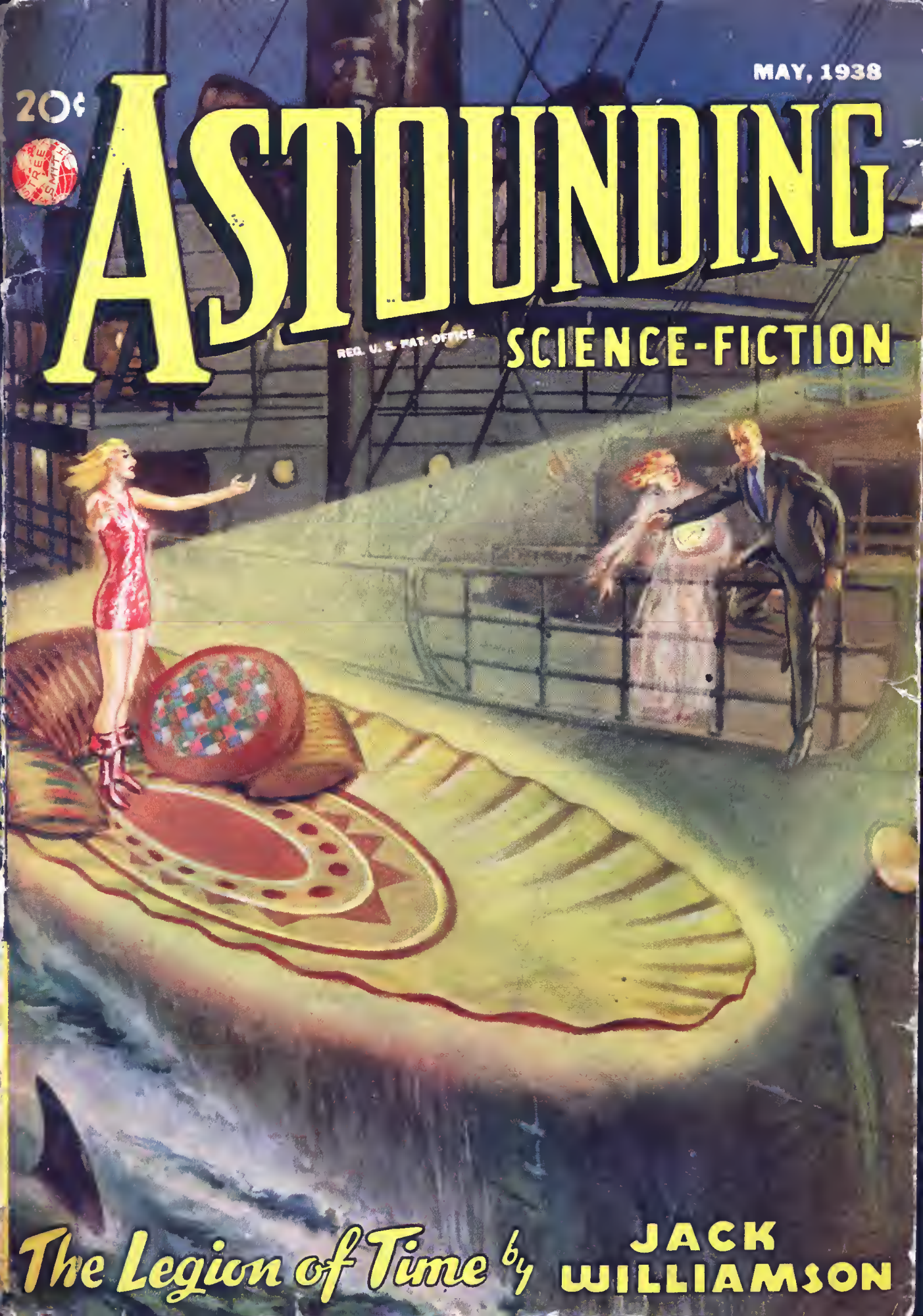
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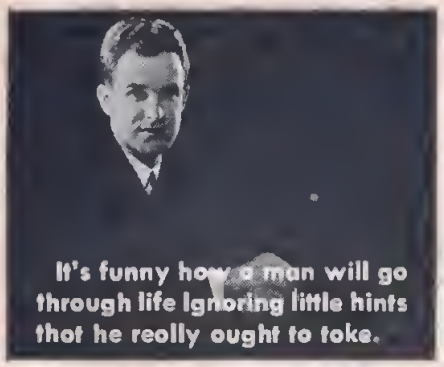

