aware of protruding eyes all through the hall.

The water dripped and dripped, and Mudge shivered again. He sneezed. It would be good——

"NO!" he shouted and everybody in the hall almost jumped out of their chairs.

Mudge turned to the president, "You see what you did?" he said plaintively.

The president was cowed. But he picked up in a moment. "Did—did you see the dean?"

"No," said Mudge. The warm room was drying his clothes rapidly, and he rolled up his sleeve so that he wouldn't blot the paper. Feverishly, he began to evolve Equation D.

He almost knew why he was working so fast. He was wholly oblivious of the audience. Very well he knew that his life depended upon his solving Equation D and thus putting the negative dimension wholly in his control. His pencil flew.

The thought began to seep into his mind in spite of all he could do.

"NO!" he yelled.

Again people jumped.

There was a grunt at his elbow and there stood the dean. He had sand in his gray hair and he looked mussed up.

"So you got back," said Mudge.

"It—it was terrible," moaned the dean in a broken voice. "The——"

"Don't say it," said Mudge.

"Doctor," said the dean, "I apologize for all I said to you." He faced the crowd. "I can verify amply everything that has happened here tonight. Dr. Mudge is absolutely correct"—he paused to swab his face and spit sand out of his teeth—"about the negative dimension. I have the uneasy feeling, however, that it is a very dangerous dimension. A man might——"

"Stop," said Mudge, loudly.

HE WAS WORKING at a terrific pace now, and the paper shot off the stand to the floor as he swept it aside. He grabbed a new sheet.

He knew he was working against death. Knew it with all his heart. That thought would not long be stayed. At any minute he might find out where he was that he dared never go——

Equation D was suddenly before him. He copied it with a weary sigh and handed it to the dean. "Read that before you get any ideas," said Mudge.

The dean read it.

"Mars," said Mudge.

Nothing happened.

The dean began to breathe more easily.

"Moon," said Mudge.

And still nothing happened.

Mudge faced the audience. "Gentlemen, I regret the excitement here tonight. It has quite exhausted me. I can either give you Equation C and D or——"

"No," said the dean.

"No!" chorused the crowd.

"I'm frightened of it," said the dean. "I could never, never, never prevail upon myself to use it under any circumstances less than a falling building. Destroy it."

Mudge looked around and everybody nodded.

"I know this," said Mudge, "but I will never write it again." And so saying, he tore it up into little bits, his wet coat making it possible for him to wad the scraps to nothingness, never again to be read by mortal man.

"Gentlemen," said Mudge, "I am chilly. And so if you will excuse me, I will envision my study and——"

*Whup!*

Lizzie was crying. Her big shoulders shook as she hunched over in the doctor's chair. "Oh, I just know something will happen to him. Something awful," said Lizzie. "Poor little man."

"I am not a poor little man," said Mudge.

She gasped as she stared up at him.

"My chair, please," said Mudge.

She started to her feet. "Why, Henry Mudge, you are soaking wet! What do you mean——?"

He cut her short. "I don't mean anything by it except that I fell in a Martian canal, Lizzie. Now be quick and

get me some dry clothes and a drink of something."

She hesitated. "You know you don't drink," she snapped—for a test.

"I don't drink because I knew you didn't like it. Bring me some of that medicinal whiskey, Lizzie. Tomorrow I'll make it a point to get some good Scotch."

*"Henry!"*

"Don't talk like that," said Henry Mudge commandingly. "I am warning you that you had better be pretty good from now on."

"Henry," said Lizzie.

"Stop that," he said. "I won't have it. I refuse to be bullied in my own home, I tell you. And unless you are very, very good I am liable to vanish like that and *stay*——"

"Don't," she begged. "Don't do that, Henry. Please don't do that. Anything you say, Henry. Anything. But don't pop off like that anymore."

HENRY BEAMED upon her. "That's better. Now go get me some clothes and a drink. And be quick about it."

"Yes, Henry," she said meekly. But even so she did not feel badly about it. In fact, she felt very good. She whisked herself upstairs and trotted down again in a moment.

She placed the whiskey and water beside his hand.

Henry dug up a forbidden cigar. She did not protest.

"Get me a light," said Henry.

She got him a light. "If you want anything, dear, just call."

"That I will, Lizzie," said Henry Mudge.

He put his feet upon the desk, feeling wicked about it, but enjoying it just the same. His clothes were almost dry.

He sank back, puffing his cigar, and then took a sip of the drink. He chuckled to himself.

His mind had quieted down. He grinned at the upset owl. The thought which had almost hit him before came to him now. It jarred him for an instant, even made him sweat. But he shook it off and was very brave.

*"Sun,"* said Henry Mudge, coolly taking another drink.

# GIANT STARS

## By

## Arthur McCann

***A discussion of the newly-measured Epsilon Aurigae that goes beyond the surface facts. Is it the largest star known—and what is a star?***

THE recently measured (not recently discovered, however) Companion of Epsilon Aurigæ brings up an old astronomical problem more sharply than ever before, because it is more on the borderline than any other star ever discovered. When is a star not a star but—something else?

In 1937 the greatest stars known were, in order:

| Star | Diameter in miles |
|---|---|
| Antares | 400,000,000 |
| Alpha Herculis | 350,000,000 |
| Beta Pegasi | 350,000,000 |
| Mira Ceti | 200,000,000 |
| Betelgeux | 200,000,000 |

Then the Companion of Epsilon Aurigæ was measured. It appears to be approximately 3,000,000,000 miles in diameter. That makes it nearly ten times greater in diameter than the other giant stars. But the more important point is that it has, in consequence, nearly 100 times the surface area.

That immensity is totally beyond conception. The Sun we know is too vast for any honest mental comprehension, so astronomers cease entirely any useless efforts to actually understand it, and use it merely as a unit. The Companion of Epsilon Aurigæ, then, is 3100 times as great in diameter as our Sun.

Considerable newspaper and popular material has appeared on that giant star already; we are not interested at present in the star itself, but only as it represents a new member of a spectacular class—the giant suns. Antares, Mira, Betelgeux—they've been the familiar members of the class. Notice that they represent no great differences in size, those greatest hitherto-known suns. The Sun we know is about one million miles in diameter. There is, however, a steady series of stars that are known, progressing from tiny things 1/100th the Sun's size on in steady increase to these familiar giants 200 to 400 million miles in diameter. (Actually, Epsilon Aurigæ itself, the main star of the binary to which the new giant is a companion, is 120,000,000 miles in diameter—a true giant in its own right, dwarfed only by the new discovery.)

The important thing is this; there is a *steady, traceable curve of increasing sizes up to Antares.* Then, abruptly, we jump to a star immensely, spectacularly bigger—the new Companion.

No star closely approaching it in size has ever before been discovered.

No star hitherto discovered was spectacularly out of line with other known stellar sizes.

The Companion, then, is unique, unique at least in our knowledge. Why?

ANTARES is, technically, a Spectral Type cM0. The M-type designation means that it is a red, comparatively cool star with a surface temperature quite low for stars—about 3000°C., or slightly

hotter than an incandescent tungsten light filament. The c-designation is the hall-mark of the super-giant sun. "Super-giant" in this sense refers not to the bulk, but the energy-output. Antares is an enormously brilliant sun, more than 10,000 times as luminous as our Sun. Any star carrying that "c" in its designation is a super-giant and about 10,000 or more times brighter than Sol, so far as energy-output goes.

The "0" of "M0" in the designation means that Antares is a perfectly typical Type M. If it were a little cooler than average for M-type suns, it would be M1, or M2. Still cooler, and it might have been an M8 star.

All of those hitherto-known giants were type cM suns. Anything that huge is bound to be a c-type star; that enormous surface area, if it is hot enough to be luminous, is bound to pour out stupendous floods of energy. All those stars are extremely tenuous—no more than a high-grade vacuum from an Earthly viewpoint. Their immense bulks are made up almost entirely of an exceedingly tenuous atmosphere surrounding a core of immensely dense and furiously active stellar material. That core is virulently, coruscantly radiant. All stars, whatever the surface appearance may be, must contain at the heart an essentially-similar mechanism of heat-shattered atoms under unendurable pressure where the atomic energy may be released. In the type-M stars, that core is buried under vast layers of obscuring, hindering, throttling atmosphere that reduces the energy and dilutes it to a red color. Even the energy of ten thousand Sols, released deep in a 400,000,000-mile gas-cloud, would serve only to warm it to a reddish-white glow.

It is understandable, then, that those known giant-size stars have been red, and super-giant class cM suns. They had to be to be that large and still be visible.

Antares, Mira, Betelgeux were all measured by direct optical means. The stellar interferometer, one of the innumerable attachments that may be applied to a large telescope, served to specialize the 100″ Mt. Wilson telescope into a trick optical instrument that did not form clear images of the stars, but blurry, concentric circles of interference patterns. By the number of blur-rings and the optical constants of the instrument, it was possible to calculate the actual diameter, when the distance to that sun was calculated.

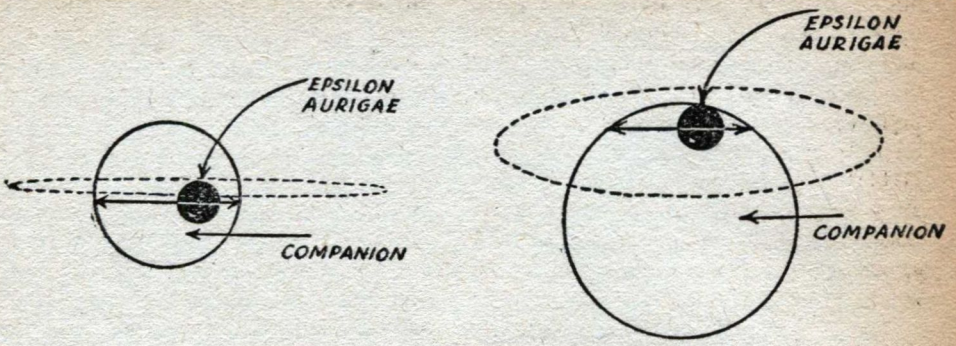
Three things were necessary; that the star observed give visible light enough to operate the interferometer. That it be reasonably (relative to interstellar distances) near. And that the star originally had been detected, or, rather, noticed.

The Companion of Epsilon Aurigæ *did not fulfill any one of these three conditions.* It was too dim to be detected. Epsilon Aurigæ, its companion, is a super-giant sun in its own right, a Class cF8 star somewhat hotter than our own Sun, and 120 times as large. That was sufficiently brilliant—enormously so—that even at the immense distance from us that it now stands it was definitely noticeable. It is a third-magnitude star, and the naked eye can detect a sixth-magnitude sun. We did not notice the Companion at all. It was much too dim.

Therefore, it was too dim to operate the stellar interferometer. Had we somehow discovered it, we could not have measured it even then.

Finally, it is immensely distant. Were it bright—even if it gave enough light—the distance is too great for the interferometer to operate with any satisfactory accuracy.

THEN, by all that's good and holy, we had no right to find out about that star at all. How did they? By a series of freak coincidences that is fantastically improbable.




*Two possible types of eclipse involving Epsilon Aurigae and its giant Companion. The double-ended arrow represents the known distance the stars move during the period of the eclipse. (Naturally, both starts move in orbits; only that of the Companion is indicated for simplicity.) The central eclipse, as at left, is improbable, for Epsilon remains visible, though dimmed, throughout. The stellar core would totally obscure it. The right-hand cut represents the actual state. Notice that, in consequence, the Companion must be larger than the central eclipse would require. The cuts are not strictly proportional. Taking the right-hand Companion as in scale, Epsilon Aurigae on the same scale should be .05 inches in diameter. The Sun on that scale would be .0004 inches in diameter.*

First, being so immensely distant, to attract attention, a companion sun, Epsilon Aurigæ itself, was provided. It was no mean provision, for, over 100,000,000 miles in diameter (enough to fill the Solar System out beyond Earth's orbit), it is so furiously energetic in its radiation that all the stupendous surface is kept at a temperature hotter than our own Sun's "little" surface maintains.

Second, since we can't see the Companion, we have to be able to detect it against a lighted background. The only way that would be possible would be to have the invisible star move across the face of a visible star—an eclipsing binary. Epsilon Aurigæ system is.

But that means that the plane of the orbits of this system must lie in exactly such a position that Earth, billions of millions of miles distant, hundreds of light years away, shall lie precisely in the same plane. If we do not see that system exactly edge on, we won't see the eclipse. We'll see over or under the obscuring dark star. The range of permissible variation, if we are to see that eclipse, is, obviously, small.

Those conditions were fulfilled. Epsilon's Companion was detected because the brilliant cF8 star varied in apparent brilliance in a regular manner. Plotting the apparent luminosity against time showed a light-curve with a period of 27 years, and of such a character as to prove that the variation was caused by an unseen Companion.

Since the eclipses did occur, that proved that Epsilon Aurigæ was, at certain times, moving directly away from Earth, and, at the opposite end of its orbit, directly toward Earth. The spectroscope is ideally adapted to measuring velocities toward and away from it in the line of sight. That gave us the orbital velocity and the period of the orbit. It was not too difficult to work out the complete orbit data for the twin stars.

Then, knowing how fast the stars moved round each other, the length of the eclipse gave the distance Epsilon had to move to pass completely past the unseen Companion. That gave us a chord of the new star's bulk. Not necessarily, however, a diameter.

Calculation showed which it was. In

the two cuts, if the visible star passes behind the Companion through a diameter, the distance we have determined represents the actual maximum dimension of the new star. If it is a chord, that means the Companion is much larger. Every Star must have an immensely dense core to generate its atomic power. No star could shine through the core of another—and Epsilon Aurigæ did shine through. It was only partially, not totally, obscured. Therefore the distance was a chord.

The calculations required to show what chord it was—whether a mere graze on a super-super-super-giant or a comparatively deep slice of a super-super-giant—were no pleasure. They were made, and the results interpreted. They showed the Companion to be something like this:

It is a star about 3,000,000,000 miles in diameter, with a surface temperature of 850° C. (That would just about melt aluminum. It is a temperature considerably lower than that of a gas flame, about that of an electric toaster, in fact.) It is about the lowest stellar surface-temperature on record. Naturally, it would be almost impossible to detect any such cool star, and it would, despite its enormous total energy-output, be unnoticed against the Milky Way. It has a mass about 21 times that of Sol—and is the *lesser* of the two stars of Epsilon Aurigæ system. The main star is 25 times as massive as Sol.

But it is a c-type super-giant. Down there, deep in the heart of that stupendous, tenuous atmosphere is one of those furiously incandescent 10,000-sun-power super-giant stellar cores functioning as wildly as in any other super-giant c-type star.*

* The c-type super-giants all have an absolute magnitude of about −5. Many exceed that very considerably (S Doradi has an absolute magnitude approaching −10.) The average Nova at the peak of its wild explosion reaches a temporary absolute magnitude of about −5 —equal only to the day-after-day, millennium-after-millennium output of a "normal" c-type super-giant.

One of the most important things the Epsilon Aurigæ system has taught us lies in this: the main star is diminished in intensity when it has to shine through the outer layers of the Companion's stupendous atmosphere, but *it remains visible.* Since the Companion is a c-type super-giant, it must have one of those enormously radiant cores buried there somewhere—but we can *not* see that core. The atmosphere of cold, non-radiant gas obscures it, but does not cut off entirely the light of Epsilon. It merely diminshes its apparent intensity.

NOW; why haven't we detected stars like the Companion before, elsewhere in space?

First, stars so huge must be rare, naturally. Super-giant suns are rare. Those stupendously bulky super-giants are rarities among rare stars.

Then, suppose there were another Epsilon Aurigæ Companion. Characteristically, the hot nucleus is shielded, its blue-white luminosity diluted in warming that immense atmosphere to a mere dull glow, an electric toaster 3,000,000,000 miles across. Between the dull-red of Antares and the toaster-glow of the Companion, we lost track. We couldn't find them.

It may well be that the Companion will be unique for ages to come, an accidentally discovered rare type that was discovered by a yet-rarer freak of happenstance. An eclipsing binary, both components of which were c-type super-giants, one of which was a gas-ball of the new, Aurigæ-type super-red-giant.

But here enters the astronomer's problem, mentioned in the first paragraphs. When is a star a star—and when is it that something else?

Suppose we expanded that already-expanded Aurigæ-type of super-giant. The core we cannot expand. That must remain dense, generating the frightful pressures and stupendous temperatures that release atomic power. But we can

expand the gaseous envelope even more. We can put it in rotation about the star —stars usually rotate anyway—so that gravity has even less effect on it. Lord knows, with only 21 times Sol's mass, that star must have a pretty feeble grip by the time its atmosphere gets even 3,000,000,000 miles out. We'll put our imaginary star's atmosphere out to 100 times as great a distance—out 300,000,000,000 miles.

We're getting pretty far out, and pretty tenuous now. Maybe we would do better with about twice as much mass, distributing it in that super-super atmosphere. Three hundred billion miles of it! It's unstable as blazes. It can't rotate really uniformly, because of orbital-period differences. But if we divide it into layers and use light- pressure to help, we may get somewhere. For instance, we can help matters a little by putting hydrogen and calcium, which are easily affected by light pressure, well out, in an orbit slower than gravity would normally allow.

But now—well, the Companion in Aurigæ, you remember, didn't shut off all the light of Epsilon. The outer atmosphere was too tenuous; it just grayed it, like a dull, gray haze. Our central core that we could not disperse, in this imaginary star, is going to show through our final structure I fear. Looking at it from a distance we'll probably see an intensely hot core—perhaps a type-c0 core, for instance, the hottest super-giant type known. The outer atmosphere we've diluted so much that it shows no real heat, now, but merely the effects of re-radiated light picked up from that inner core. The layers of different light-supported atoms will, from a great distance, appear as rings of light, rather than layers.

In a telescope, it would look just like a "planetary nebula" in fact, this incomparably vast star of ours. Like them —like the observed Ring Nebula in Lyra, for instance—it would, alone of stars, be vast enough to show as an actual circular object in a telescope here on Earth.

That would be a star incomparably vaster even than the Companion of Epsilon Aurigæ. Beside it, Mira Ceti, Betelgeux, the greatest of the red giants, would shrink to—the pinpoints they appear.

But not, perhaps, Antares. Antares, by infra-red light photography, shows evidences of a ring-nebula about it. Antares may, in fact, be a sort half-way step between the Companion and the—well, Hollywoodian super-collossal-giants of the planetary nebula order.

But, asks the astronomer, when is a star a star, and when is it something else—a planetary nebula 100,000,000,000 miles in diameter?

# The Legion of Time

## By

## Jack Williamson

*Synopsis: Parts I and II.*

*DEADLY antagonists, two women haunted Dennis Lanning's life. He was eighteen, in 1927, when Lethonee first appeared to him in the apartment at Harvard that he shared with three others: Wil McLan, the mathematician; Lao Meng Shan, the Chinese engineer; and Barry Halloran, all-American tackle and his dearest friend.*

*Tragic with dread, and beautiful, Lethonee's intangible image came to him alone, holding the great jewel of time that she called the* chronotron. *In it, she showed him wondrous Jonbar, her city, lying far-off in possible futurity. Jonbar's destiny, she told him, and even her own, was in his hands.*

*"Don't fly tomorrow," she warned him. "Or Jonbar will be slain!"*

*Lanning obeyed, giving up his opportunity for his first solo flight because he had fallen in love with her vanishing image. And Barry Halloran was killed in his stead.*

*Grief-stricken, Lanning left America. And Sorainya appeared to him, floating beside the rail of his ship in the tropics, on her golden shell of Time. Red-mailed warrior queen of Gyronchi, splendid and alluring, she called to him to leap to the shell and return with her to share her throne.*

*He was about to leap, when Lethonee came back to warn him. For the shell was but an immaterial image. He would have fallen to die in the shark-infested sea. Sorainya vanished, angered. And Lethonee explained.*

*Jonbar and Gyronchi are two conflicting possible worlds of future probability. Either of them may be made real, by the fifth-dimensional progression.* But not both. *They are fighting for survival. And the "lamp of reality", Lethonee says, is in Lanning's hands. She and Sorainya are each beckoning him to carry it into her own hall of possible futurity. The choice is his—the outcome veiled in unresolved probability.*

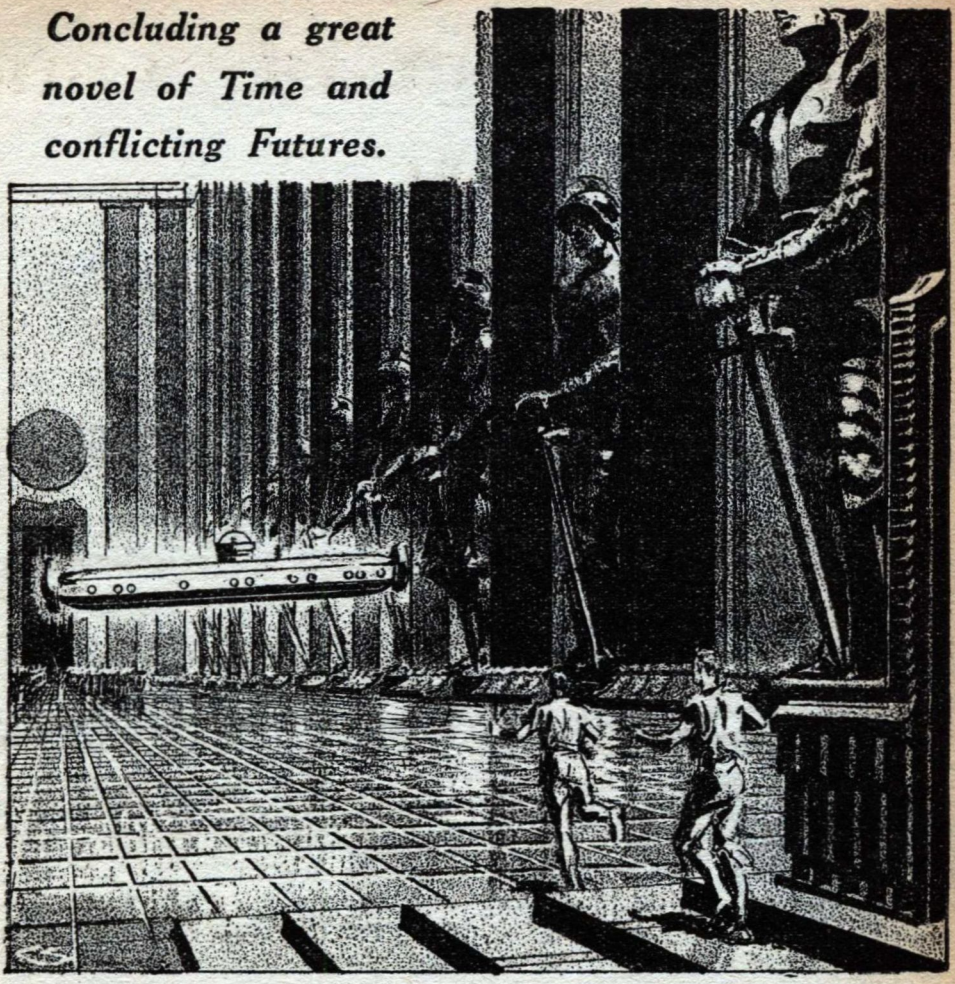
*Haunted, Lanning walked bewildered through the years. Lethonee guarded his life. Sorainya tried again to lure him to death. He became war correspondent, pilot, soldier—fighting always the right of might. In 1938, flying with Lao Meng Shan to defend Hankow from air raiders, he was shot down.*

*Plunging toward death, they were taken aboard a strange ghost-ship, revived by doctors from Jonbar. Barry Halloran is there, alive again, amid a dozen fighting men—all snatched from death by the mysterious* dynat.

*Captain of the* Chronion *is Wil McLan. Now queerly aged, twisted from torture, he tells in a voiceless whisper how he mastered Time with the geodesic analyzer. He saw Sorainya, loved her, built the ship to cruise Time to reach her in Gyronchi. But she imprisoned him treacherously, tortured him for the secret of Time, and let Glarath, high priest of the strange* gyrane, *study the* Chronion.

*Lethonee helped him escape, guided him to Jonbar. Unwittingly, his experiment has altered the trend of probability from Jonbar toward Gyronchi. To de-*

***Concluding a great novel of Time and conflicting Futures.***



***In the air of Sorainya's great hall, the dim shape of the Chronion appeared—and snapped to solidity as the mist of Time dissolved from it.***

*fend menaced Jonbar, Wil McLan has come back to gather the Legion of Time.*

*He makes Lanning commander. They return to Jonbar. But some triumph of Gyronchi extinguishes the probability of Jonbar, and it disappears about them. Lethonee dissolves from Lanning's arms.*

*Aboard the* Chronion, *they find that the enemy, now with a time ship of their own, have used the* gyrane's *power to drag some vital object from the past. It was the resulting warp of probability that obliterated Jonbar.*

*The* Chronion *raids Gyronchi to recover the object, and so restore the possibility of Jonbar's existence. Lanning leads seven men into Sorainya's citadel. All save he and Barry Halloran are killed fighting her huge, guardian ants. They break into her strong room, find the mysterious object sealed in a brick of black cement, and start back to the* Chronion.

*But Sorainya appears suddenly before them, in her vast throne hall, leading another horde of the gigantic ants.*

*"She has cut us off!" Lanning gasps. "There's no way out——"*

## XII.

BUT ONE WEAPON now remained to the two men standing alone beside the diamond throne before Sorainya and her charging horde of giant ants: Barry Halloran's blood-stained Mauser.

"Quick!" urged Lanning. His red fingers closed hard on the precious black brick that was the very cornerstone of menaced Jonbar. "Fire! There's time enough to get—her!"

Yet, as soon as Barry raised the rifle, he was sorry he had spoken. For the queen of Gyronchi, in her black-plumed panoply, was too splendid to be slain. All the mocking, glorious beauty of Sorainya returned, as when she had come to him on the golden shell. Demon-queen! He bit his lip, and fought down a frantic impulse to snatch Barry's level rifle.

The gun crashed, and Lanning waited, with a stricken heart, to see Sorainya fall. But it was one of the great ants that stumbled and clutched with four queer limbs at its armor shell.

"I had it on her," muttered Halloran. "But they'd get us just the same. And she's a woman. Sort of—beautiful!"

Lanning reeled, and the anvil of agony rang louder in his brain. His taut fingers grasped the brick, and his dulled mind groped foggily for any possible way back to the ship, however desperate. But there was none.

And the voiceless question of Wil McLan was rasping in his ears: "Could any man kill Sorainya?"

But there was something—— His dazed brain spun. Sorainya must be destroyed, so Wil McLan had said. And Lethonee had told him, long ago, that he must choose one of the twain, and so doom the other. His heart came up in his throat, and he reached out a trembling hand.

"Give me——"

But the rifle had snapped, empty. Halloran flung it down, folded his crimsoned arms, stood waiting grimly. Lanning bent to pick up the gun, gasping: "Mustn't give up, alive! That prison of horror——"

But Sorainya had paused, leveled the yellow needle of her sword. A hot blue spark hissed to the rifle. Lanning's hand jerked away from the half-fused weapon, seared, nerveless. Too late. She had them——

The golden bugle of her voice pealed down the hall, triumphant: "Well, Denny Lanning! So you prefer Gyronchi? And the dungeon, to my throne here——"

Lanning blinked. Sorainya and her charging horde were already halfway down the hall. Beneath her crested helmet, he could see that clear-cut face still white with vengeful anger; those long, green eyes cold as ice and cruel with a pitiless mockery. But something was coming between—a shadow, a thickening silver veil.

The shadow grew abruptly real. Breathless, Lanning rubbed at his eyes, shuddering to the shock of incredulous hope. For it was the *Chronion!*

The green glow fading slowly from her polar disks, the time ship's silver hull dropped to the floor before the throne. The small figure of Lao Meng Shan, on the foredeck, turned the Maxim mounted there toward Sorainya and the *kothrin*—and then fell desperately to taking the gun apart, for it was jammed.

The thin, twisted figure of Wil McLan, under his crystal dome, was beckoning urgently. After that first stunned instant, Lanning caught at Barry's arm, and they ran frantically to climb aboard.

SORAINYA screamed a wild battle cry. With a flashing sweep of her golden sword, she led the great ants on at an unchecked run. A scattering volley from their heavy guns peppered the *Chronion.*

The turret revolved beneath the dome,

and the yellow ray flamed upon Lanning and Halloran from the crystal gun, to pull them into the field of the ship.

Lanning had glimpsed the blind, bewildered figure of the navy airman, Willie Rand, stark and alone on the deck. But, when he and Halloran tumbled breathless over the rail, finding Shan still busy with the useless Maxim, Rand was gone.

"Look, Denny!" Barry Halloran was hoarse with an awed admiration. "The damn blind fool!'

He pointed toward Sorainya's horde, and Lanning saw Willie Rand, going to meet them. Bandaged head bent low, he moved at a blind, stumbling run. The broken Mauser was level in his hands, the whetted bayonet gleaming.

The giant ants paused before that solitary charge as if bewildered. Sorainya's fierce shout urged them on. Their guns rattled, and the sailor's body jerked to the smacking impacts of the bullets. But he ran on.

Lanning staggered to the deck speaking tube, gasping: "Wil, can we help him?"

Wil McLan, under the dome, shook his white head.

"No," the whisper came. "But it's what he wanted. Useless—but terrible. Grand!"

Even Sorainya halted. Her golden needle leveled and spat blue fire. Willie Rand lurched, and his clothing began to smoke. But he staggered on, to meet the yellow axes lifted.

Lanning had dropped on his knees, to help the Chinese with the jammed gun. But he saw Rand come to the rank of ants. He saw the flashing bayonet, as if guided by an extra-sensory vision, drive deep into a black thorax.

Then the golden axes fell——

But Wil McLan, on his bridge, had spun his shining wheel, closed a key. And the *Chronion* was gone from Sorainya's hall, back into the blue, shimmering gulf of her own timeless track.

Lanning reeled through the turret, where Duffy Clark was on duty behind the crystal gun, and up to join Wil McLan below the dome. The old man seized his arm, eagerly.

"Well, Denny! You got it?"

"Yes." And Lanning demanded: "But how'd you come to meet us in the hall? That's all that saved us! And where's Barinin?"

"There was an alarm," husked the voiceless man. "They discovered us on the ledge, and turned down one of the *gyrane* rays from the battlements. Barinin was caught at the gun. Crisped black——"

He shuddered.

"We had to take off; and I drove down into the future, to avoid meeting their time ship. I hadn't wanted to enter the fortress with the ship—when we couldn't explore it with the *chronoscope*. There was too much danger of collision with some solid object—with very disastrous results.

"But that was the only course possible. We had to take the risk—and we won." He sighed wearily, mopped sweat from his scar-seamed face. "That hall was the largest room. From my plans, and a study of the ruins in futurity, I approximated its position. And we came back to where I guessed it had been. That's all. But where is—it?"

LANNING handed him the glazed, black brick from Sorainya's strong room. His hollow, blue eyes lit with an eager gleam.

"What could it be?"

"Let's open it up," the old man rasped, "and find out!" The brick trembled in his hands. "We've got to discover where Glarath and Sorainya took it from—in Time and Space—and put it back there. If we can."

Lanning lifted his eyes from the black fascination of the little block that was the foundation of all Jonbar. Anxiously, he caught at McLan's twisted arm.

"Do you think——" he gasped. "Will they follow?"

McLan's hollow eyes dulled. "Of course they'll follow," he whispered. "It means life and death to Gyronchi, as well as to Jonbar. And they have the time ship—if only one. If they fail to overtake us on the way, they will surely be waiting where the object must be placed. They know the spot."

He repressed a little sigh of grim foreboding.

"And now we are only five."

But the white head came erect, and the haggard eyes flashed again, with a bleak bitterness of hate.

"But you saw Sorainya's dungeons," he rasped. "Now you know why Gyronchi must be destroyed." He handed the brick to Lanning. "See if you can break it open."

"I know," Lanning was whispering grmily. "For I've seen Jonbar, and—Lethonee."

The block was glass-hard. He tapped at it vainly, broke his pocket knife on it, then carried it down to the deck. It yielded at last to hack saw, chisel, and sledge. It proved to be a thick-walled box, packed with white fiber.

Breathless, with quivering fingers, Lanning drew out the packing, and uncovered—a thick, V-shaped piece of rusty iron.

His vague, wild expectations had been all of something spectacular. Perhaps some impressive document of State upon which history should have turned. Or the martyr's weapon that might have slain some enemy of progress. And disappointment drove a leaden pain through his heart. With heavy feet, he carried it back to Wil McLan.

"Just a piece of scrap iron," he said wearily. "Just an old magnet, out of the magneto of a Model T. And we spent all those lives to find it!"

"That doesn't matter, what it is," the old man whispered. "It was important enough, when Gyronchi wrenched it out of the past, to deflect the whole direction of probability—to destroy even the possibility of Jonbar.

"Now, with the *chronoscope*, I must try to find its place. And then we must put it back—if Sorainya will let us!" He looked suddenly up at Lanning. "But you're tired, Denny. And you've been hurt."

Lanning had hardly been conscious of fatigue. Even the ring and throb of pain in the back of his brain had become a tolerable thing, a vague and distant phenomenon that did not greatly matter. And he felt a great surprise, now, when the dome went black and he knew that he was falling on the floor.

## XIII.

LANNING woke with his head bandaged, lying in the little green-walled hospital. Barry Halloran grinned at him from the opposite bed. The little cockney, Duffy Clark, came presently with a covered tray.

"Cap'n McLan?" he drawled. "Why 'e's on 'is bridge, sor, with hall 'is bloomin' gadgets. 'E's tryin' to find where that bloody she-devil and 'er blarsted ants got 'old of that magnet."

"Any luck?" demanded Lanning.

He shook a tousled head.

"Don't look it, sor. Wot with hall Spayce and Time to search for the spot. And the woman and the blarsted priest is arfter us, sor, in a black ship full of the bloomin' hants! We've seen it—twice, sor. A blinkin' 'ell-ship!"

"But we can outrun them!" broke in Barry Halloran. "The *Chronion* can give 'em all they want."

"Ayn't easy, sor!" Clark shook his head. "Cap'n McLan's running the fields at full potential, with the bloomin' converters overloaded. And still they're 'olding us, neck and neck. Lor, the bloody swine!"

An overwhelming lethargy was still in Lanning. He ate, and slept again.

And many hours of the ship's time must have passed when he suddenly awoke, aware of another sound above the accelerated throb of the atomic converters—the hammering of the Maxim!

He tumbled out of bed, with Barry Halloran after him, and ran to the deck. The firing had stopped, however, when they reached it. The *Chronion* was once more thrumming alone through the flickering blue abyss.

But little Duffy Clark lay beside the Maxim, smoking and still, his body half consumed by the *gyrane* ray.

Shuddering, Lanning climbed up into the dome.

"They caught us," sobbed voiceless Wil McLan. "They'll catch us again. The converters are overdriven. As the grids are consumed, they lose efficiency. They got poor Clark. That leaves four."

The question burning in his eyes, Lanning whispered: "Did you find—anything?"

Solemnly, the old man nodded, and Lanning listened breathlessly.

"The time is an afternoon in August of the year 1921," whispered Wil McLan. "The broken geodesics of Jonbar had already given us a clue to that. And I have found the place, with the *chronoscope.*"

Lanning gripped his arm. "Where?"

"It's a little valley in the Ozarks of Arkansas. But I'll show you the decisive scene."

The little man limped to the metal cabinet of the geodesic analyzer, and his broken fingers carefully set its dials. A greenish luminescence filled the crystal block, and cleared. Lanning bent forward eagerly, to peer into that pellucid window of probability.

An impoverished farm lay before his eyes, folded in the low and ancient hills. A sagging shack of gray, paintless pine, a broken window gaping black and the roof inadequately patched with rusty tin, leaned crazily beside an eroded rocky field. The sloping cow pasture, above, was scantily covered with brush and gnarled little trees.

A SMALL, freckled boy, in faded overalls and a big ragged straw hat, was trudging slowly barefoot down the slope, accompanied by a gaunt, yellow dog, driving two lean red-spotted cows home to the milking pen.

"Watch him," whispered Wil McLan.

And Lanning followed the idle path of of the boy. He stopped to encourage the dog digging furiously after a rabbit. He squatted to watch the activities of a colony of ants. He ran to catch a gaudy butterfly, and carefully dissected it. He rose unwillingly to answer the halloo of a slatternly woman from the house below, and followed the cows.

Wil McLan's gnarled fingers closed on Lanning's arm, urgently.

"Now!"

Idly whittling with a battered knife, the boy spied something beside a sumac bush, and stooped to pick it up. The object blurred oddly in the crystal screen, so that Lanning could not distinguish it. And vision faded, as Wil McLan snapped off the mechanism.

"Well?" demanded Lanning, bewildered. "What has that to do with Jonbar?"

"That is John Barr," rasped the voiceless man. "For that metropolis of future possibility is—or might be—named in honor of the boy, barefoot son of a tenant farmer. He is twelve years old in 1921. You saw him at the turning point of his life—and the life of the world."

"But I don't understand!"

"The bifurcation of possibility is in the thing he stoops to pick up," whispered Wil McLan. "It is either the magnet that we recovered from Sorainya's citadel—or an oddly colored pebble which lies beside it.

"And that choice—which Sorainya

sought to decide by removing the magnet—determines which of two possible John Barrs is ultimately fixed in the real universe by fifth dimensional progression."

"But how?" said Lanning. "From such a small thing!"