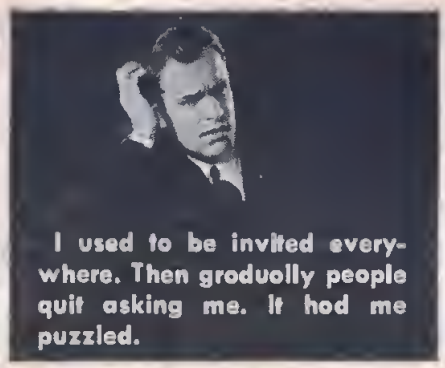

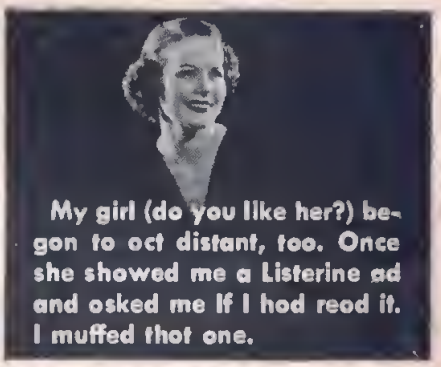

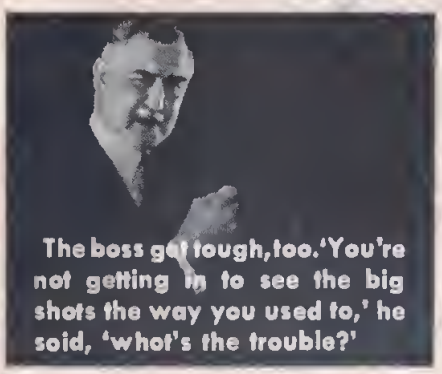

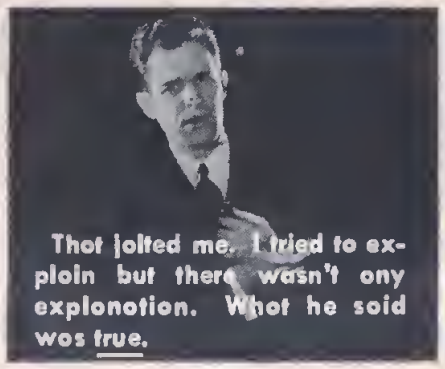

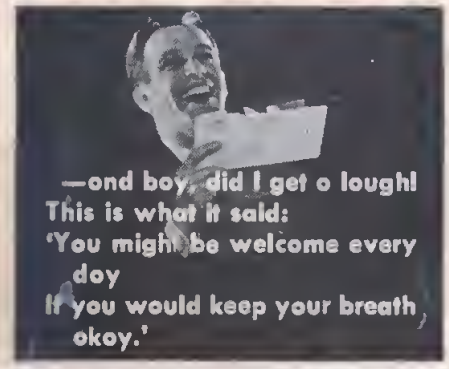

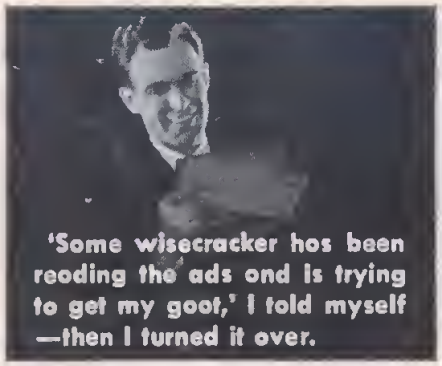

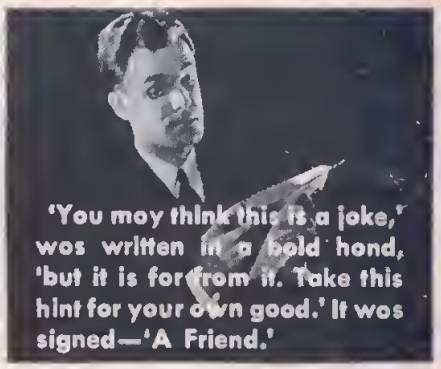

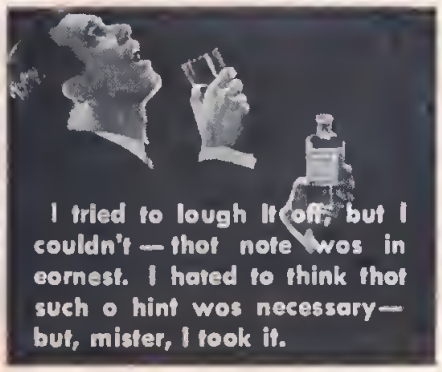

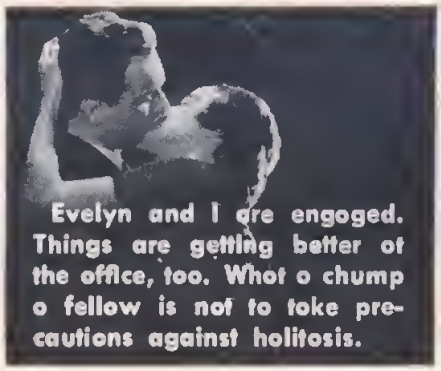

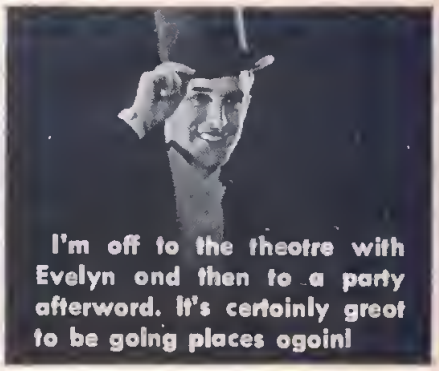

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Volume XXI Number 3