"If he picks up the discarded magnet, he will discover the mysterious attraction it has for the blade of his knife, and the mysterious north-seeking power of its poles. He will wonder, experiment, theorize. Curiosity will deepen. The scientist will be born in him.

"He will study, borrow books on science from the teacher of the one-room school in the hollow. He will presently leave the farm, run away from a domineering father who sneers at 'book larnin',' to work his way through college. And then he will become a teacher of science in country schools, an amateur experimenter.

"Sometimes the flame will burn low in him, inspiration be forgotten in the drudgery of life. He will marry, raise two children, absorbed for years in the cares of family life. But the old thirst to know will never die. The march of science will rekindle the flame. Finally, at the age of fifty-five, he will run away again—this time from a domineering wife and an obnoxious son-in-law—to carry on his research.

"A bald, plump little man, mild-mannered, dreamy, impractical, he will work for years alone in a little cottage in the Ozarks. Every possible cent will go for the makeshift apparatus powered from a crude homemade hydro-electric plant. He will go often hungry. Once, a kindly neighbor will find him starving, nearly dead of influenza.

"BUT AT LAST, in 1980, a tired but triumphant little man of seventy-one, he will publish his great discovery. The dynatomic tensors—shortened to *dynat*. A radically new principle in physics, making possible the release of atomic energy under control of the human will.

"Given freely to the world, the *dynat* will soon solve many problems of power, communication, and food—although John Barr, not waiting for material success, that same year will be quietly buried by his neighbors beside a little church in the Ozarks. And presently the illimitable power of the *dynat* will be the lifeblood of the splendid new metropolis of Jonbar, christened after him.

"Nor is that all. Ennobled humanity will soar on the wings of this most magnificent slave. For the *dynat* will bring a new contact of mind and matter, new senses, new capabilities. Gradually, as time goes on, mankind will become adapted to the full use of the *dynat*."

The whisper was hoarse with a breathless awe.

"And at last a new race will arise, calling themselves the *dynon*. The splendid children of John Barr's old discovery, they will possess faculties and powers that we can hardly dream of——"

"Wait!" cried Lanning. "I've seen the *dynon!* When Lethonee first came, so long ago, to my room in Cambridge, she showed me New Jonbar, in the jewel of the *chronotron*. A city of majestic, shining pylons. And, flying above them, a glorious people, robed, it seemed, in pure fire!"

Hollow eyes shining, Wil McLan nodded solemnly.

"I, too, have looked into New Jonbar," he whispered. "I have seen the promised glory beyond—the triumphant flight of the *dynon*, from star to star, forever! In that direction, there was no ending to the story of mankind.

"But in the other——"

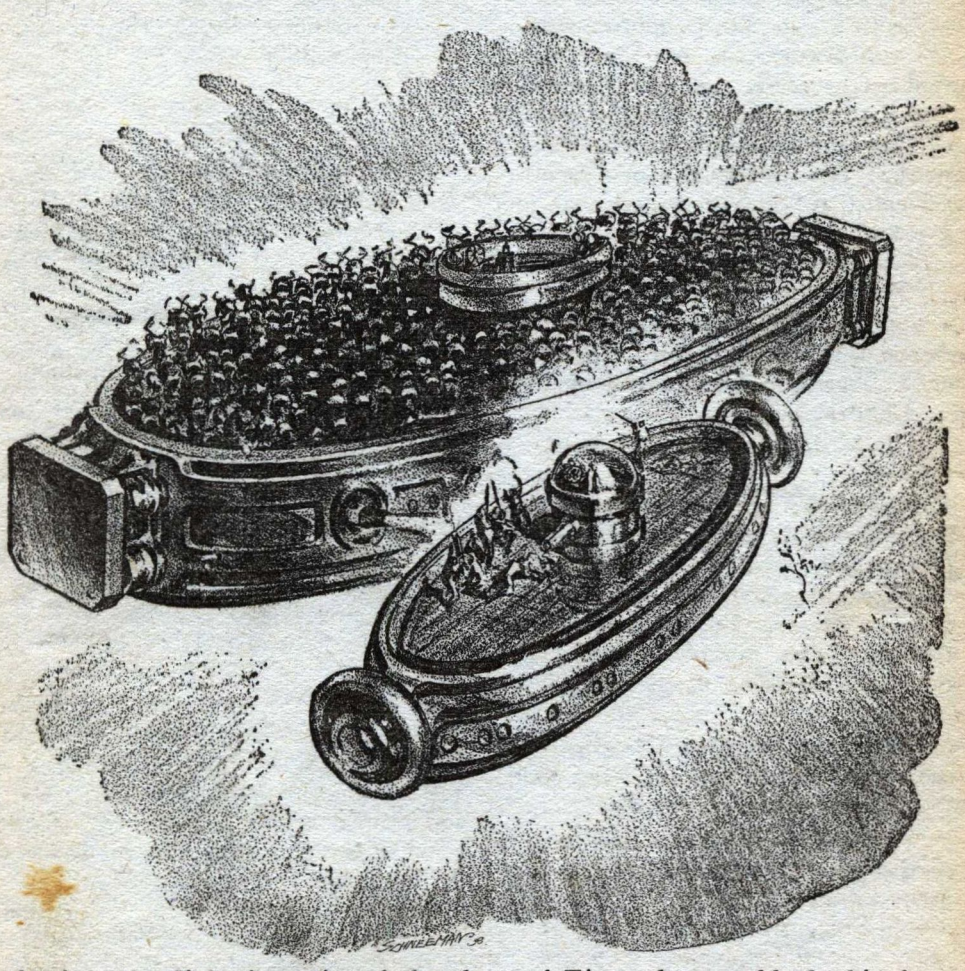
His white head shook. There was silence under the dome. Lanning could hear the swiftened throb of the converters, driving them back through the blue shimmer of possibility toward the quiet scene in the Ozarks they had watched in the crystal block. He saw Lao Meng

Shan cleaning the Maxim on the deck below. Barry Halloran, rifle ready, was peering alertly into the flickering abyss. Duffy Clark was already consigned to the gulf of Time.

"If we fail to replace the magnet," the grave whisper at last resumed, "so that the boy John Barr picks up the pebble instead, the tide of probability will be turned—as, indeed, it is turned—toward Gyronchi.

"The boy will toss the pebble in his hand, then throw it in his sling to kill a singing bird. And all his life will want a precious spark. It will remain curiously similar, yet significantly different.

"JOHN BARR, in this outcome also, will run away from his father's home, but now to become a shiftless migratory worker. He will marry the same woman, raise the same two children, and leave them in the same way. The same mechanical ingenuity, that might have discovered the *dynat,* will lead to the invention of a new gambling device, on which he will make and lose a fortune. He will die—equally penniless—in the



***Against the flickering mist of the abyss of Time, the vast black ship from Gyronchi loomed, her decks swarming with Sorainya's huge fighting-ants.***

same year, and be buried in the same graveyard in the Ozarks.

"The secret of atomic power will now be discovered nine years later, but with a control far less complete than that attained through the perfection of the *dynat*. The discoverer will be one Ivor Gyros, an exiled Russian-Greek, working with a renegade Buddhist priest in an abandoned monastery in Burma. Calling the secret the *gyrane*, the two will guard it selfishly, use it to destroy their enemies and impress the superstitious. They will found a new fanatical religion that will sweep the world, and a new despotic empire."

The whisper paused again, gravely.

"That is the way of the cult of the *gyrane*, and of Sorainya's dark dynasty," rasped Wil McLan, at last. "A way of evil! You have seen the end of it."

"I have!"

A little shudder touched Lanning, at memory of that desolate scene in the crystal block: mankind annihilated in the final war of the priests and the kings, by the *gyrane* and the monstrous mutations it had bred. The jungle returning across a devastated planet, to cover the rusting pile of Sorainya's citadel and the shattered ruins of the vast, black temple.

Quivering, then, his hands grasped at the rusty V of the magnet, lying beside the controls of the *chronoscope*.

"And so—— And so all we have to do is to put it back, where the boy John Barr will pick it up?"

"All," nodded Wil McLan. "If we can!"

Lanning started, then, and shivered to the rattle of the Maxim. His scarred face stiff with startled dread, Wil McLan was pointing. Lanning turned. Close beyond the dome, he saw the square, black mass of the time ship from Gyronchi.

"Mankind!" cried McLan. "The converters—failing!"

He flung his broken body toward the controls.

But already, Lanning saw, the decks had touched. In the face of the hammering Maxim, a horde of the gigantic ants, monstrous spawn of atomic radiation, was pouring over the rail. Leading them with the flame of her golden sword, magnificent in her crimson panoply, came Sorainya!

## XIV.

"SORAINYA!" Lanning gasped. "She's aboard!"

"Sorainya!" It was a stricken, husking echo from old Wil McLan. His broken hands came up, automatically, to the odd little tube of bright-worn silver that Lanning had wondered about so often, hanging at his throat. That ancient, smouldering hate glazed his sunken eyes again. Yet a strange agony racked his whisper. "Sorainya—must she die?"

"The ants!" warned Lanning. "Pouring aboard! Can we get away?"

Wil McLan started, and his hands fell to the controls again.

"Can try!" he rasped. "But that converter——"

A score of the great ants were rushing the Maxim on the foredeck. Lao Men Shan was crouched behind the rattling machine gun. And Barry Halloran stood beside it, a sturdy, smiling giant of battle, waiting with his bayonet for the ants.

"Fight 'em!" his great voice was booming out cheerfully. "Fight 'em!"

Grinning blandly, the little Chinese made no sound at all.

With a ringing war cry, Sorainya had turned toward the turret, followed by a dozen ants. The needle of her golden sword flashed up, pointing at Wil McLan in the dome. And her green-eyed face was suddenly terrible with such a blazing passion of hate that Lanning shuddered from its fury.

"She's coming here!" sobbed the dry, hoarse whisper of Wil McLan. "After me!" Terror flared red beside the ancient hatred and the puzzling agony in his eyes. "Ever since I refused to aid her conquest——"

Lanning was already running down the turret stair.

"I'll try to stop her!"

And the whisper rasped after him: "And I'll pull away—if the converters will stand it."

In the little turret, beside the crystal helix-gun that projected the temporal field, Lanning belted on a Luger. He snatched the last Mauser from the rack, loaded it. His eye caught one hand grenade left in the box. He scooped it up, gripped the safety pin.

The little door was groaning and ringing to a furious assault from without—for the *Chronion* had not been designed for a fighting ship. It yielded suddenly, and a great black ant pitched through.

Lanning tossed the last grenade through the doorway, and ripped at the ant with his bayonet. He reeled to the burning stench of formic acid. A savage mandible ripped trousers and skin from his leg. But the third thrust stilled the monster, and he leapt into the doorway.

Outside, the grenade had cleared a little space. Three of the monsters lay where it had tossed them, crushed and dying. But the warrior queen stood unharmed in the crimson mail, with eight more ants about her. A savage light of battle flamed in her long green eyes, and she flung the ants forward with her golden sword.

"Denny Lanning," her voice cut cold as steel. "You were warned. You defied Gyronchi, and chose *her* of Jonbar. So—die!"

Yet Lanning, waiting grim and silent in the turret's doorway, had a moment's respite. He had time for a glimpse of Barry and Shan, now engaged in a furious battle about the Maxim, holding back a murderous avalanche of ants. He caught Barry's gasping, "Fight! Fight! Fight 'em, team!"

HE SAW BRIEFLY the high, black side of the other ship, beyond. He glimpsed the gaunt, cadaverous, black-robed priest, Glarath, safe on his quarter-deck. H saw a second company of ants, aglitter with gold and crimson weapons, gathered by the rail, ready to leap after the first.

Panic gripped his heart. It was an overwhelming horde——

But suddenly the black ship was gone, with Glarath and the rank of ants. There was only the flicker of the blue abyss. The throb of the over-driven converters was heavier beneath the deck. Wil McLan had driven the *Chronion* ahead once more in the race toward the past.

But Sorainya and her boarding party remained upon the deck. The Maxim suddenly ceased to fire. Shan and Barry were surrounded. Then the eight attacking ants converged upon Lanning in the doorway, urged on by Sorainya's pealing shouts, and he had attention for nothing beyond them.

The bayonet had proved more effective than bullets against the great ants. And now, defending the doorway, Lanning fought with the same deadly technique he had mastered in Sorainya's citadel.

A ripping lunge, a twist, a savage thrust. One ant fell. Another. A third. Fallen black bodies made an acrid reek. Spilled vital fluids were slippery on the deck.

The bullet from a crimson gun raked Lanning's side. A golden axe touched his head with searing pain, where a tenderness remained from the other battle. A heavy gun, flung spinning like a club, knocked out his breath, sent him staggering back for a dangerous instant. But he recovered himself, lunged again.

Sorainya ran back and forth behind the ants, shrilling her battle cry. A

cruel, smiling elation lit her beauteous face, and her narrowed green eyes were cold and bright with the lust of blood.

Once, when the ants fell back and gave her an opening, she leveled the needle of her sword at Lanning. Knowing the deadly fire it held, he ducked, and whipped a shot at her red-mailed body with the Luger.

His bullet whined harmless from her armor. And blue flame jetted past his shoulder. A jolting shock hurled him aside against the wall. Half blind, dazed, he slapped at his burning shirt, and reeled back to meet the remaining ants.

Four were left. His staggering lunge caught one. And another fell, queerly, when he had not touched it. And a hearty voice came roaring to his ears, "Fight, gang! Fight!"

And he saw that the battle on the foredeck was ended. A great pile of the dead, black ants lay about the Maxim. Lao Meng Shan was looking over the barricade, with a curiously cheerful grin fading from his still, yellow face.

And Barry Halloran, crimson and terrible with the marks of battle, came chanting down the deck. It was a burst from his Luger that had dropped the monster beside Lanning. He flung the empty pistol aside, and leveled his dripping bayonet.

Lanning was swaying, gasping for breath, fighting a descending blindness as he fought the two remaining ants. He feinted, lunged, recovered, parried, still defending the turret door.

But he saw Sorainya turn to meet Barry Halloran, and heard her low, mocking laugh. He saw the rifle shift in Barry's crimson hands, ready for the lunge that might pierce the queen's woven mail.

"Fight——"

BARRY'S chanting stopped on a low, breathless cry, astonished. The grim smile of battle was driven from his face by a sudden, involuntary admiration.

"My God, I can't——"

The bayonet wavered in his slackening grasp. And the queen of war, with a brilliant smile and a mocking flirt of her sable plume, darted quickly forward. The golden needle flickered out in a lightning thrust, drove his body through and through.

Lanning's reeling lunge caught one of the attacking ants. He ripped, twisted, recovered. He staggered back from a flashing yellow blade, lurched forward again to engage the survivor.

But his eyes went, again and again, to that other tableau, so that he saw it as a continuous picture. He saw the practiced twist that withdrew Sorainya's blade. He saw her draw it through her naked hand, and then blow Barry a malicious kiss, from fingers red with his own lifeblood.

A dark fountain burst and foamed from Barry Halloran's heart. The admiration on his face gave way to a hard, grim hate. His hands tried to lift the rifle, but it slipped away from them and fell. And his stained face became terrible with a bewildered, helpless baffle-ment.

"Denny——" It was a soft, bubbling sob. *"Kill——"*

And he slipped down, beyond Sorainya.

Lanning brought his staggered mind back to the one remaining ant. It was too late to avoid the descending golden axe. But his weary muscles had time to complete the lunge. A little deflected, the flat of the blade crashed against his head, drowned him in a black flood of pain.

Automatically, the run-down machine of his body finished that familiar rhythm —rip, twist, slash. And then, slowly, it toppled down beside the dying ant.

Still, for an instant, some atom of awareness lingered. *Don't quit now!* it shrieked. *Or Sorainya will kill Wil McLan. She will take the magnet back. And Jonbar will be lost.*

But that despairing scream was drowned in dark oblivion.

## XV.

AGONY WAS still a rush and a drumming beat through all of Lanning's head. But a frantic purpose that had lived even through unconsciousness lifted him reeling to his feet.

The throbbing deck lurched and wheeled beneath him. And the black mist in his eyes veiled the flickering blue. But he saw Lao Meng Shan and Barry Halloran lying dead in the midst of the slaughtered ants.

He saw that Sorainya was gone from the deck, and the malicious triumph of her golden voice floated down to him. "You have led me a long pursuit, Wil Lan. I thank you for the pleasure of the chase. Remember, once I promised you my sword——"

A terrible scream, because it was voiceless, whispered, came rasping down from the dome. And then Lanning heard Sorainya's low, throaty laugh, pleased and pitiless.

"Perhaps you had the means to destroy me, Wil McLan. But never the will—for I know why you first came to Gyronchi! Other men have sought to slay me, as silly moths might seek with their wings to beat out the flame. They failed."

"We'll see, Sorainya," Lanning muttered under his gasping breath. "For Barry's sake!"

His body moved stiffly, like a rusted machine. It staggered and reeled. Pain rushed like a river in his brain. A mist of darkness veiled his sight, shot with blinding wheels of red. All his body was a throbbing ache, his garments glued to it with drying blood. His whole being revolted from effort.

But he found the Mauser, picked it up in numbed, fumbling hands, and staggered into the turret that he had tried to guard where the metal stair led up to the bridge. The caressing mockery of Sorainya's golden tones came down to him again, boasting.

"You were a fool, Wil McLan, to seek my doom. For, since you brought us the secret of Time, the *gyrane* can conquer death also. I may be the last of my line—but I shall reign forever! For I searched the future for the hour of my death. And it is not——"

Reeling up the turret stair, Lanning came into the bridge beneath the dome. Wil McLan was lying on the floor, beneath the shining wheel. His broken hands were set down in a great dark pool of his own blood, to lift his shoulders. His white head was thrown back, so that his scarred, thin face could look up at Sorainya. The dark, deep-sunken eyes were fixed on the woman, blazing with a beaten, hopeless hate.

Hung by its thin white chain from his neck, the little silver tube touched the spreading pool of blood.

Lithe and tall in the red splendor of her black-plumed mail, Sorainya stood facing him, crimson drops still falling from her thin, yellow sword. But she heard Lanning's unsteady step, and turned swiftly to meet him as he came to the top of the stair.

A bright, fierce exultation lit the smooth, white beauty of her face. A deadly, smiling eagerness flashed in her long emerald eyes, at sight of Lanning. And her blade cut an arc of golden fire before him.

"Well, Denny Lanning!" her suave voice greeted him. "So you would try, where the others failed? The champion of *her!* Then carry her my message, to Jonbar, in—Nothingness!"

Her ringing blade struck sparks from his bayonet.

SHE WAS beautiful. Tall almost as Lanning, and strong with the lithe, quick strength of a tigress. The woven red mail followed every flowing curve of her. Wide nostrils flared, and high

breasts rose to her quickened breathing. One red hand clutched the magnet. Bright yellow hair was bursting from under the black-crested helmet. A wild, fierce smile was fixed on her face, and she attacked with the speed of a panther leaping.

Lanning parried with the bayonet, thrust warily at her gleaming body. She swayed aside. The blade slid harmless by her breast. And the yellow needle flicked Lanning's shoulder with a whip of pain.

His weapon was the longer, the heavier. And it made no difference, he tried to tell himself, that she was beautiful—for Barry's death was still a dark agony writhing in him, and he could see Wil McLan on the floor behind her, gasping terribly for breath and following the battle with hate-lit, glazing eyes.

But he fought a fatigue more deadly than Sorainya's blade. All his strength had been poured out in the battle with the ants. Sorainya was fresh, and she had a tireless energy. The rifle grew leaden heavy in Lanning's hands. His vision dulled to a blurry monochrome, and Sorainya was but a fatal shadow that could not die.

He was glad she blurred, for he could no longer see her lissome loveliness. He tried to see, in her place, the black-armored horror of one of her ants. He lunged into the rhythm of the old attack—rip, twist, slash.

But the blade slithered again, harmless, from the gleaming curve of her body. And the flash of her sword drew a red line of pain down his arm. She leapt back, with a pantherine grace—and then stood, as if to mock him, with the yellow needle down at her side.

"No, Denny Lanning!" She gave a little breathless laugh. "Strike if you will—for I shall never die. I scanned all the future for the hour of my death, and found no danger. I cannot be slain!"

"I'll see!" Lanning caught a long gasping breath, and shook his ringing head to clear it. "For Barry——"

With the last atom of his ebbing strength, he gripped the rifle hard and rushed across the tiny room under the dome. He thrust the gleaming bayonet, with every ounce of muscle, up under the curve of her breast, toward her heart.

*"Denny!"*

It was a choking sob of warning from Wil McLan. And the golden needle flashed up to touch the rifle. Blue fire hissed from its point. The rifle fell out of Lanning's hands. He staggered backward, stunned and blinded by the shock, smelling his seared hands and the burning pungence of ozone.

He caught his weight against the curve of the dome, and leaned there, shuddering. It took all his will to keep his knees from buckling. He caught a deep, rasping breath, and blinked his eyes.

He could see again. He saw Sorainya gliding forward, light as a dancer. Beneath stray wisps of golden hair, her white face was dazzling with a smile. And her lazy voice chimed, gayly, "Now, Denny Lanning! Who is immortal?"

HER ARM flashed up as she spoke, slim and red in its sleeve of mail. A terrible, tigerish joy flashed in her long green eyes. And the sword, like a living thing, leapt at Lanning's heart.

He struck at the blade, a stiff and awkward blow, with his empty hand. It slashed his wrist. Deflected a little, it drove through his shoulder, a cold, thin needle of numbing pain, and rang against the hard crystal behind him.

Sorainya whipped out the sword, and wiped its thin length on her fingers. She blew him another red kiss, and stood waiting for him to fall. Her white smile was breathless, thirsty.

"Well?" Her voice was a liquid caress. "Another?"

Then Lanning's failing eyes went beyond her. The tiny dome swam. It took a desperate effort to focus Wil

McLan. But he saw the jerky little movement that broke the thin, white chain, tossed the tiny silver tube across the floor. He heard the voiceless, feeble gasp: "Break it, Denny! And her! For I—can't!"

Sorainya had sensed the movement behind her. Her breath caught sharply. And the yellow sword darted again, swift as a flash of light, straight for Lanning's heart. Even the tigerish grace of that last thrust, he thought, was beautiful——

But the silver cylinder had rolled to his foot. Desperately—and shuddering with a cold, incredulous awareness that, somehow, he was so crushing Sorainya's victorious beauty—he drove his heel down upon the tube.

It made a tiny crunching sound.

But Lanning didn't look down. For his eyes were fixed, in a trembling, breathless dread, upon Sorainya. No visible hand had touched her. But, from the instant his heel came down, she was —stricken.

The bright blade slipped out of her hand, rang against the dome, and fell at Lanning's feet. The smile was somehow frozen on her face, forgotten, lifeless. Then, in a fractional second, her beauty was—erased.

Her altered face was blind, hideous, pocked with queerly bluish ulcerations. Her features dissolved—frightfully—in blue corruption. And Lanning had an instant's impression of a naked skull grinning fearfully out of the armor.

And then Sorainya was gone.

The woven red mail, for a weird fractional second, still held the curves of her form. It slumped grotesquely, and fell with a dull little thud on the floor. The plumed helmet clattered down beside it, rolled, and looked back at Lanning with an empty, enigmatic stare.

Lanning tried to look back at Wil McLan, seeking an explanation of this appalling victory. But a thickening darkness shut out his vision, and the ringing was deafening in his head. A shuddering numbness, from the wound in his shoulder, spread to all his being. And his knees at last gave way.

## XVI.

LANNING lay still on the floor of the dome, when awareness came back. The throb of the atomic converters came loud through the metal beneath his head. The anvil of agony still rang in his skull, and all his body was an aching, blood-clotted stiffness. But, queerly, the cold pain had ebbed from the sword-thrust in his shoulder.

"Denny?"

It was a voiceless sob, from Wil McLan, husky with an urgent pleading. Lanning was surprised that the old man still survived Sorainya's stab. Despite the screaming protests of exhaustion and pain, he swayed once more to his feet, leaning against the curve of the dome. He blinked his clearing eyes, and found McLan still lying in the dark pool on the floor.

"Wil! What can I do?"

A broken hand pointed.

"The needle in the drawer," gasped McLan. "Four c.c. Intravenous——"

Lanning stumbled to the control board, found, in the drawer beneath it, a bright hypodermic and a small bottle of heavy lead, marked: *Dynatomic formula L 648. Filled, New York City, August, 1985.*

The liquid in the needle shone with a greenish luminescence. He pushed up McLan's sleeve, thrust the point into the radial vein at the elbow, pushed home the little plunger.

He examined the wound in the old man's breast. It had already ceased to bleed. It looked—puzzlingly—as if it had been healing for days instead of minutes.

"Thanks," whispered McLan. "Now yourself—but only two c.c.!"

He lay back on the floor, with his

eyes closed. Lanning made the injection into his own arm. It seemed that a quick tide of strength and power flowed through his veins. His dulled senses cleared, the aching stiffness ebbed away. Still he was dead-tired, still his battered head ached. But he felt something of the same almost-mystical well-being that he had known when first aboard the *Chronion,* after the surgeons of Jonbar had brought him back from death.

He picked up the rusty little magnet lying on the floor beside Sorainya's empty armor. Was there still a chance to put it back, and save Jonbar? He peered apprehensively out into the gulf of shimmering blue. What if Glarath overtook them again?

The rhythmic beat of the converters beneath the deck suddenly wavered, slowed. Trouble, again. But Wil McLan, still white and trembling, pulled himself up behind the wheel, began to adjust the controls.

"Do you think——?" demanded Lanning, anxiously. "Can we put it back?"

"If the converters hold out," the old man whispered, "we can—try! Glarath will guard the spot, no doubt, with his ship and the *kothrin.* And you must fight this time alone. But I'll be able to take you there. My old body is about finished, anyway, and ill-adapted to the *dynat.* But it gave me life enough for that."

The thrumming was becoming swifter again, steadier, as his broken hands touched keys and dials.

"SORAINYA——?" The question burst from Lanning's lips. "That tube I broke?" His hand touched the twisted shoulder. "Wil, what happened to Sorainya?"

The old man turned from the controls. Supporting his weight with both gnarled hands on the bright wheel, he looked at Lanning. The old hatred was gone from his sunken, eyes, and they were dark with an agony of grief.

"I loved Sorainya," came his whisper. "That tube held her life. I took it because I thought I hated her——" He caught a sighing breath. "I did hate her, for all she had done to me! But still I could never break the tube."

"But what was it?" Horror roughened Lanning's voice. "I didn't touch her. But she changed—dreadfully! As if she had some terrible disease. She died. And then even her skeleton was gone!"

Wil McLan's hollow eyes were dry, glazed with pain.

"Sorainya failed to discover the hour of her death when she searched her future," came the tortured rasping. "For it was in her past! In the year that Sorainya mounted her throne, the Blue Death swept Gyronchi—a plague born of the poverty and squalor in which oppression held the peasants. It was that pandemic that killed Sorainya."

"But——?" Lanning stared. "I don't understand!"

"When Lethonee helped me escape from Sorainya's dungeons and recover the *Chronion,*" the whisper answered, "I determined to destroy Sorainya. I searched her past—with the *chronoscope*—for a node of probability. I found it, in the year of the Blue Death.

"For the priests of the *gyrane* managed to prepare a few shots of effective antitoxin. When Sorainya contracted the disease, Glarath rushed to her castle with the last tube of the serum, and saved her life.

"But if the tube had been broken before it reached her, the geodesic analyzer revealed, she would have died. Discovering that, I drove the *Chronion* back through the temple to the plague year. I carried away the tube."

Lanning nodded slowly. "I see!" he murmured, awed. "It was like the carrying away of the magnet, to destroy Jonbar."

"Not quite," pointed out Wil McLan. "The magnet was carried into the future. Its geodesics skipped over the vital node. Therefore Jonbar was immediately blotted from the fifth-dimensional sequence.

"But I carried the tube back into the past of Gyronchi. It was possible for its geodesics to make a loop and return to the node. Therefore—so long as the tube was intact—she was not essentially affected. But, when you broke the tube, the possibility of her survival was blotted out."

Lanning was staring at him, numbed with a bewildering paradox. "But if"—the incredulous question burst out—"if Sorainya died as a girl, what about Sorainya the queen? The woman that imprisoned you, and haunted me, and fought the legion. She didn't exist!"

The white, bleak face smiled a little, at his bewilderment, and a thin, shaking hand touched his arm.

"Remember," McLan whispered softly, "we are dealing with probabilities alone. The new physics has banished absolute certainty from the world. Jonbar and Gyronchi, and the two Sorainyas, living and dead, are but conflicting branches of possibility, as yet unfixed by the inexorable progression of the fifth dimension. The crushing of the tube merely altered the probability factors of Sorainya's possible life."

A soft gleam of tears was in his hollow eyes. They looked down at the little glistening heap of woven mail, the empty helmet and the golden sword.

"But the queen Sorainya was real, to me," he breathed. "And, to me, she is dead."

Lanning broke in with a final question: "These wounds? Were they made by a woman who didn't exist in reality——?"

"When they were made, her probability did exist," whispered Wil McLan. "And a lot of atomic power had been spent—through the temporal field—to match our probability to hers. You will notice, however, that they are disappearing now with a remarkable rapidity."

The bright eyes lifted to Lanning. "Just keep in mind, Denny, that the logical laws of causation are still rigid—but removed to a higher dimension. The absolute sequence of events, in the fifth dimension, is not parallel with time—although our three-dimensional minds commonly perceive it so. But that inviolable progression is the unalterable frame of all the universe."

His gnarled hand reached out to touch the rusty magnet in Lanning's hand.

"The march of that progression, higher than Time," his hushed whisper ran on solemnly, "has now forever obliterated Sorainya, the queen. The sequence of events has not yet settled the fates of Jonbar and Gyronchi. But still the odds are all with Gyronchi."

The thin hand gripped Lanning's arm. "The last play is near," he breathed. "The hope—the probability—of Jonbar is all in you, Denny. And the outcome will soon be engraved forever in the fifth dimension."

He turned to grasp the Wheel of Time.

## XVII.

WIL McLAN lived to nurse his failing converters, although Lanning was stricken to see his pallor and his ebbing strength. He drove the *Chronion,* still ahead of pursuit in her shimmering abyss, back down her geodesic track until the dials stood at 5:49 P. M., August 12, 1921. He raised his hand in a warning signal, and his whisper rasped down through the speaking tube. "Ready, Denny! They'll be waiting to guard the spot."

Lanning was standing on the foredeck, peering alertly into the flickering blue. As a desperate ruse that might win a precious moment, he had donned Sorainya's armor. It fitted without discomfort. Her black plume waved above

*The Warrior Queen of Gyronchi was gone! For an instant a grinning skeleton draped in crimson mail stood—then dropped to rotting dust!*

his head. One hand clutched her golden sword—the device in the hilt which made it also an electron gun was either broken or exhausted. The other moistly gripped the rusty magnet—which must be returned to the path of a barefoot boy, to save his namesake world.

His weary brain, as he waited, dully pondered a last paradox: that, while the *Chronion* had outrun the black ship of Glarath in the long race backward through Time, no possible speed could bring her to the goal ahead of the other ship. He gripped the sword, at the warning from McLan, and his body went tense in the borrowed mail.

And the *Chronion* flashed out of the blue again, into the lonely hush of that valley in the age-worn Ozarks. Everything was exactly as Lanning had seen it in the shining block of the *chronoscope:* the idle, tattered boy, indiligently driving the two lean cows down the rocky slope toward the dilapidated farm, with the gaunt, yellow dog roving beside him.

Everything—except that the great, squarish, black mass of the time ship from Gyronchi lay beside the trail, like a battleship aground. Glarath was a haggard, black pillar on his lofty deck. Ugly projectors of the *gyrane's* blasting atomic energy beam frowned from their ports. And scores of the great ants had been disembarked, to make a bristling, hideous wall about the spot where the magnet must be placed.

Whistling, the dawdling boy had come within twenty yards of the spot. But he gave no evidence that he saw either ship or monsters. One of the red-spotted cows, ahead, plodded calmly through a giant black ant.

Back to Lanning, already tensed to leap from the deck, came a whispered explanation of McLan. "No, the boy John Barr won't be aware of us at all —unless we should turn the temporal field upon him. For his life is already almost completely fixed by the advancing progression in the fifth dimension. In terms of his experience, we are no more than phantoms of probability. Travelers backward into time can affect the past only at carefully selected nodes, and then only at the expense of the terrific power required to deflect the probability-inertia of the whole continuum. It required the utmost power of the *gyrane* merely to lift the magnet from John Barr's path."

Gripping the magnet and the sword, Lanning flung himself to the ground. He stumbled on a rock, fell to his knees, staggered back to his feet, and ran desperately toward the great black ship and the horde of ants ahead of the loitering boy.

He waved the golden sword, as he ran, in Sorainya's familiar gesture. And Glarath, on his bridge, waved a black-swathed arm to answer—and then, as Lanning's tired feet tripped again, he went rigid with alarm.

For Lanning's weary gait lacked all Sorainya's grace, and the black priest marked the change. A great hoarse voice croaked a command. The wall of giant ants came to attention, bristling with the crimson and yellow of arms. And a thick, black tube swung down in its port.

THE FIRST BLAST of the atomic ray struck a rock beside Lanning. It exploded in a blaze of white. Molten stone spattered the red mail. A hot fragment slapped his cheek with white agony, and blinded him with the smoke of his own flesh burning.

The boy, meantime, had already walked into the unsuspected ranks of ants. A cold desperation clutched at Lanning's heart. In a few moments more, John Barr would have picked up the pebble instead of the magnet, and the fate of two worlds settled forever —unless he broke through.

Strangled wtih bitter white smoke, Lanning caught a sobbing breath, and sprinted. Twin blinding lances of the *gyrane's* fire fused the soil to a smoking pool of lava, close behind him. He was now safe beneath their maximum depression. But the ants were waiting ahead.

Thick crimson guns were leveled, and a volley battered Lanning. The bullets failed to pierce the woven mail. But the impacts were bruising, staggering blows. And one raked his unprotected jaw and neck, beneath the helmet. A sickening pain loosened his muscles. Red gouts splashed down on the crimson mail. He gritted broken teeth, spat fragments and blood, stumbled on.

Yellow axes flamed above the ebon ranks. He whirled the yellow sword, and leapt to meet them. For an instant he thought the ants would yield, in awe of Sorainya's very armor. But Glarath croaked another command from above, and they fell upon him furiously.

Golden blades ripped and battered at his mail. He drove Sorainya's sword into an armored, jet thorax. And a

clubbed red gun smashed against his extended arm. The bone gave with a brittle snap, and his arm fell useless in the sleeve of mail. He clutched the precious magnet close to his body, and leapt ahead.

Blows rained on him. The helmet was battered stunningly against his head. A cleaving axe half severed his neck, at the juncture of helmet and mail, and hot blood gushed down in the shirt.

Yet some old terror of their queen repelled the ants from any actual contact with her mail. So Lanning, even wounded and beaten down, pushed through their close ranks to the hollow square they guarded.

He saw the ragged boy John Barr stroll unawares through the farther ranks, the hungry dog at his heels. He saw the gleam of the pebble, the triangular print where the magnet had lain, but two paces from the boy. Another second——

But he was falling. His strength was rushing out in the foaming red stream from his neck. Another merciless blow smashed his shoulder, numbed the arm that held the magnet, crushed him down.

Lanning's eyes were dim with weakness and pain. But, as he fell, he saw beside him, or thought he did, a splendid figure. The grave, majestic head and mighty shoulders of a towering man rose above a mantle of shimmering opalescence. Deep and wide and clear, the eyes of the stranger struck Lanning with a power that was unforgettable, supernal.

A bare, magnificent arm reached out of the flaming veil and touched his shoulder. That cold touch tensed Lanning's body with a queer, shocking force. A deep, hushed voice said: "Courage, Denny Lanning! For mankind."

AND THE STRANGER was gone. Numbed with awe, Lanning knew that he had been one of the *dynon,* the further heirs of Jonbar.

His hand had given Lanning a mysterious new strength, cleared the red mist from his head. And the visitation meant, Lanning knew dimly, that Jonbar still was—possible!

Glarath had bellowed another command, and an avalanche of ants was falling on his body. And the aimless boy was already stooping for the pebble.

Lanning hurled himself forward, his good arm thrust out with the magnet. A yellow blade of pain slashed down at his sleeve. The horde crushed him to the earth. But the magnet, flung with the last effort of his fingers, dropped into the triangular print.

A bright curiosity—the very light of science—was born in the eyes of the stooping boy. His inquisitive fingers closed on the V of steel. And then the warrior ants, piling themselves upon Lanning's body, were suddenly gone.

The black ship flickered like a wing of shadow, and vanished.

John Barr picked up the magnet, wonderingly discovered a clinging rusty nail that it had drawn from the dust, and went on down the slope, driving his two spotted cows through the unseen hull of the *Chronion.*

Dennis Lanning was left alone beside the trail. He knew that he was dying. But the slowing, fading throb of his pain was a triumphant drum. For he knew that Jonbar had won.

His failing eyes looked down toward the *Chronion.* He wondered if Wil McLan had been hurt again, in the battle. Puzzled dimly, he saw the little time ship flicker also, and vanish. And he lay quite alone in the sunset on the slope of that Ozark hill.

## XVIII.

IT WAS a dream, all a delirium of death, a thing that could not have been. But Lethonee had been standing beside him. Tall and straight in the same simple white, with the great splendid jewel of the *chronotron* held in her hands.