MAY, 1938

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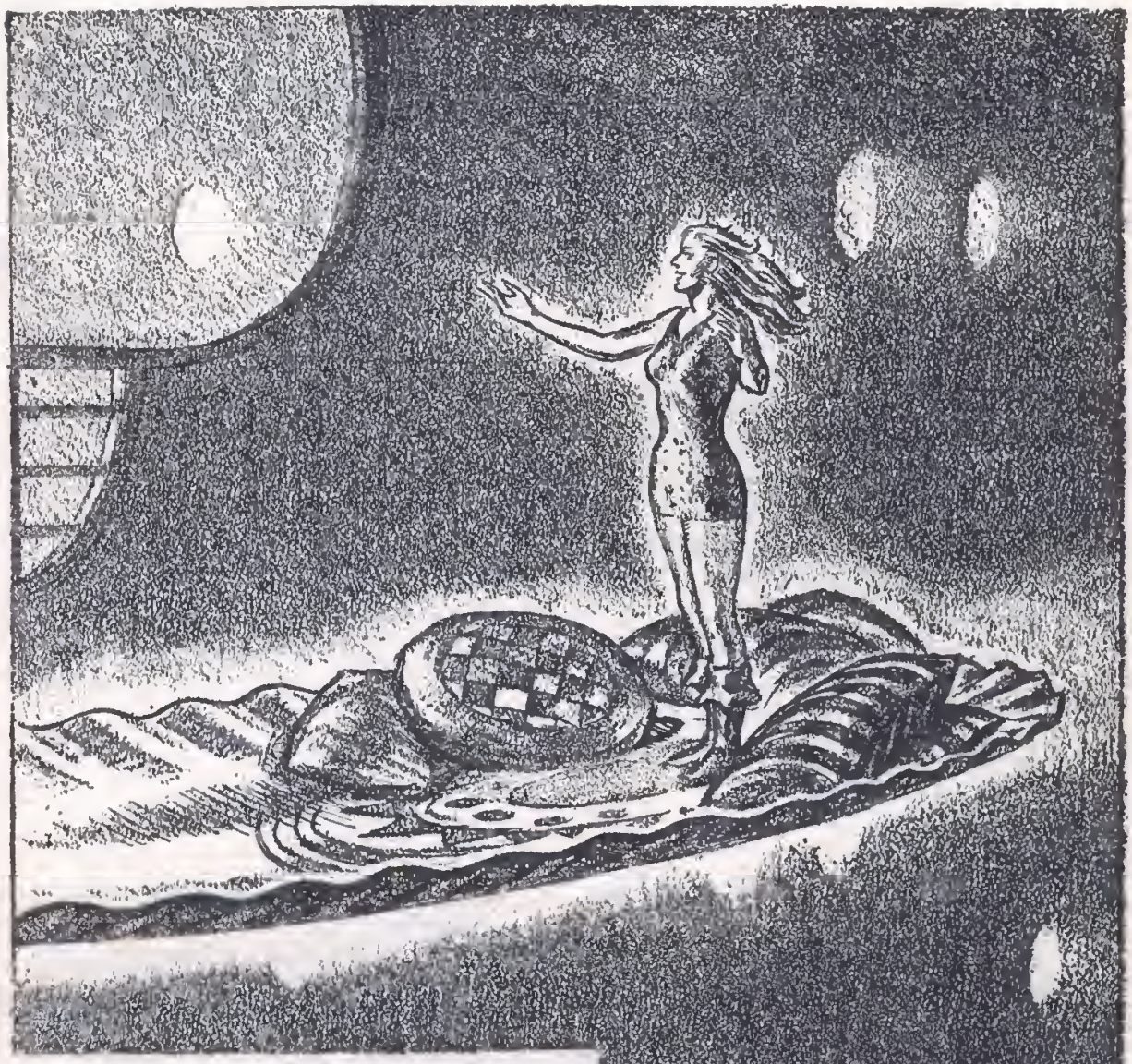
THE beginning of it for Dennis Lanning—the very beginning of his life—was on a hushed April evening of 1927. Then eighteen, Lanning was slender, small-featured, with straw-yellow hair which usually stood on end. He commonly wore a half-diffident smile—but his gray eyes could light with a fighting glint, and his wiry body held a quick and unsuspected strength.