Her white face, under her coronal of shimmering mahogany, was beautiful, and in her violet eyes shone a tender, joyous light.

"I thank you, Denny Lanning!" her breaking silver voice had whispered. "I bring you the thanks of all Jonbar, for a thing that no other could have done."

Lanning struggled against a terrible inertia, to speak to her. But all his desperate effort could utter not even one word of his love. For he was held in the leaden hands of death.

But he saw the violet eyes turn soft with tears, and he heard her trembling breath, "Live, Denny Lanning! Get well again. And come back to me!" Her full lips quivered, and the tears sprang glistening into the jewel's soft glow. "For I'll be waiting, Denny Lanning, whenever you come to Jonbar."

He fought again the rigor of death, but in vain. And darkness blotted out the jewel and Lethonee.

As if all his life swirled in brief review, through the last hallucination of death, he thought that he was once again lying in a clean bed in the little green-walled hospital aboard the *Chronion*. The brisk, efficient surgeons of Jonbar had been attending him for a long time in the dim, drowsy intervals of sleep. The wondrous agencies of the *dynat*, he dreamed, had made his body whole again.

It had to be a dream. For Willie Rand was sitting up on the opposite bed, grinning at him with clear, seeing eyes. Willie Rand who had been slain—blind and alone—in that fantastic, hopeless charge against the ants before Sorainya's diamond throne. He blew an expanding silver ring, watched it happily.

"Howdy, Cap'n Lanning. Smoke?"

Numbed with bewilderment, Lanning reached automatically to catch the cigarette he tossed. There was no pain in the arm that the great ant's clubbed gun had broken. He tried the fingers again, incredulously, and stared across at Willie Rand.

"What's happened?" he demanded. "I thought you were—were killed! And I was cashing out——"

Rand exhaled a white cloud, grinned through it.

"That's right, cap'n," he drawled cheerfully. "I reckon we've all died twice. And I reckon we'll all get another stack of chips—all but poor Cap'n McLan."

"But——?" gasped Lanning. "How were——?"

"Well, cap'n, you see——"

But then there was a clatter on the stair. Barry Halloran and bull-like Emil Schorn came down from the deck, carrying a stretcher. It bore a sheeted form, and behind came two of the surgeons from Jonbar, in their tunics of gray and green. A third rolled in a table of instruments. They laid the bandaged figure gently on a bed. Lanning caught the gleam of a hypodermic, glimpsed the little shining needles that gave off a healing radiation of the *dynat*.

"That's the little limey, Duffy Clark," Willie Rand was informing him. "He was the last one. He was put overboard on the flight back from Gyronchi, and sort of lost in probability and time. Took days to untangle the geo—geodesics. But they found him! He was burned with the *gyrane*—the same cussed ray that put my lights out. But I reckon that *dynat* will tune him up in good shape again, now that Gyronchi never was."

LANNING was sitting up on the side of his bed, a little shakily at first. And now Barry Halloran discovered him. The rugged, freckled face lit with a joyous grin. He strode swiftly to grip Lanning's hand.

"Denny, old man! I knew you'd be coming round!"

"Tell me, Barry!" Lanning clung to the powerful hand. He shuddered to

a sudden burning agony of hope. "How did all this happen? And can we—can we——?" He gulped, and his desperate eyes searched Barry's broad, cheerful face. "Can we go back to Jonbar?"

A shadow of pain blotted the smile from Barry Halloran.

"Wil did it." His voice was deep with a sober regret. "Wil McLan. The last thing he did. After you had settled with Gyronchi, he left you and drove the *Chronion* back down to Jonbar. He was dead when he got there—dead beyond the power of the *dynat* to revive him. For even it can't make men immortal, not until the *dynon* come.

"They are building a tomb for Wil, there in Jonbar."

The big tackle looked away for a moment, with a new huskiness in his voice.

"Wil knew he was going down," he went on suddenly. "He had rigged an automatic switch to stop the *Chronion* when it came to Jonbar, and Lethonee's time. And she sent the doctors back with it, to haul us out of Time and probability, and resurrect us with the *dynat,* as they did before. Quite a hunt, I gather, through the snarl of broken geodesics."

"Lethonee?" whispered Lanning, urgently.

*"Ach!"* It was a bellow greeting from Emil Schorn. He smashed Lanning's fingers in a great ham of a hand. *"Ja, Herr* Lanning! Jonbar is der Valhalla der old sagas promised us, where men fight and die and are restored to fight again. *Und* Sorainya——"

An awed admiration deepened the bellow.

"Der red queen of war! *Ach,* Sorainya was a Valkyrie—one of Odin's maids of battle, terrible and beautiful. There will be none like her in Jonbar, *nein!* Though the maiden waiting for you there is fair enough, and kind."

"Jonbar? Are we going back?"

*"Ach, ja!* Our own time is closed to us forever—unless we choose to perish there. We exiles of time, *ja.* But der white girl has promised to make a place for us in Jonbar. And der *herr doktors* with us say that it need not be an idle, useless one. For mankind, marching forward under der *dynat,* will meet new enemies. We may even fight again, for Jonbar." A stern eager blue flashed in his eyes. *"Ach, heil,* Valhalla!"

Lanning was standing on the deck, aglow once more with the mystical strength and elation that came from the *dynat,* when the *Chronion* slipped again from her blue shimmering bourn into the clear sky over Jonbar.

Genial sunlight of a calm spring morning burned dazzling upon lofty, silver pylons. Gay-clad multitudes thronged the vast green parks and broad viaducts and the terrace gardens of the towers, eager to greet the *Chronion.*

The battered little time ship drifted down slowly above them. The men out of the past, radiantly fit, but still—as Barry Halloran commented—a tramp-ish-looking lot in their ragged, faded, oddly assorted uniforms, were leaning on the rail, waving in answer to the welcome of Jonbar.

ALL THE LITTLE Legion alive again: Schorn and Rand and Duffy Clark, swarthy Cresto and grave-eyed Barinin and grinning Lao Meng Shan. The two lean Canadians, Isaac and Israel Enders, standing silently side by side. Tall Courtney-Pharr, and grim Von Arneth, and Barry Halloran. And dapper little Jean Querard, perched perilously on the rail, making a speech of thanks into space.

But it was one of the scientists from Jonbar who held the bright wheel under the dome. And the *Chronion* floated over a slim, new shaft of pure white that soared alone from a wooded hill. Standing on its crown, both arms reach-

ing skyward, Lanning saw the statue in hard white metal of a small weary man —Wil McLan.

All the Legion saluted, as they passed, and a silence stilled the humming of the multitudes below.

A wide valve had opened ahead in the argent wall of a familiar tower on a hill. The *Chronion* nosed through, dropped gently upon the same platform in the great hangar, where a smiling crowd was waiting, cheering noisily.

Jean Querard strutted and inflated his chest. Teetering on the rail, he waved for silence.

*"C'est bon,"* his high voice began. *"C'est très bon——"*

Trembling with a still incredulous eagerness, Lanning leapt past him, over the rail. He pushed his way through the crowd, and found the elevator. It flung him upward, and he stepped out into that same terrace garden of his most poignant memory.

Amid its fragrant, white-flowered greenery, he paused for a moment to catch his breath. His eyes fell to the wide, verdant parklands that spread smiling to the placid river, a full mile beneath. And he saw a thing that probed his heart with a queer little needle of pain.

For this great river, he saw, was the same river that had curved through Gyronchi! Great pylons soared where miserable villages had stood. The lofty monument to Wil McLan, he saw, leapt up from the very hill that had been crowned by the squat, black temple of the *gyrane*, beneath the awful funnel of black.

But where was the other hill, where Sorainya's red citadel had been?

His breath shuddered and caught, when he saw that it was *this same hill*, that now bore the tower of Lethonee. His hands gripped hard on the railing, and he looked down at the little table where he had dined with Lethonee, on the dreadful night of Jonbar's dissolution.

And Sorainya, glorious on her golden shell, rose again to mock him, as she had done that night. Tears dimmed his eyes, and a haunting, sudden ache gripped his pausing heart.

*Oh, fair Sorainya—slain!*

A light step raced through the sliding door behind the shrubs, and a breathless voice panted his name, joyously. Lanning looked up, slowly. And a numbing wonder shook him.

"Denny Lanning!"

Lethonee came running toward him, through the flowers. Her violet eyes were bright with tears, and her face was a white smile of incredulous delight. Lanning turned shuddering to meet her, speechless.

For the golden voice of the warrior queen had mocked him in her cry. And the ghost of Sorainya's glance glinted green in her shining eyes. She had even donned a close-fitting velvet gown of shimmering crimson, that shone like Sorainya's mail.

She came into his open, trembling arms.

"Denny——" she sobbed happily. "At last we are—one."

The world was spinning. This same hill had borne Sorainya's citadel. Jonbar and Gyronchi—conflicting possible worlds, stemming from the same beginning—were now fused into the same reality. Lethonee and Sorainya, also ——? Eagerly, he drew her against his racing heart. And he murmured, happily——

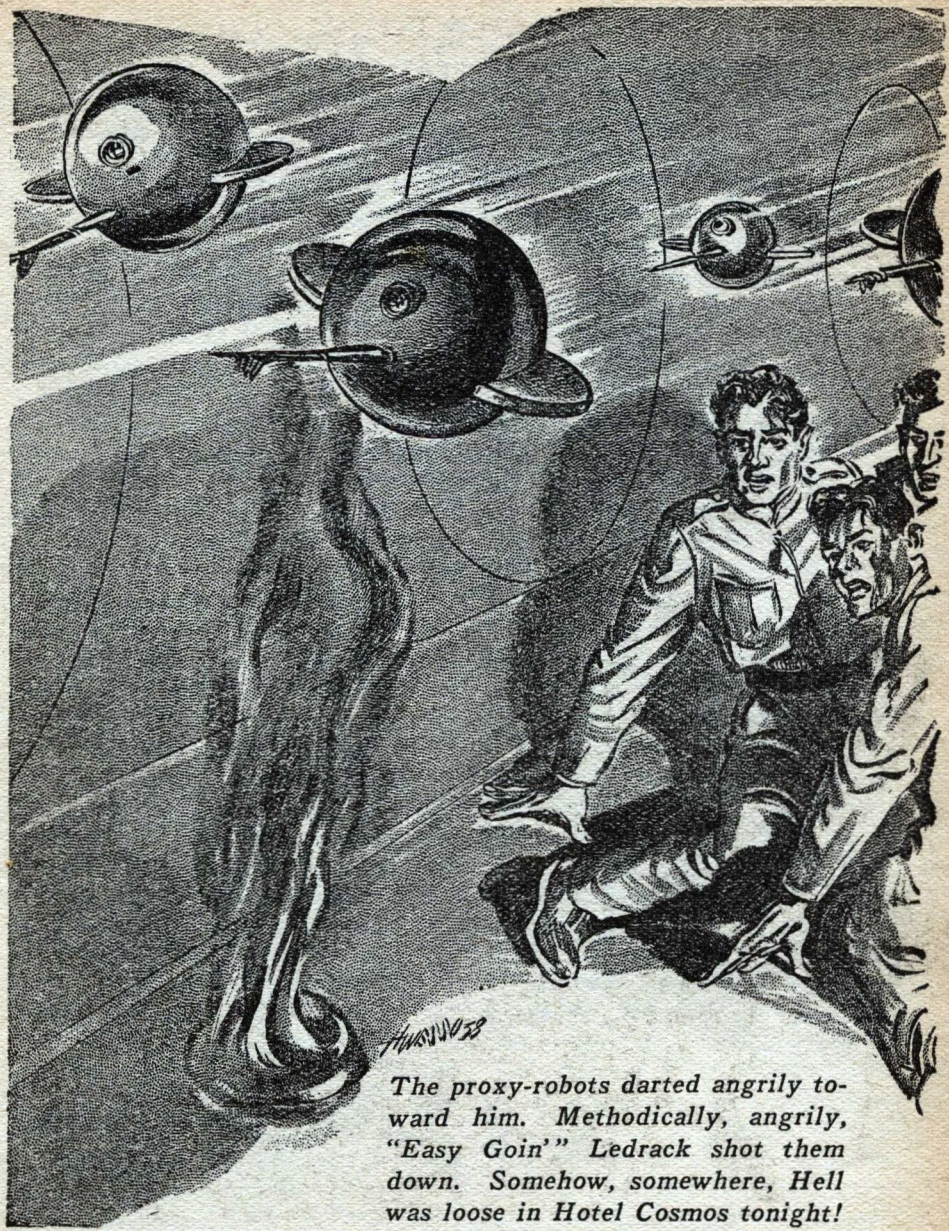
"One!"

THE END

# HOTEL COSMOS

## By Raymond Z. Gallun

***A political assassin loose—in a hotel harboring savage race-hatred of a dozen alien, antagonistic worlds!***



*The proxy-robots darted angrily toward him. Methodically, angrily, "Easy Goin'" Ledrack shot them down. Somehow, somewhere, Hell was loose in Hotel Cosmos tonight!*

VIEWED casually, the building wasn't very remarkable. Just a beautiful, skyward sweep of glittering chromium, like many of the other structures of Twenty-third Century Chicago.

It wasn't till you discovered its nature that you received a kind of icy, majestic thrill. Its name, flashing in brilliant lights at night, was *Hotel Cosmos*. Within its walls lay a haven for every kind of intelligent extra-terrestrial creature who dared to cross the interplanetary and interstellar distances to the alien Earth. Few of those beings could have survived raw Earthly conditions for much more than a minute.

Old Dave Ledrack, known as "Easy

Goin'" to his friends, paced quiet, green-lit corridors with the silence of a passing ghost. His round, red face revealed nothing of his thoughts; his footsteps on the thick carpets were steady and unhurried. His heart, beneath his neat, white uniform, betrayed not a trace of quickening in its beat, even though there now existed around him exceptional potentialities for trouble.

There always were potentialities for trouble here in *Hotel Cosmos,* as old Dave knew from eighteen years of intimate experience. When you banded together in one building beings of hundreds of diverse forms and backgrounds, and of as many widely separated conceptions of what is just and what is not, automatically you formed a brew that had most of the ticklish danger of a charge of hyper-dynamium explosive.

And now, tonight, circumstances held a much greater threat than was usual. This was the beginning of the great Galactic Conference, a gathering dedicated to the readjustment of thousands of petty and major differences accumulated over many years of commercial relations.

It would not have been surprising, then, had Dave Ledrack felt cold twinges of uneasiness lancing through him. But his remarkable coolness was proved by the fact that such was not the case. Easy Goin' Ledrack's placidity remained unruffled. With possible hell and damnation all around him, he never turned a hair. Perhaps he only dreamed, half amusedly, of some of the fantastic upsets of his interesting career. But let it not be said that he was not alert, too.

The aspect of all the corridors of the building was much the same. Their floors were heavily carpeted; the walls, of tooled metal, were dully shining in the subdued green glow of the lights. Their uniformity was broken at regular intervals by airtight circular doors, which resembled in a somewhat less massive form the portals of bank vaults. Each door displayed a number, wrought in black onyx inlay, and mounted on each were several small valve-wheels for regulating and adjusting the temperature, pressure, and gaseous composition of the atmosphere of the room within. The twilight was eerie and soft, and the sweeping sameness of the halls suggested the interminable distances seen in opposed mirrors.

SUCH WAS the interior of *Hotel Cosmos,* which was operated and laid out in a manner not markedly dissimilar from that of any hotel for humans. But the fact that it was meant for beings far from human, even in an intellectual sense, made one think of the vast gulfs between the stars; of dark steamy worlds, where slimy horrors sported and thought and toiled; of great, stark, un-Earthly mountains and deserts; and of a thousand other fearful and near unimaginable things.

Old Dave, however, never allowed his imagination to trouble him.

Concealed in his right ear was a tiny etherphone receiver, part of the equipment of every member of the Terrestrial Guard Police, to which he belonged as a requirement of his position as Chief of Watch in the greatest other-world hostelry in the Americas.

He listened now, to low, ticking messages, presented in intricate code, as he walked on through the quiet Martian section of the hotel.

"Space Liner *Ardis* coming in from Planet Five of Antares. Landing at 10:19 p. m. in fourth cradle of Civic Space Docks. 4-2-5 on board! 4-2-5 on board! Caution! Caution! This is Holman signalling. Attention, Ledrack! Attention, Ledrack——"

Old Dave grinned with faint benignance. John Holman, his capable, conscientious little boss, was worrying again, he could tell, from the tone of the message. But of course Holman had good and sufficient reason.

4-2-5—the code number assigned by the Space Travel Bureau to a visiting entity who must otherwise remain forever nameless on Earth. Dave had been warned before of 4-2-5's possible sinister purposes.

4-2-5 was reputed to be the greatest trouble-maker, and one of the most brilliant scientists, in the galaxy. But never once had his cold, inhuman cleverness permitted his numerous suspected depredations against law and order to be definitely pinned on him. Hence, he could not legally be denied entrance to Earth.

Planet Five of Antares was a hellish, hot, reeking place with an atmosphere so lethal that one breath of it would swiftly have killed a man. But 4-2-5's kind were not men. Their flesh was of a porous, silicous composition, breathing and living in a different way than any flesh native to Earth. Hideous, hard-shelled things, 4-2-5's kind crept through the shadowy jungles of their world, and dwelt there in a strange luxury, incomprehensible to a man in its repellent needs, but evidently satisfactory to them.

Slavery, piracy, and the brutal conquest of several neighboring planets of Antares had been attributed to them. But at their vast distance from Earth, all this information was vague indeed to the terrestrial populace in general. The one great threat to the successful continuation of 4-2-5's various wrongs was the stupendous fleet of the Interstellar League, headed by its Earthly unit. Earth had extensive commercial interests on Planet Seven, interests which she meant to protect if she could; and Seven was now dangerously involved with 4-2-5's purposes.

Old Dave Ledrack glanced at his wristwatch. 10:17 p. m. In another two minutes the *Ardis,* bearing its sinister passenger, would settle gently on its flaming retard-jets, and into its cradle. There would be brief customs inspections. By eleven o'clock the black transfer cars would come, bringing new guests for *Hotel Cosmos.* Among them 4-2-5.

DAVE THRUST his right hand within his coat, contacting a tiny transmitting instrument strapped under his armpit. Rapidly and silently he worked its key, coding out a brief message acknowledging Chief Holman's warning to be on his toes.

After that there was nothing for Dave to do but pace his beat and wait. He passed several times through the extensive and standardized Martian and Venusian sections of the hostelry, ignoring, during this interval, except for one routine tour of inspection, the rows of more adaptable cubicles, the interiors of which could be adjusted and conditioned to suit almost any form of living thing. Dave paused briefly beside first the Venusian and then the Martian recreation hall. The interiors of both, sealed away from all intrusion of Earth's atmosphere, were screened with frosted glass. But from them there issued, faint and disquieting, odd vocal noises reminiscent humorously of those of a zoo, but suggestive also of dim, nameless horror to the uninitiated.