In that beginning was the same fantastic contrast that ran through the whole adventure: the mingling of everyday reality with the stark Inexplicable.

Lanning, that last term, shared a Cambridge apartment with three other Harvard seniors, all a little older than he. Wilmot McLan, the mathematician, was a slight man, grave and reticent, already absorbed in his work. Quietly cheerful, studious Lao Meng Shan,



TIME

presenting a time travel.

proud son of a mandarin of Szechwan, was eagerly drinking in the wonders of modern engineering. Good friends and swell fellows, both. But the one who stood always closest to Lanning was Barry Halloran.

Gigantic red-haired all-American tackle, Barry was, first and last, a fighter. Some stern, bright spirit of eternal rebellion he and Lanning shared in common. Companions in everything,

Two women of two mutually exclusive possible futures seek to enlist the aid of a man of the present—by demanding his death!

they had been taking flying lessons together at the East Boston airport.

The other three were out, however, on this drowsy Sunday evening, and the house was still. Lanning sat alone in his room, reading a thin little gray-bound book. The flyleaf was inscribed, "To Denny, from Wil—a stitch in Time!" It was Wil McLan's first scientific work (which he had just published at his own expense) entitled, *Reality and Change: The Nature of Time.*

Deep-hidden in its abstruse mathematics, Lanning had sensed an exciting meaning. He leaned back, with tired eyes closed, trying to complete the tantalizing picture he had glimpsed through the mist of symbols on the page. The book began with Minkowski's famous dictum: "Space in itself, and Time in itself, sink to mere shadows, and only a kind of union of the two retains an independent existence."

Was Time, then, but another extension of the universe; to-morrow as real as yesterday? What if one could leap forward——?

"Denny Lanning!"

A clear silvery voice had spoken his name. Dropping the book, he sat upright in his chair. He blinked, swallowed. A queer little shudder went up and down his spine. The door was still closed, and there had been no other sound. But a woman was standing before him on the rug.

A plain white robe swept long to her feet. Her hair, a glowing mahogany-red, was held back with a blue, brilliant band like a halo. The composure of her perfect, classic face was almost stern. But, behind it, Lanning felt agony.

Before her, in two small hands, she held a thing about the size and shape of a football—but shimmering with splendid prismatic flame, like a colossal, many-faceted diamond.

HER GRAVE EYES were on Lanning. They were wide, violet. Something in their depths—a haunting dread, a piercing, hopeless longing—choked him with emotion, dimmed his eyes. Then amazement came back, and he stumbled to his feet.

"Hello!" he gasped. "Yes, I'm Denny Lanning. But who are you?" His glance went to the locked door behind her. "How'd you get inside?"

A grave smile lit the white cameo of her face.

"I am Lethonee," she said. Her voice, Lanning noticed, had an unfamiliar musical rhythm. "And I am not really in your room, but in my own city of Jonbar. It is only in your mind that we meet, through the *chronotron,*"—her eyes dropped briefly to the immense flashing gem—"and only your study of Time made possible this complete *rapport.*"

Open-mouthed, Lanning was drinking in the slim, clean youth of her, the glory of her hair, her calm, deep loveliness that was like an inner light.

"Lethonee——" he murmured, relishing the sound. "Lethonee—— Dream or not, you are beautiful!"

A quick little smile, pleased and tender, rewarded him. But instantly it was gone, before the deep solemnity of trouble.

"I have come a long way to find you, Denny Lanning," she said. "I have crossed a gulf more terrible than death. Will you help me?"

A queer, trembling eagerness had seized him. Incredulity struggled with a breathless hope. A throbbing ache was in his throat, so that he couldn't speak. He walked uncertainly to her, and tried to touch the slim bare arms that held the great jewel. His quivering fingers met nothing but air.

"I'll help you, Lethonee," he gulped at last. "But how can I?"

Her silver voice sank to a low, urgent tone. From the startling whiteness of her face, the great, violet eyes seemed to look far beyond the room.

"Because destiny has chosen you, Denny Lanning. The fate of the human race is on your shoulders. My own life is in your hand—and the doom of Jonbar!"

"Eh!" Lanning muttered. "How's that?" He rubbed his forehead, bewilderedly. "Where's Jonbar?"

His wondering dread increased when the girl said: "Look into the *chronotron*, and I can show you Jonbar."

She lifted the great flashing jewel, holding its ends in her two small hands. Her eyes dropped to it. Colored rays shattered from it, blindingly. It exploded into a prismatic glare. The fire-mist slowly cleared, and he saw—Jonbar!

The lofty, graceful pylons of it would have dwarfed the skyscrapers of Manhattan. Of shimmering, silvery metal, they were set immensely far apart, among green park-lands and broad, many-leveled roadways. Great white ships, teardrop-shaped, slipped through the air above them.

"That is my Jonbar, where I am," the girl said softly. "Now let me show you the city that may be—New Jonbar—lying far-off in the mists of futurity."

BRIGHT FLAME veiled the city, and vanished again. And Lanning saw another wondrous metropolis. The green hills along the horizon were the same. But the towers were taller, farther apart. And they shone with clean brilliant colors, against the wooded parks. The city was one artistic whole; a single stupendous jewel whose beauty caught Lanning's breath.

A reverent awe was in the girl's voice when she whispered: "New Jonbar! Its people are the *dynon*."

There were fewer ships in the air. But Lanning now saw tiny figures, clad it seemed in robes of pure, bright flame, launching themselves from lofty roofs and terraces, soaring above the parks in perfect, wingless freedom.

"They fly through adaptation to the power of the *dynat*," breathed the girl. "It makes them near immortal, almost—godlike! They are the perfect race to come."

Prismatic flame hid the vision. The girl lowered the crystal in her hands. Lanning stepped back. He blinked bewilderedly at the reading lamp, his books, the chair behind him. From that old, comforting reality, he looked back to the girl's white wonder.

He spoke again, diffidently: "Lethonee —— Tell me, are you real?"

"I am real as Jonbar is." Her voice was hushed and solemn. "You hold our destiny—to give us life or death. That is a truth already fixed in the frame of Space and Time."

"What—" Lanning gulped, "what can I do?"

Dread was a shadow in her eyes.

"I don't know. The deed is dim in the flux of time. But you may strike for Jonbar—if you will. To win or to perish! I came to warn you of those who will seek to destroy you—and, through you, Jonbar."

The rhythm of her voice was almost a chant, a prophecy of evil.

"There is the dark, resistless power of the *gyrane*, and black Glarath, the priest of its murderous horror. There are the monstrous hordes of the *kothrin*, and their savage commander, Sorainya."

The white beauty of Lethonee had become almost stern. A sorrow darkened her eyes, yet they flashed with a deathless hatred.

"She is the greatest peril." It was a battle-chant. "Sorainya, the Woman of War! She is the evil flower of Gyronchi. And she must be destroyed."

Her voice fell, and Lethonee looked at Lanning over the giant crystal, her eyes full of a tender and almost childish concern.

"Or," she finished, "she will destroy you, Denny."

Lanning looked at her a long time.

At last, hoarse with wonder, he said: "Whatever is going to happen, I'm willing to help—if I can. Because you are—beautiful. But still—what, exactly, am I expected to do?"