Promptly at eleven o'clock the casket-like transfer refuges, used while moving the visiting entities from ship to hostelry, were wheeled out of the elevators and along the corridors to the entrances of the various rooms, each of the latter having been specially prepared for the individual for which it was reserved. Each refuge was supported on a bierlike carriage, and was tagged with the number of the occupant it protected from the hostile environmental conditions of Earth.

Dave Ledrack found the refuge marked 4-2-5, Planet Five, Antares, without more than what must seem a casual glance. Guardedly he watched

while white-clad attendants lifted it through a circular door and into the air lock of the cubicle selected for its occupant. Now the door was closed and sealed behind it. There had been no sound or other evidence to betray the nature of the unhuman monster it concealed. But now 4-2-5 was free to emerge within the privacy of his carefully conditioned quarters, and proceed with whatever business was his.

Visitors from across space seldom emerged from their rooms, other than to go to the recreation halls, if such were provided for the particular type of creature they happened to be. The most important reason was simply that direct exposure to Earthly conditions usually held a promise of swift death. Instead, they accomplished their contacts with the terrestrial environment by means of radio-controlled proxy robots, usually provided by the hostelry itself. Martians and Venusians came to Earth in sufficient numbers to warrant the existence of recreation halls for them, which they reached by means of conditioned passages traversing the rear of their cubicles. But 4-2-5 was the only one of his kind now on Earth, and the presence of others was infrequent. Hence there was no place for him to go for recreation; he must remain confined to his quarters.

NOW THAT he was delivered to his room without slip-up, Dave had no further duty where he was concerned, except to keep careful but unobtrusive watch. Dave had no right or desire to pry.

After that, nothing special happened for about an hour. Nothing special, that is, that you could really put your finger on and say, "Here's trouble." But abruptly—so abruptly that the beginning of the phenomenon might have been timed almost to the second, had he glanced at his watch—old Dave felt a wave of definite uneasiness sweep over him. It was about half after eleven o'clock then.

Dave Ledrack had thought himself to be one person without nerves; it was annoying now to find himself the victim of an unfathomable worry. He had no faith in the idea that anyone could really sense danger approaching, unless there was tangible though perhaps not easily discoverable evidence of it working on him from some quarter.

Checking up on himself, Dave found no such evidence, except the brooding quiet of green-lit halls, which was quite the normal thing here. The youthful attendants he met in his rounds looked strained and worried. When he greeted them they returned only surly nods, heavy with the spell of alien things. But Dave passed this off as something to be expected. And so, quite in line with his nickname of Easy Goin', he shrugged and grinned deprecatingly.

But putting his mind at rest wasn't quite as easy as that. Morbid suspicions began to creep into his thoughts —suspicions of a quality which he had never experienced before in his life. Meanwhile his imagination was keyed up to cold, nerve-tensing vividness. In spite of his natural inclination to coolness, he began to remind himself that all around him here were a hundred strange hells, encompassed by those little airtight rooms where no man could live, and where, transiently, dwelt brilliant entities who would probably much sooner see the human race wiped out than not. Devils—hideous devils!

The Venusians, for instance. Pressure, moisture, heat! They spent more than half of their lives in the water. And they looked quite a bit like those abhorrent Earthly marine animals—sting rays. Dark, mud-hued hide; long, rigid tails; slow-moving, winglike fins that worked with a kind of horrible, spiralling grace, like the blades of an old-time seagoing ship's screw. And hor-

rible, sullen, expressionless eyes, imbedded in deep folds of loose skin!

But unlike the rays, the Venusians had four short legs resembling those of a turtle, by means of which they could crawl out of the shallowly sunken cities of their planet and onto the dry land where most of the machines which their science had provided for them were located. And they had tapered, flexible organs around their mouths, serving them in lieu of hands.

The Martians. Gray, spongy monstrosities with great brooding orbs. They were even more repellent than the folk of Venus. As for those other beings from other solar systems—4-2-5 and his kind, for instance—there was something too nameless about them for a man ever to grasp. 4-2-5's people breathed corrosive fluorine instead of oxygen, for one thing, and deadly cyanogen gas was a normal part of the atmosphere of the world they inhabited!

DAVE REALIZED now, more clearly than ever before, that within a few yards of him in every direction were horrors eternally beyond the ken of humankind, yet deeply involved in the same mesh of a vast space commerce.

Dave was pacing through the Martian section, when a low buzz sounded behind him. He did not look back, for he knew that the sound originated from a small proxy robot.

But when the mechanism began to circle his head excitedly, the situation was different at once. The robot was a little flying sphere, about eight inches in diameter. It had a single mechanical eye, and one flexible metal arm. More than that, besides its propulsion, radio direction, and auditory receiver units, it possessed only the capacity to speak, as its unseen guide, hidden in one of the rooms here, directed.

It spoke now in clear, clipped English, originating in the manipulation of some artificial device, rather than by means of living vocal cords. Few extra-terrestrial creatures possessed the natural capacity to reproduce the sounds of human speech.

"There is death," it said quietly. "I am X-4-3, Conference Ambassador from Mars. The Venusians, I think, remember the old war, in which our ether fleets destroyed theirs. Someone has tried to destroy me. The door of my quarters. Someone attempted to burn through the metal. Had I not heard a sound, and frightened the intruder away, heavy Earth-air would have rushed in and smothered me!"

Something maddening and irritable and mysterious in Dave's nerves, made him want to call the entity controlling this proxy robot a fool. But instead he enquired politely: "Room 18, isn't it?"

It wasn't far to room 18. Dave hurried there, with the proxy gliding along beside him. In the metal door was a deep, still-glowing scar, made evidently by a small atom-blast.

Ledrack nodded with unaccustomed grimness. "Withdraw your robot," he ordered. "Everything will be taken care of."

"It is best that such should be true, Earth creature," the voice returned, with dark, murderous insults lurking just beneath its placid, artificial tones.

Dave saw the airtight outer valve of the room's air lock open to receive the proxy. Beyond, through the transparent inner valve, he glimpsed the dim-lit, metal room, where the great Martian ambassador himself sprawled—an abhorrent, spongy elipsoid—on a rug of dark, heavy fabric. But when the automatically operated door closed, no opportunity was given Dave to report the attempted assassination, either to Karen, manager of the hotel, or to Holman, chief of the Terrestrial Guard Police.

Echoing from down the hall was a jarring concussion, followed by a ragged, slurring scream.

DAVE RUSHED toward the source of the disturbance at once. It was just beyond the end of the Martian section, where there were great sliding doors, and where the Venusian section began. And here a part of the metal wall was blasted out. There was a sickening stench of fetid Venus jungles in the air, a few fragments of a Venusian bath tank scattered on the floor, and a torn body, smeared with thick, dark blood and now bereft of life. R-2-3, Venus ambassador, destroyed!

Dave, ordinarily so cool, felt a sharp wave of fury at that moment. He wanted to hurt someone—he didn't know whom—since the identity of the murderer was hidden from him.

What had thus far occurred, however, was only the beginning of pandemonium, which now seemed to break all around him. From distant and near in the great building he heard human shouts of anger and terror, mixing with the buzz of proxy robots, and the occasional low hiss of blast weapons. The effects of what was taking place could be unguessably far-reaching. Many of the entities now in the hotel were galactic celebrities. Titanic war hovered darkly in the background, as Dave realized at once. And since this was Earth, his people would be held largely responsible.

In his little etherphone, Karen, the manager, was shouting wildly for Dave, while at the same time police code was coming in, trilling Holman's message of warning: "Calling Ledrack! Calling Ledrack! Karen reports trouble! Investigate at once! We are coming! We are coming!"

Dave reached into his coat to tap out a brief phrase of acknowledgment. Further than that he didn't know quite what to do. A screaming fury was in his nerves—something that was like murder madness, urging him to kill and kill and kill! But no time was given him now to think out possible causes for this treacherous phenomenon.

He was cool enough to remember his duty first. As an officer of the law it was his duty to attack trouble and try —at least try—to control it!

There seemed to be many scenes of trouble here in the hostelry, but the one far down the corridor of the Venusian section was the nearest. Four white-clad youths were down, screaming on the floor, while proxy robots wheeled and darted over them like angry hornets of gigantic size. No weapons were in evidence here, but the proxies, by hurling their own bulks swiftly, could strike furious blows against their human adversaries.

Old Dave—Easy Goin'—Ledrack, rushed forward, the pistollike device in his hand flaming vengefully. Ragged bolts of energy lanced from it blindingly, and with each blast a proxy robot clattered to the floor in glowing, superheated fragments. At least Dave couldn't cause any real inter-world complications here. These were only robots. The entities that ruled them couldn't be injured by their destruction.

The voices of the robots—all of them doubtless the proxies of Venusians—made no human sounds, but only hissed a kind of animal defiance, born of a thousand real and fancied wrongs of a petty nature inflicted in the past by Earthmen. Revenge now! Revenge! The remaining proxies hurtled toward Dave, like wickedly glittering projectiles, their camera eyes agleam, their metal arms extended like spearpoints.

The four youths who were in the employ of *Hotel Cosmos,* and who had been knocked over, were now scrambling weakly to their feet, their faces and shoulders streaming blood. But they were not too stunned to scream curses and exhortations, their faces twisted with fury and terror.

"Get 'em, Dave! Get 'em——! Dirty, stinking Venus folk—— We ought to

open all the valves of the rooms, and let 'em die in the Earth air! And those Martians, too! Damn 'em! And all the rest! By glory, let's do it! Let's! We will——"

Dave, armed as was no one else present, smashed the last of the small attacking mechanisms with a series of dazzling bursts of energy. But matters were getting rapidly out of hand.

Mingled with the other sounds of disorder and chaos, throbbing and dinning throughout the hostelry, now came ominous hisses. Attendants were opening valves—putting a madness born of murder impulses into effect—preparing to drown alien beings in Earth atmosphere unsuited to their needs.

And Dave, gripped by the same strange power, found himself wanting to take part in the massacre too. Those filthy, unhuman demons! Down with them! Down! Easy Goin' Ledrack seemed to have been transformed.

BUT ALWAYS some part of him must remain the same. Tact! Never before had he needed the capacity for soothing speech so much as now! War—sweeping the galaxy—wiping out races—shattering planets themselves!

"For Heaven's sake, hold yourselves down, fellas!" he shouted to the attendants. "Put those valves back where they belong! Don't you understand what it'll mean if all this goes on—if a lot of these ambassadors and so forth are killed—especially on Earth and by Earthmen? We're up against something—some kind of science, it must be—that's stirring up our blood this way. And it's the same with the other creatures in the hotel. If you want to prove that you're real men, here's your chance! Get control of yourselves! And go around and see what you can do about quieting poor chumps who are going off the deep end. Remember there are cruisers and battleships from other planets out there at the spaceport, and that real hell can blow up at any minute!"

The attendants looked at him sheepishly then, and he knew that his words had had at least some effect. But he could not linger here longer. And so he hurried on along the corridors, beating down proxy robots, exhorting his own kind to caution, each time with waning success. His own nerves, excited and irritated in some hidden manner, and in a progressive way, seemed to be approaching the breaking point.

A terrific hubbub issued from the Martian recreation hall. Somehow Dave got into a lightweight vacuum armor, secured from an emergency supply closet. Thus attired, he traversed the air lock which led into what was, in effect, a fragment of old Mars. Low, sweeping arches, Cyclopean in the dim illumination of radioactive lamps supported in quaintly wrought sconces. Deep, zigzag carvings in gray stone. Dave knew that the air now around him was cold and dry and thin, but protected as he was he could not feel this difference.

His attention could scarcely have been directed toward such otherwise-intriguing details now. With sluggish haste, spongy, ovoid bodies were creeping toward the shelter of massive pillars and low exits, the while they uttered low moaning, rasping cries of terror. For proxy robots, probably controlled by Venusians, had come through the air lock. That the Martians were not smothering in an influx of dense terrestrial atmosphere was due only to the fact that the air lock was massive in construction, and though it could be operated easily enough in its intended manner, it was difficult to destroy or tamper with. Automatic safety devices prevented both of its doors being opened at once, rendering a free inward flow of Earth air impossible as long as the lock was intact.

Nevertheless the intruding proxies, though they were unarmed, were capable of serious damage inflicted with their own hurtling forms. Hissing sibilantly, they were hurling themselves against the Martians, smashing into horny, fibrous flesh.

Once more Dave raised his blast, shooting several of them down in quick succession to protect the seemingly helpless Martians. But two of the latter presently produced blast weapons themseles. Nor were these deadly devices now directed only against proxy robots, but at Dave too!

DISGUSTED, and furious with rage, he retreated to save his life. Back through the air lock he went, muttering savage imprecations.

Events for a brief spell after that were blurred in his mind. The green-lit halls echoed with crescendoing sound. Human figures and more proxies rushed past him. Soon he found his way to the section intended for interstellar visitors. Here, somehow, he got into difficulties with a powerful young man, provoked to the point of insanity. Dave fought the youth with bare fists that ached to use the blast gun on anything that chanced to oppose him. The air reeked with noisome odors belonging to a dozen varied worlds. Victorious at last in his battle, but dazed, Dave slipped on something slimy and cold on the carpeted floor—the shattered shreds of a nameless entity from out in the interstellar reaches—a great scientist, doubtless, though of a nightmarish, octopoid shape.

Dave fell, and whacked his head against the wall. Half stunned, he got up, cursing and discouraged.

The sounds of chaos were still louder now. At dawn, worlds would probably be at war, provoked by the spell of fury that had suddenly seized their intellectual leaders, supposedly attending a peaceful conference on Earth!

Old Dave saw things then in his mind's eye—things to which what was taking place here was like a spark compared to a great conflagration. And the savage resentment and fear and loyalty which those hellish visions aroused within him stirred up in his mind a dim glow of hope. If he could act cleverly and quickly enough, perhaps graver trouble could be averted—or maybe he would just be committing another interworld atrocity.

4-2-5 of Planet Five, Antares! Old Dave had no conclusive reason to accuse this individual of responsibility for the hell that had broken loose. But Dave was sure that this chaos had not blossomed out of nothing. Someone, in some subtle way, had caused it for purposes of his own. And Dave had been warned about 4-2-5. Hence, though there was no proof, wasn't 4-2-5 most likely to be the wrongdoer? To say that he was, was a gamble, of course; but now there was no time for anything but a gamble.

Dave began to run toward the corridor where 4-2-5's quarters were located. As he approached the room, a dim intimation of how the Antarean was protecting himself from possible attack came to him, and with it a clearer belief in 4-2-5's guilt. For Dave's nerves grew more and more taut and strained as he advanced closer to where the Antarean lay concealed. It was as though old Ledrack was pushing his way deeper and deeper into a subtle aura of evil; unseen, yet no less powerful because of that. The invisible radiations beat stronger and stronger upon his nerves and brain until the murderous fury within him seemed to destroy most of the coördination of his bodily movements, and to sear his brain with the fire of insanity. Whatever it was that 4-2-5 was using to stir up hell in *Hotel Cosmos* was also, by its disruptive effect on nerve tissue, an excellent safeguard against attack by living creatures when it was sufficiently strong.

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FOR PIPE OR CIGARETTE

JOHN HOLMAN'S code buzzed once more in Dave's etherphone. It was blurred and scratchy with static—some sort of short-range radio-barrage, doubtless, to keep inimical proxy robots away from 4-2-5's refuge.

Dave was scarcely able to make out the message. "In the—Lord, what's the matter, Ledrack? We've got the hotel surrounded with men. I'll be with you —minute!"

Holman. Dave wouldn't have asked for a better chief than the capable, energetic little man. Only Holman was high-strung. Here in the grip of the sinister aura that pervaded this building, he would be a hopeless, homicidal maniac!

His teeth gritted, Dave leaned against the wall of the corridor for support, meanwhile struggling to tap out a message in the hope that at least an intelligible portion of it would get through the barrage of static that must completely distort the finer waves on which the proxy robots depended for guidance—at least within the immediate vicinity of 4-2-5's quarters. Anyway there were no proxies flying in this corridor.

"No! Don't come in here, Chief!" Dave signalled. "Stay outside and keep watch! Give me five minutes to work alone!"

The need for hurry did not allow him to communicate further. Instead he started forward again along the passage, fighting to control his twitching muscles and to think clearly through the murk of madness that was striving to disrupt his reason. It wasn't only courage that kept him grimly to his task. He did not realize that he was one man in a million, as far as emotional make-up went.

But he could see what had happened here, to other, lesser humans. The passage rang with thick cries from a few men who writhed on the floor, their faces livid with emotions too strong to allow them coördinated action. Here, so close to the probable source of the aura—a matter of a few yards—they could only twitch and stare and scream, as if gripped by epileptic seizures.

Nevertheless Dave kept going somehow, surging nearer and nearer to the focus of the weird spell that had thrust invisible fingers throughout the great other-world hostelry. Making those last few yards was like the final effort of a racer to reach his goal ahead of his competitors.

The door of 4-2-5's quarters. Old Dave didn't try to use his key to open it. He was sure that it was fastened on the inside. Instead, he took a little cylinder from the pouch of the vacuum armor he had put on, and drew its primer pin. One end of the cylinder began to blaze with the blue-white heat of atomic energy being unleashed. He touched this end to the upper rim of the door. Swiftly the cylinder melted its way into the metal, and sank out of sight. Dave stepped back, tensed, waiting for the time fuse to do its final work. A moment later there was a violent explosion, and the outer portal of the room's air lock was blasted to fragments.

Dave held his weapon, and now, with clumsy haste, he stumbled forward again, leaping into position. His pistol flamed, its muzzle directed through the inner glass valve of the air lock at the thin, disclike thing that sprawled on the floor of the room beyond.

IN THE INSTANT before the blast of energy took effect, Dave Ledrack faced 4-2-5. The Antarean, believing that his defenses were insurmountable, must have been taken almost entirely unawares. Dave saw that his hard shell was covered with a second shell of a black material, obviously artificial, and doubtless intended as a protection against the subtle emanations he was using.

The inner door of the air lock, light

in construction, shattered and crumpled at once. And assassination was accomplished with the same withering stream of energy.

But the small globe, supported on a tripod in the center of the room, still blazed out the invisible radiations of madness, as Dave knew from his own feelings. Otherwise there was only a flicker of sparks about the tripod to betray the activity of the apparatus.

With a final surge of will power, Dave scrambled and staggered into the metal chamber, from which was pouring a reeking, hot wave of cyanogen and fluorine gases. But his vacuum armor protected him from these poisons. His hands clutched a lever to which shreds of gray, alien flesh still clung—grasping organs which had been untouched by the destroying blast from his weapon. They were the grasping organs of a creature born in the region of another star, but in whose fathomless mind unholy ambitions, like those which come to some men, had surged restlessly, provoking sinister action.