The words almost crackled from Lethonee's lips: "Beware of Sorainya!" Then, her rhythmic voice once more soft and musical, "Denny, make me one promise. Promise me that you will not fly to-morrow."

"But I'm going to!" Lanning cried. "Max—he's the instructor—said that Barry and I could solo to-morrow, if the weather's right. I couldn't miss it."

"You must," said Lethonee. "Or Jonbar will be slain!"

Lanning met her violet eyes. Emotion had burned away some barrier. He looked into her very soul—and found it beautiful.

"I promise," he whispered. "I'll not fly."

"Thank you, Denny." Her smile set a throbbing ache in his throat. "Now I must go."

"No!" Alarm tore Lanning's heart. "I don't know half enough. Where you are, really. Or how I could find you again. Don't go!"

"But I must." Dread clouded her face again. "For Sorainya might follow me here. And if she finds that the crisis turns indeed on you, she will strive to take you—yes, destroy you! I know Sorainya."

"But——" Lanning gulped. "But—will I see you again?"

"It is your hand on the wheel of time," the girl said gravely, "and not mine. Good-by, Denny."

"But wait!" gasped Lanning. "I must tell you! I——"

But the fire of a million sunlit prisms had burst again from the jewel in her hands. Lanning was momentarily dazzled, blinded. Then, blinking, he found himself alone in the room, speaking to vacant air.

DREAM—or reality? The question racked him. Could she have been an actual person, come across the gulf of time from the remote, possible future? Or was he going crazy?

Dazed, he picked up the little gray book, and reread a paragraph of Wil McLan's: "To an external observer gifted with four-dimensional senses, our quadraxial universe must appear complete, fixed, and forever unchanging. The sweep of Time is no more than the hand of a subjective watch; it is no more than the intangible ray of consciousness, illuminating human experience. In any absolute sense, the events of yesterday and to-morrow are alike eternal as the structure of space itself."

But the white, troubled beauty of Lethonee rose against the page. How did that fit with her tale of worlds that might be?

He flung aside the book, helped himself to a generous slug of Barry Halloran's pre-war Irish whisky, and walked blindly down through Harvard Square. It was after three when at last he came in to bed, and then he slept with a dream of Lethonee.

He wanted to tell Barry, in the morning, for they had been closer than brothers. But he thought the big redhead would only laugh—as he himself might have laughed if another had told him the thing. And he didn't want laughter at his dream of Lethonee—not even from Barry.

Half sick with a confusion of wonder and doubt, of hopeless hope for another glimpse of her, and bitter dread that she had been all illusion, Lanning waited for the fatal hour.

"Buck up, kid!" Barry boomed at him, heartily. "I never thought you'd be shaky—Max says you've got the nerves of a hawk. I'm the one that should be turning green around the gills. Come out of it, and let's go catch some sparrows!"

Lanning wanted to solo that morning

more than he had ever wanted anything —until he saw Lethonee. He had promised not to fly. But what signified a promise made in a dream?

He stood up, uncertainly—and then the phone rang. He had made his own expenses, that year, covering university activities for a Boston paper—and this was his editor. It was an assignment that could have been evaded. But, listening, he saw the tragic eyes of Lethonee again, beyond her glowing jewel.

"Okay, Chief," he said. "On the job!" He hung up and looked at Barry. "Sorry, old man. But business first. Tell Max I'll be out to-morrow. And —happy landings, guy."

"Tough luck, kid."

The big tackle grinned, crushed his hand, and went out.

Lanning read in his own paper, four hours later, how Barry Halloran died. The training plane had gone out of control two thousand feet over Boston harbor, and plunged down into the Charles River Basin. Grappling hooks had brought part of the battered wreckage up out of the mud, but the body had not been recovered.

Lanning shut his eyes against the black headlines, reeling. He was sick with a dread that was almost terror, numbed with a black regret. For Lethonee had saved his own life, he knew—at the cost of Barry Halloran's.

II.

LANNING felt no gratitude for the warning that had saved his life. Rather, a sick regret, an aching sense of guilt for Barry's death. Yet he could feel no actual resentment toward Lethonee —the tragedy seemed a terrible proof of her reality—for in her grave, troubled beauty, surely, there had been no evil.