Dave pulled the lever. The activity of the apparatus died out. And the veteran guardian of *Hotel Cosmos* crumpled to the floor, relaxed at last, that awful straining tension gone from his body. Slimy, murky, dim-lit—this place was more repellent from the human viewpoint than a crocodile's Stygian, fetid den. But Dave Ledrack was too utterly spent to care. Weariness and relaxation made him feel almost—well, —luxurious. It was almost as though he could understand Antarean conceptions of luxury at last.

And human cleverness had contributed its bit to that luxury. All around, on the walls of the chamber, projected there in the same manner that a magic lantern projects a picture on a screen, were colored scenes which made this compartment look like a landscape of the dead 4-2-5's homeland. Haze. A great red sun. Bizarre vegetation coiling in the shadows of jagged hills that were at once hideous and beautiful. Such had been the efforts of Earthmen to make their guests feel at home.

DAVE LEDRACK'S eyes were closed now. But his weariness seemed to help him to understand the recent past, and to realize that a safe ending of what had taken place had been reached.

4-2-5's objective was easy to guess. The Antarean had wanted to stir up trouble throughout the galaxy so that he and his people could continue their lawless activities unmolested. With many peoples at each other's throats, there would be no strength in reserve to halt his piracy, and his conquest of lesser, neighboring worlds.

As to the means 4-2-5 had employed to create disruption—that was not beyond explanation either. Dave knew about the influence of the weather, and other natural conditions, upon intelligent temperaments. Excessive sunspot radiations had been blamed on Earth for various savage outbreaks among his own people. Perhaps 4-2-5 had only managed to isolate, and to generate in much stronger form, the particular radiation that excited living brain and nerve tissue.

But he was destroyed now. Tomorrow, in the vast Conference Auditorium, his plot would be laid bare and proven. Entities from many worlds would sit in judgment, seeing through the eyes of their proxy robots. Cruel they were, and unhuman—but they were reasonable, and few of them had any desire for war. Earth could not be blamed for the disruption and death that had taken place. Customs officials had doubtless seen 4-2-5's apparatus; but they had not known what it was, and at all conferences, according to inter-world law, delegates were allowed much of the freedom of honor.

But now the guilty had been found

out, and the huge fleet of the Interstellar League could work vengeance upon 4-2-5's people.

Dave was satisfied. There had always been danger in his strange job; but there was romance too—the thrilling romance of glittering stars, of limitless abysses, and of time marching on to greater and greater glory.

Dave knew that he had accomplished a task for which he was eminently suited. Had it not been for his placid nature, cool far above the average, he would have been unable to resist 4-2-5's subtle attack well enough to do what he had done.

"Easy Goin'," he muttered happily. "Easy Goin' Ledrack——"

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## RELATIVITY IN METALLURGY

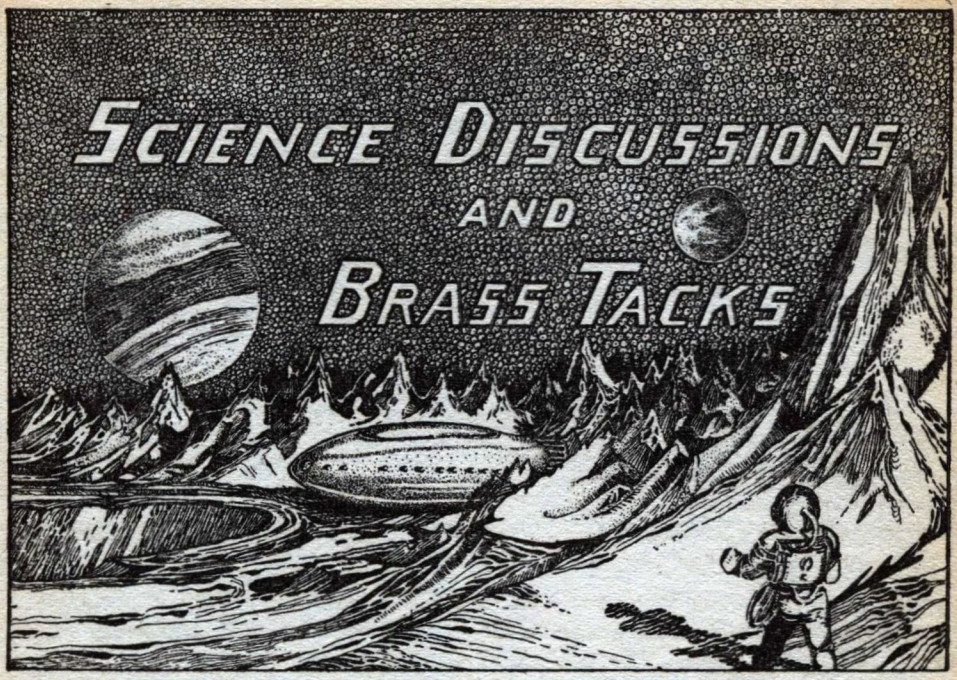
FOR centuries now, the tale of the Lost Art of hardening copper has lured men to experiment, to attempt to reach that goal of copper hard as steel. Sadly, it begins to appear that it is a case of relativity in metallurgy—plus a little psychology of "them were the good old days" order.

Let us picture a scene in ancient days, some 30 years after the first introduction of iron. We have on the left the Old Warrior, the fountainhead of knowledge and information. (The literacy rate being so low as to be out of sight, grand-daddy was the local library, perforce.) The oldster contemplates sadly the wreckage of a bronze helmet, neatly bisected in a fashion that suggests that its late occupant was also bisected. The white-crowned head shakes slowly, lugubriously. "They don't make good bronze these days. It's all cheap workmanship. When I was a youngster they knew how to harden copper so a sword wouldn't open it. Them were the good old days."

Grandfather, in the rosy mists of memories, neglected to state that the sword that wouldn't open the good bronze helmet was a bronze sword. They "lost" the art of hardening copper when they found the art of extracting iron and making it into steel. Copper, surprisingly, was suddenly very soft.

Some such situation may well have started the idea that, once-upon-a-time, men could harden copper. Our civilization is the first in the history of the world that consciously looks *forward* to better things instead of *backward*. In the Middle Ages it was well and truly known that Greece had known more and done things better. Therefore it was reasonable enough to believe that they had had copper harder than steel. The rumor became a "well-known fact."

Till recent times, hardened copper would have been advantageous. A steel-hard metal resistant to corrosion was what was really needed. Hard copper would supply that. But stainless steel does the job today, and does it far more cheaply, for copper is one of the rare elements, actually. Today, we can harden copper till it equals the strength of ordinary steel. (The ancients did *not* use the modern method; it requires metallic beryllium which can be obtained only by high-powered electrical means.) Because of its cost, however, it is used only in special applications, where non-sparking tools (as in powder plants) or non-magnetic metals are required.




### *Rocket mathematics.*

Dear Editor:

Can it be that the Honourable Treasurer of the British Interplanetary Society was so unnerved by Leo Vernon's equations and spare "kv's", that he entirely missed the main point of the "Rocket Flight" article? Stripped of its astronautical foliage, the question (at least as I see it) is simply one of hard-boiled mechanics, or, to be specific, the interpretation of Newton's "Lex II".

Mr. Clarke starts off his mathematical barrage with that old standby of the physics texts: F=Ma.

Now, as Mr. Vernon explained in quite some detail, this formula is suitable for all mechanical discussions wherein the mass remains constant. And this covers practically all considerations of classical mechanics with the exception of the two R's—Rockets and Relativity. For rocket mechanics, wherein the mass does continuously vary, Mr. Vernon chooses a more general formula:

$$F=\frac{d}{dt}(Mv).$$

Here, Mv is the momentum or "amount of motion" and its t-derivative is the rate of change thereof. Such a formula holds true for either constant or variable mass. Where the mass is constant, it reduces to the formula

$$F=M\frac{dv}{dt}$$

which is, of course, synonymous with Clarke's F=Ma.

For variable mass, the formula becomes

$$F=M\frac{dv}{dt}+v\frac{dM}{dt}.$$

Now if Mr. Clarke will substitute his Xk for F, and m-kt for M in this latter formula, he should have little difficulty in tracing the ancestry of the elusive "kv".

The material above is simply to illustrate my point that the differences lie wholly in the interpretation of the Second Law. Vernon's generalization may or may not be justified, but it is certainly not to be lightly dismissed as "balony". Willy Ley's article, to which Mr. Clarke refers us, was descriptive rather than explanatory and quite non-mathematical in treatment. If Vernon's math. be wrong, then let Clarke point out the error.

But there is another bone of contention I must pick with Mr. C. After glancing not two but many times at his exponential equation,

$$e=\frac{m}{m-kt}$$

I quite fail to see how he deduces therefrom the odd fact that a rocket must burn "e" times its final mass of fuel in order to attain its exhaust velocity. Substituting for v, the exhaust velocity X, we have

$$e=\frac{m}{m-kt}.$$

But here we find e as the ratio of the *original mass* to the final mass, and not of the *fuel* mass to the final mass, as Clarke infers. To make this point clearer, let $m_1$ equal the final mass. Then $m_1=m-kt$ and $m=m_1+kt$. The ratio then becomes:

$$e=\frac{m_1+kt.}{m_1}$$

Whence $kt=(e-1)m_1$,

or the weight of the fuel (kt) is equal to, not e, but (e—1) times the final weight of the rocket at exhaust velocity.

And now, having done with mathematical unpleasantries, may I offer my belated appreciation of McKay's "Radiation in Uniform"? I can only say that it is the most usefully informative article I have ever read in Astounding. It is a favorable reflection on the average science-fiction reader that articles like this and

the recent one on positrons—the *Scientific American* would call them "stiff"—can be used successfully in a magazine of scientific fiction.

Did you notice the way the wave and the corpuscular theories of light were harmonized? Must be something wrong, there; it can't be as simple as that! I have some ideas of my own on this subject that I hope to air at some future date; that is if I survive the squelching I expect to receive at the hands of Clarke.

I have a question about polarization that perhaps Mr. McKay will straighten out. When a ray of unpolarized light enters a rhomb of Spar from above and is doubly refracted into ordinary and extraordinary rays, which ray is polarized in the vertical plane and which is polarized in the lateral plane? Or, to put it crudely, which ray "knifes" through the crystal and which "plows" through? If anyone knows the answer to this one, I would appreciate having it. Textbooks which I have consulted all seem to be a trifle vague on this point.

Afterthought: Don't you think that Mr. McKay's article merits a "sequel"? A discussion of optical, magnetic, and electrostatic rotation would not be at all amiss.—Norman F. Stanley, 43A Broad St., Rockland, Me.

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## *A+B=C——Q.E.D.*

Dear Mr. Campbell:

Just two days after seeing the manuscript for the June Editorial, "Fantastic Fiction", at your office, I attended a presentation lecture which introduced an item which surely belonged as an addenda to that list of fictional predictions come true. The new fluorescent tube lumaline lamps.

For a goodly number of years, our fictioneers have been predicting the "cold white light" lamp. They've had them accomplish it by biologic means, imitating the firefly, and by mysterious electric means. They've used an unspecified type of atomic power, and "radium lamps" to accomplish the purpose. But it was generally agreed that any "future civilization that really counted" would have cold white-light lamps.

We, gentlemen, are the future civilization that really counted. I always have liked those technically neat solutions of a problem that seem to tuck up all the loose ends, and wind up with a beautiful Q.E.D.—or rather, Q.E.F. You know—like the "black body solution". There isn't any such thing as a black body, because all things reflect a little light. But technically the same result is obtained by a small round hole in a hollow sphere of the blackest thing we *can* get. It fulfills the requirements; all light striking its non-existant surface is absorbed. That is, to me, intellectually satisfying.

They've done that sort of trick again, I think. Problem: True white light (due to the fact that we live on a planet of a star at about 6500°C.) represents the visible emission of a solid body at a temperature of 6500°C. How to imitate it—produce it synthetically?

You can't do it by the straight-forward attack. Tungsten, most resistant of solids, boils freely some 600°C. lower. A gas at that temperature won't work unless under high pressure—and you can't exert pressure at that temperature.

The tungsten filament reaches only about 2800°C. at best. Most of its energy, then, is expended in the infrared, where it does no one any good as light.

They've used mercury vapor lights. The tungsten bulbs being low-temperature, don't give enough blue, and blue light is particularly useful in close work needing sharp definition. Mercury vapor lights, rich in the green and blue, give that. But the workmen look like a collection of ambulating corpses, a machine-shop operated by trained zombies.

They tried adding the green-blue rich mercury to the red-rich tungsten filament bulb, each—they hoped—making up for the other's lack. In the first place, the combination still distorted colors weirdly. In the second place, a tungsten bulb wastes most of its energy in the infrared. But mercury light wastes more than half its energy in the ultraviolet, which is just as useless, so far as sight goes, as infrared. The combination, then, simply leaked energy at both ends of the spectrum, and didn't work well in the middle.

Now they've got a new method of attack. More than half the energy of that mercury vapor light spilled out at the top end of the spectrum—ultraviolet. Now light energy is something like rocks, in one way. You can make little ones out of big ones, but you can't make big ones out of little ones. Ultraviolet light represents the "big ones"—the high-power concentrated quanta. A number of substances will split those "big ones" into two or more "little ones". The fluorescent compounds. They act as step-down transformers, taking in ultraviolet light and transforming it to visible.

The new lights depend on that. That waste ultraviolet energy of the mercury arc falls on a layer of powdered fluorescent compound lining the tube in which the low-pressure mercury arc works. The ultraviolet energy strikes the powder (they don't have to use an ultraviolet-transparent glass, because the powder is inside with the arc) and is converted to visible. Zinc, cadmium and calcium tungstates fluoresce in the green-blue region of the spectrum. Phosphate salts of the metals fluoresce in the red-orange-yellow region. Silicates in the red-orange.

A hot gas, or an electrically-excited gas (for instance the mercury vapor) gives a spectrum consisting of separate bright lines. But fluorescent compounds give a streak, a smudged, blended streak of light along a whole region of the spectrum. They look, to a spectroscope, much as a hot solid does—a continuous spectrum in a given region. Then by judiciously combining those metal tungstates for blue, phosphates for yellow-orange, and silicates for red, and playing ultraviolet light on them, we get any color or combination of color we want.

But behold! The ultraviolet energy doesn't escape—it's used. There is no infrared energy generated—therefore no waste at the low end of the spectrum. In fact, about the only way energy can get out of that tube is as light—visible light.

A 15 watt fluorescent tube gives a pure white, daylight color, light. It is "6500° white light" because they mixed in the desired colors at will. Further, it gives as much light as an 80 watt tungsten light. It operates on 110 volts, A.C. And—operating at full blast, it is at body temperature!

It is cold, white, daylight color light. It wastes neither in the ultraviolet nor the infrared. It costs about 1/5th as much as tungsten-produced light.

And I think it's an intellectually beautiful concept.—Arthur McCann, 761 Scotland Road, Orange, N. J.

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## *Rocketeers Please Answer.*

Dear Mr. Campbell:

Here's the bad penny again. I have hopes of redeeming myself one of these days and becoming mebbe at least a nickel—a good one I mean.

I hope that you can find room for the following paragraphs. In spite of heroic efforts to save the day for the thermal rockets I still maintain the gas engine has it all over them, lock, stock and barrel. I have found though, one serious flaw in the name of one of my quantities. *That* isn't quite true either—it was found for me, against me rather. Perhaps my side of the question will be a bit clearer when the following is read:

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CITY..... STATE .....

AGE..... HEIGHT..... WEIGHT.....

COLOR OF EYES.....COLOR OF HAIR.....COMPLEXION.....

I have heretofore maintained that the conventional gasoline internal combustion engine will develop some 25,000,000 foot poundals of energy for every pound of fuel consumed (the correct ration of gas and oxygen). I wish to change that to 25,000,000 poundal *sec's* of energy. Poundal sec being of course the Ft of the momentum equation. The change is necessitated because foot poundals are intrinsically wound up with the KE equation. The foot poundals of the above poundal sec's of course depends on the rate of acceleration and the time during which it was accelerated—a thousand and one different quantities and all are as right as the next. And by that I don't mean to infer that any of them are wrong. Because of this I renew my stand that the KE equation is fundamentally the wrong equation to use in rocketry. To state a simple reason simply I'll quote from a physics text: "The ratio of the masses of two bodies is the inverse of the ratio of the accelerations that a given force imparts to the bodies when applied to them in succession." The KE equation absolutely will not fill—with possibly the exceptions of "rare" coincidences—the bill.

For instance: given, 10 lbs. accelerated at 4 ft/sec 2 for 2 sec.

KE=W=mas=10x4x8=320 ft. poundals

By the above quotation we should be able to get the same results by reducing the mass by half and doubling the acceleration.

W=mas=5x8x16=640 ft. poundals

In other words, ft. poundals don't mean a thing when it comes to measuring energy consumed (Ft) and that's what happens when a rocket leaves the ground, isn't it?

But this is not by any means the only example that can be brought to bear on the case but it is enough I hope to cause a little bit of "research" on the subject by those who unwittingly use the KE equation for their calculations.

Too, as I have once before inferred, I still believe internal combustion, motor driven rocket is a near-future project. Why? Because most of the materials and the ways and means have already been found by researchers. Which is something that can hardly be said of the airplane, steam engine, and vacuum tube radio ten years before their invention. For instance, one course of development might lie in this plane. Ions are attracted by magnetic fields. And magnetic fields can be created by electricity. To properly influence an ion to jump from a O v. to some 2500 mi/sec does not require a tremendously strong field if it is done in something like ten inches. Extremely high current can be used in this. But didn't Mr. Campbell state that at near absolute zero temperatures, lead was resistanceless? What would happen if an electrical generator was wound with this kind of conductor? If it were shorted, the voltage would remain the same but the current would go simply sky high—keep climbing until the infinitismal resistance of the circuit created enough friction with the stupendous current to account for the energy driving the generator. But there we have the current—a bit in the abstract I'll admit but there just the same. And the weight is not a serious problem. Just remember that 1 hp can lift 550 lbs off the Earth's surface and should only half the hp of the motor be effectively used on the rockets the loading could still be over 250 lbs/hp. for a possible lift. And at only 2.5 lbs of fuel, all told, per hp.hr. Think it over.

Another brace of figures and I'll quit. Considering the poundal sec. of energy produced by the int. comb. motor (this will vary of course with the type of motor used and whether or not the brake horse-power of said motors agree with the type of hp Watt concocted), taking for granted that one bhp equals 33,000 lbs lifted one ft every minute, the figures are close enough for estimates. Here's something, too. A late airplane engine weighing some 1200 lbs, developed 1000 hp over a period of 150 hrs without any but minor adjustments. In other words it developed some 9,500,000,000,000 poundal sec. of energy from somewhere's around 35 tons of gas—a bit less than a gallon and a half a minute. Those 9,500,000,000,000 poundal sec. would push a fifty ton object—as large as our largest airplane, mind you—to a velocity of nearly 2000 mi/sec in free space. Yet, some say space travel is far in the future due to the lack of suitable power.

Of course, my request is to place in Science Discussions if you can find room and deem such action advisable the aforementioned "following paragraphs". I've checked over the figures 3 or 4 times and although the views are no doubt a bit radical I'm of the opinion there is good basis for them. Too, they might stir things up a bit in general.

But enough!—C. K. Auvil, Box 166, Mineral, Washington.

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### *Maybe it's done with mirrors instead of Math?*

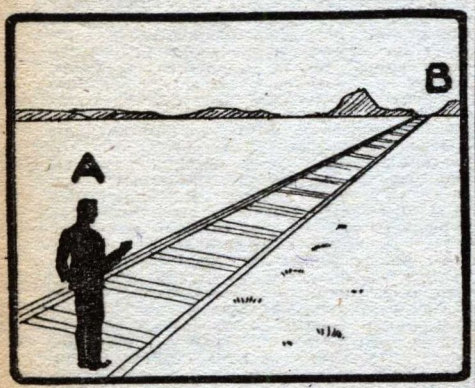
Dear Editor:

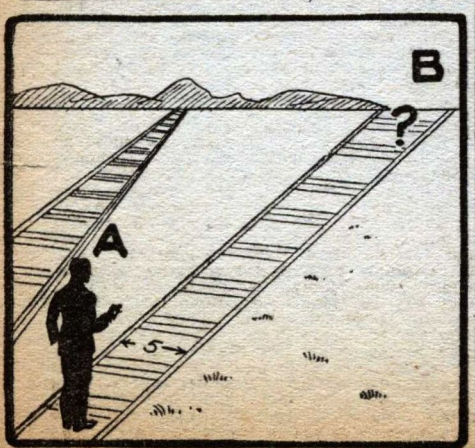
My "Vanishing Hydrometer" experiment of some months back elicited more of a response than I believe it would. Now I am faced with another brain-teaser, whose solution just seems to eternally lie outside my grasp. I hereby warn the readers that this is no problem for people with soft brains. I make no promise of pensions to widows.

*The Information:* A railroad track (or a stone wall or a row of trees etc.) gives the illusion of shrinking in the distance. Though we know this is not so—how can we offset this optical illusion?

*The Actual Problem:* A pair of track rails are five feet apart at the observation point (A). How far apart will they have to be at a point (B) one mile away so that they will appear to the eye normally, with apparently the same size as at the starting point? In other words—how can we dispense with the optical illusion of the tracks meeting in the distance?

Perhaps this illustration will be of aid. The answer can be figured out, either by geometry, trigonometry, calculus or most of the more advanced forms of mathematics. But I'm not the one who can do it!—Gerry Turner, Alpha Epsilon Pi, Ohio State University, Columbus, Ohio.



# BRASS TACKS

*We changed the story title as the magazine title—for greater clarity of meaning.*

Dear Mr. Campbell,

I don't care whether this letter is printed or not as I'm writing it primarily in order to make myself heard when you make up your new department, "The Analytical Laboratory". You will get a letter like this from me each month and as I say it does not matter whether you go to the length of printing it. Just so's you read it.

I catalogue each story of each issue and have done so since the August, 1936 issue. Therefore the following stories are listed according to my catalogue ratings based on a five-star maximum.

For first place, I consider it a tie between two stories: Nat Schachner's "Island of the Individualists" and the first part of Jack Williamson's "Legion of Time" (which was announced beforehand, by the way as "Legion of Probability". Why the change?). I have given both five stars but think the edge goes to the Schachner yarn. For one thing you can never tell how a serial will turn out, and for another I strongly like the whole "Past, Present, Future" series, having given each of the three stories printed so far five stars. And let me tell you that I don't hand out five-star ratings right and left either. Since August, 1936 when I began my ratings, only "Galactic Patrol" and your own series "Accuracy" received five stars, aside from these three mentioned above.

In second place, I put E. E. Smith's article "Catastrophe" which I gave four and a half stars. Astronomical articles are my favorites. Let's have more of them. And please, let's have less of Mr. Willy Ley whom I do not like.

Clifton B. Kruse's tale, "The Incredible Visitor" is in third place with three and a half stars—but may I point out that the idea of having super-dense beings from super-dense planets is becoming just the slightest bit played out. And so, by the way, is the negative space idea. Schachner's "Negative Space" is the twin of John D. Clark's "Minus Planet". (But Schachner is still my favorite author. And what has happened to Clark?)

In fourth and fifth place respectively are "Procession of Suns" by R. R. Winterbotham (the idea behind which is just a bit on the fantastic side) and Spencer Lane's "Niedbalski's Mutant"—both with three stars.

And now for stories which I think ought to be "panned consistently and hard". What in the world induced you to print "Ra for the Rajah". Do you realize that it has no plot outside of one that would fit it for some future "scienti-love magazine". The only good point about it—which gave it the one and a half stars it rated—is the aerial polo game Peterson has invented.

And as for "Three Thousand Years". *You* may be crazy about it but I'm not. I read it because I always read Astounding from cover to cover but it is only a sense of duty that impels me on.—Isaac Asimov, 174 Windsor Place, Brooklyn, New York.

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*Analytical Lab rated high in reader approval itself—second only to "Legion of Time".*

Dear Editor:

After obtaining the May issue of Astounding Science-Fiction, I compared the cover by Schneeman with those of the March and April issues by Wesso and Brown, respectively. It could not compare with the other two. Schnee-

man is your best interior artist by far, but keep Wesso and Brown on the covers. The cover on the March issue, by Wesso, was the best I have seen in a long time.

Congratulations on the new department—The Analytical Laboratory. It is certainly a fine addition to our magazine. I was pleased to see that the ideas of the other readers checked with mine pretty well, though I could not see why "Something from Jupiter" was not up among the leaders. I found it different, very interesting, and well written.

"The Legion of Time" by Williamson is off to a great start. It is truly a *mutant* story; the plot is utterly different in its basic principles from any story I have ever come across in the realms of science-fiction. If the remaining installments of "The Legion of Time" keep up to the standard set by the first part, Williamson's serial will be remembered as one of the great stories of science-fiction.

As to the rest of the stories in the May issue, "The Island of the Individualists" was by far the best. Schachner seems to be up to par again. For awhile there his stories were very poor, far below his usual standard. "The Brain-Storm Vibration" and "Static" were both very good, giving the former a slight edge. I am somewhat disappointed in "Three Thousand Years". So far it has dragged considerably and the plot itself does not seem to be anything great or different. I cannot class the science article, "Catastrophe", with the rest of the stories, nor can I give it enough praise. Only Dr. Smith could write such a masterpiece. The article gives one a true concept of the tremendous forces which held sway during the birth of our Solar System, and it leaves a clear impression in the mind, not soon to be erased—Peter R. Rawn, 215 15th Ave., No., Seattle, Wash.

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***"Con" of last month now "pro" Miss Evans.***

Dear Mr. Campbell:

Someone once remarked that a science-fiction fan's mind changes with the weather—and believe me I'm no exception. Since my last letter (withering methinks) to you, I have changed my views and opinions of your policy considerably. Or maybe I was more grouchy than usual the night I typed that missive. At any rate, please except my apology for that error of my better judgment. Despite its shortcomings, Astounding is still the leading science-fiction magazine—and may always continue to be so!

In the May issue, I noticed in particular the letter of Miss Evans. In fact, that is the second reason for my writing this. It so happens that I am one of the "back-biters" of whom she speaks. It seems in my March letter I criticized "Whispering Satellite", saying that it was a poor imitation of Weinbaum. I still think it

is—but that is beside the point. What I'm trying to get across is that to the best of my knowledge, SGW originated the "intelligent animal" type of yarn. And although I fully realize that he never held all rights to this type, I maintain that unless an author can do a tale of this kind within some degree of Weinbaum's mastery, he should not attempt it. I've read some very good stories of this sort that weren't by Weinbaum—and still found them enjoyable! But the above mentioned is the *only* type of Stanley Weinbaum tale that I would consider as being an imitation. His other works were no more unusual than anyone else's—though you'll have to admit every one had that certain touch. To sum it all up, I agree wholeheartedly with Miss Evans except in that one point mentioned—James S. Avery, 55 Middle St., Skowhegan, Me.

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### *Best—and Worst!*

Dear Mr. Campbell:

The April Astounding was the 13th which I have read, so I decided to tell you what I thought of the magazine during the year.

It declined gradually to an all-year low in December, then rose rapidly in quality to a high point in February, then declined slightly.

Your best authors are Wellman, Ayre, Smith, Stuart, and, until recently, Schachner. Binder and Schachner need a rest—especially Binder.

Your best cover illustrator is, of course, Brown. For interior illustrations Wesso is best and Dold next, the latter because of his choice of subjects.

I didn't like the change of title from Astounding Stories, which is catchy, to Astounding Science-Fiction, which sounds flat. Besides, your Science-Fiction is not more astounding than any other.

The renewal of Brass Tacks would have been an improvement if it hadn't taken space from Science Discussions.

The mutant covers are a great improvement.

The ten best stories of the year, as well as I can remember, were:

1. "Seeker of Tomorrow" One of the greatest time travel stories ever written, because of the impossibility of return to the present.
2. "The Great Ones"
3. "Galactic Patrol"
4. "Past, Present, and Future"
5. "A Surgical Error"
6. "Space Signals"
7. "Whispering Satellite"
8. "Anachronistic Optics"
9. "Wings of the Storm"
10. "Flareback"

The ten worst stories were:

1. "Martyrs Don't Mind Dying"
2. "Three Thousand Years!"
3. "Thunder Voice"
4. "The Fatal Quadrant"
5. "Dark Eternity"
6. "Mana"
7. "The Mind Master"
8. "Angel in the Dust Bowl"
9. "Stardust Gods"
10. "Air Space"

Here's for more "Seekers of Tomorrow" and fewer "Dark Eternities"—Lew Cunningham, Box 253, San Ysidro, California.

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*The Ph.D. was attached by the first Editor to print a Dr. Smith story—it is now part of his trade name. It was not his choice, though it is his right.*

Dear Sir:

A present controversy prompts me to write again after a lapse of several years. If too much already is being said of "Galactic Patrol" and "E. E. Smith, Ph.D." I'm regretful but yet highly insistent; they both are great. When an author shows the divine sparks of genius, we

who appreciate must rally to his cause—and this is, undoubtedly, one of the times.

There may be those who desire everything in terms of symbols, formulae, and numbers. We all know persons who become indignant when a writer ceases to take his theme from 1893 ideas and imagines upon present accepted theories something a little more advanced. This is true, not alone in science fiction, but in every field of writing under the Sun.

It must be admitted that "Galactic Patrol" departs from the purely material and quests into the relatively unknown field of mentality. Yet who is qualified to say what mysteries in the subconscious or conscious may or may not be unraveled tomorrow? More than that, who can tell what exists beyond these tiny dabs of mud and rock circling our insignificant Sun? You need only stand under a night sky, surmising on the million probabilities of its thousand-fold stars, to be thankful for a Smith who can take us there and make those probabilities real. Moreover, what is science-fiction at all, if not a partial release from things known?

Thus I am forced to come to the cause of "Galactic Patrol" and its brilliant author. Though I cared little for much of the "Skylark of Valeron", the "Galactic Patrol" carried me back to the olden days of glorious former *Skylarks*, and anyone with an atom of appreciation for a truly great story will keep it—as the horde of us will who do appreciate it—and read it forever.

As to the Ph.D. part of the uproar, I think Dr. Smith's justification of his use thereof is hardly called for. Who but the holder of a real degree would dare to claim it before the group who make up science-fiction's public? Perhaps it helps the case, but I hate to see a gifted writer take the defensive before those whose names are unknown.

In all seriousness, let us hope that those who disapprove of "Galactic Patrol" and new-thought stories like it will take a new view. I wouldn't say—don't buy the magazine. I'd say—shake some of the dust off your imaginations, and consider the little we know as against the infinity of what we don't—Gerald H. Adams, Wiley College, Marshall, Texas.

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### *Wandrei's promised a story.*

Dear Mr. Campbell:

The May issue of Astounding Science-Fiction is good throughout with the exception of "Catastrophe" and, possibly, "Procession of Suns". Williamson's tale "The Legion of Time" starts off well. This is the first time that I have read an installment of a serial before I have the whole thing, but I am not sorry that I didn't wait—it's truly a *mutant* and a darned good one.

Let's have more of Dr. von Theil and Lieutenant West by Kent Casey. Also some more of Handyman Joshua and Dr. Meadow by M. Schere.

I think that the pages taken up by the science articles are just wasted space that should be used for stories, but I realize that many readers like the articles and would kick if you cut them out—so I'll just grin and bear it. It will take more than a few wasted pages to make me quit Astounding.

What has happened to Donald Wandrei? He is one of my favorite authors and we haven't had anything from him since October 1936, with "Infinity Zero". See if you can't get him going again—Willard Dewey, 1005 Charles St., Everett, Wash.

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### *Minneapolis fans——?*

Dear Mr. Campbell:

Being the only science-fiction fans in the city of Minneapolis (far as we know) we have got together to give you our composite opinion of the latest Astounding.

"The Legion of Time", we agree, is excellent—but why change the word "thought-variant" to "mutant"? The words seem to be synonymous. "Procession of Suns" started well, giving some promise of originality, but then disappointed us. "Niedbalski's Mutant" was

very good. More by Spencer Lane plizz. The rest of the stories ranged from fair to worse, with "Ra for the Rajah" copping booby prize.

On Schneeman's first cover for Astounding we disagree rather violently. OES, still prejudiced in favor of Wesso, has no use for it, while ARB gives it his benign approval. At least we agree that the new Street & Smith emblem in the upper left hand corner is purty. The back cover is excellent.

"The Analytical Laboratory" is a swell idea, though we can't see how "Flareback" and "Wings of the Storm" rated so high. "Master Shall Not Die", however, deserved all the praise it got and more.

We should like to get in touch with other science-fiction fans living in the Twin Cities. We hate to think that we may be the only two of that select society in these parts. So let's hear from you, fans!—Arden Benson and Oliver E. Saari, 4011 Emerson Avenue North, Minneapolis, Minn.

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### *Note divergence of opinion on "Rajah".*

Dear Mr. Campbell:

"The Squeaking Wheel Gets the Most Grease." Therefore—May reader's report.

"The Legion of Time"—So-So. Typically Williamson.

"Catastrophe"—excellent. With two ray guns and a spaceship it would have made a good story. Most interesting article, because of its style.

"Ra for the Rajah"—superb! Fast-moving. I detect a Renaissance in science-fiction. Don't fail us, Mr. Campbell.

"The Brain-storm Vibration"—good.

"Three Thousand Years!"—good.

"Static"—fair. Rest of the magazine So-so. Let's have no more of Schachner's Three Musketeers. The first story was all right. After that—no!

The May issue is one of the best we've had. Keep up the good work.—A. I. Benson, U. S. S. California.

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### *"Rajah" again.*

Dear Mr. Campbell:

The newly inaugurated Analytical Laboratory certainly proved that a new writer can take top honors for the best story of an issue. Nor was the March issue an exception. John Victor Peterson's "Ra for the Rajah" is so far out in front this issue, there's no competition!

Schneeman sort of slipped on the cover. It's a bit drab and indistinct, as covers go, but I sincerely believe that with a little practice along that line, he'd be as good as Brown.

Kent Casey is as good as ever with "Static", although M. Schere, patterning basically, as did Casey, after his previous excellent story, lacked the punch to put his story over. Sometimes this sequel stuff doesn't work out so well.

"Three Thousand Years" is "Rebirth" all over again. "Rebirth" was, and is, my favorite story. McClary seems to be relying on the success that the novely written "Rebirth" had, to put "Three Thousand Years" across.

I wonder if it would be in good taste to sort of vaguely hint that Virgil Finlay would be a wonderful artist to get for Astounding?—Russell A. Leadabrand, Route 2, Box 264A, Dinuba, California.

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### *Misogynist! Bet you hear from Miss Evans!*

Dear Editor:

For the past five years I have been an uncomplaining and completely satisfied reader of Astounding. I had hoped to remain that way but find it impossible for the following reason.

In the last six or seven publications females have been dragged into the narratives and as a result the stories have become those of love which have no place in science-fiction. Those who read this magazine do so for the science in it or for the good wholesome free-from-women stories which stretch their imaginations.

A woman's place is not in anything scientific. Of course the odd female now and then invents something useful in the way that every now and then amongst the millions of black crows a white one is found.

I believe, and I think many others are with me, that sentimentality and sex should be disregarded in scientific stories. Yours for more science and less females—Donald G. Turnbull, 91 Oriole Parkway, Toronto, Ont., Canada.

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### *There is this—every previous civilization has fallen.*

Dear Editor:

What has happened? I thought last month's miracle issue was a mistake—but now it's beginning to be a habit! Astounding has suddenly taken an adrenalin cocktail and is moving along at a furious rate.

Let me make an outline before I faint.

The Cover: is startling and eye catching. This is the third time I have been able to state such a fact. And all three times have been in rapid succession.

"Hyperpilosity": was a very unusual and perfectly logical tale. It reads like an item in any newspaper. No greater compliment can one offer.

"The Faithful": is another "different" short story. And it, too, is logical. This is too much for my fluttering heart. At last someone's realized that the ant is not the only organism capable of taking man's place after his departure.

Civilization's Downfall has become the most familiar plot in the pot-boiler's category. No less than *four* of this yawnable type in the April issue. It's almost as bad as the time travel plague of last year.

"Galactic Patrol": appears to have concluded by leaving a bad taste in everyone's mouth. I don't know how it ended myself, having washed my hands of the "epic" after part two. Dr. Smith's old fault of making the ludicrous commonplace was mainly responsible for its blow-up. After all, when space ships "crawl" along at ten times the speed of light and the hero can push over an impregnable fortress single-handed—what are we to consider as "astounding?" Stop choking the horse with candy, doctor.

You may be interested to know that I now include Greenland among my science-fiction writing ports. Letters have also come along from China, South Africa and Egypt. Astounding seems universal.—Gerry Turner, Ohio State University, Columbus, Ohio.

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### *He's good partly because he does take time.*

Dear Mr. Campbell:

So now, I know, the meaning of the saying, "All things come to him who waits." Even McClary comes back into Astounding Science-Fiction if you just wait long enough. But why be a meanie and make us wait for his swell stories? Much too much time elapsed between "Rebirth" and "Three Thousand Years!"

I was afraid that I might be disappointed in this new story of Mr. McClary's, but if the rest is as good as the first installment I think that he has topped himself.

It is a good cover on your April issue. In fact, I like everything about your magazine and even if we are in a depression you can count on my twenty cents being on the line each month for Astounding Stories.—Mary C. Bosworth, 524 North Monroe St., Tallahassee, Florida.

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