A kind of excitement, however, buoyed up Lanning for a few days, and relieved his grief. There was a bright hope that Lethonee would return. Her memory was a haunting pain of loneliness, that would not die. Her enigmatic warnings, even the vague expectancy of peril, lent a spice to existence.

But life went on—after the funeral preached for Barry's never-recovered body—as if Lethonee had never come. Lao Meng Shan returned to China, eager to put his new science at her service. Wil McLan was off to Europe, on a fellowship in theoretical physics.

And Lanning presently embarked for Nicaragua, on his first foreign press assignment. American marines were straightening out the Sacasa-Chamorro fracas. Barry's uncle had offered him an advertising job. But a burning unrest filled him, born of the conflicts of doubt and hope, wonder and grief, dread and bitter longing. He saw no way ahead, save to break old ties, to forget.

It was on the little fruit steamer, bound for Corinto, that he first saw Sorainya! And knew, indeed, that he would never forget, never escape the strange web of destiny flung across Space and Time to snare him.

Velvet night had fallen on the tropical Pacific. The watch had just changed, and now the decks were deserted. Lanning, the only passenger, was leaning on the foredeck rail, watching the minute diamonds of phosphorescence that winged endlessly from the prow.

But his mind saw, instead, the great jewel that Lethonee had called the *chronotron,* and her slim haunting form behind it.

And it startled him strangely when a ringing golden voice, in pealing mockery of her own, called: "Denny Lanning!"

His heart leapt and paused. He looked up eagerly, and hope gave way to awed wonderment. For, flying beside the rail, was a long golden shell, shaped like an immense shallow platter. Silken cushions made a couch of it, and lying amid them was a woman.

Sorainya—Woman of War!

Lethonee's warning came back. For the long-limbed woman in the shell was clad in a gleaming, sleeveless crimson tunic of woven mail that yielded to her full lissom curves. A long, thin sword, in a jeweled sheath, lay beside her. She had put aside a black-plumed, crimson helmet, and thick masses of golden hair streamed down across her strong, bare arms.

The white, tapered fingers, scarlet-nailed, touched some control on the shell's low rim, and it floated nearer the rail. Upraised on the pillows and one smooth elbow, the woman looked up at Lanning, smiling. Her eyes were long and brilliantly greenish. Across the white beauty of her face, her mocking lips were a long scarlet wound, voluptuous, malicious.

FLOWER OF EVIL—Lethonee's words again. Lanning stood gripping the rail, and a trembling weakness shook him. Swift, unbidden desire overcame incredulity, and he strove desperately to be its master.

"You are Sorainya?" He held his tone grave and low. "I had warning to expect you."

She sat up suddenly amid the cushions, as if a whip had flicked her. The green eyes narrowed, and her body was tense and splendid in the gleaming mail. Her red mouth became a thin line of scorn.

"Lethonee!" She spat the name. "So that slut of Jonbar has found you?"

Lanning flushed with anger, and his fingers drew hard on the rail. He remembered the cold glint of an answering hate in the eyes of Lethonee, her sadly stern ultimatum: "Sorainya must be destroyed."

"So, you are angry Denny Lanning?" Her laugh was a mocking chime. "Angry, for a shadow? For Lethonee is but a phantom, seeking with lies and tricks to live—at the cost of other lives. Perhaps you have discovered that?"

Lanning shuddered, and wet his lips.

"It's true," he whispered, "that she caused Barry's death."

The scorn had fallen like a mask from Sorainya's face. Now she tossed her splendid head, and pushed back the tumbled glory of her hair. The sea-green eyes danced an invitation, and she smiled.

"Lethonee is no more than a spectre of possibility." Her tone was a suave caress. "She is less than a single speck of dust, less than a shadow on the wall. Let us forget her, Denny Lanning—shall we?"

Lanning gulped, and a tremor shook him.

Her bare arms opened, beckoning.

"But *I* am real, Denny. And I have come for you—to take you with me back to Gyronchi. It is a mighty empire, more splendid than the pallid dream of Jonbar. And I am its mistress."

She stood up with one flowing movement, tall and regal in the scarlet mail. Her bare arms reached out, to help Lanning to the golden shell. Her cool, green eyes were shining with intoxicating promise.

"Come, Denny Lanning. To rule with me in Gyronchi!"

Lanning's hands gripped the rail until his knuckles cracked. His heart was pounding, and he drew a long shuddering breath.

"Why?" His voice rapped harsh and cold. "Of all men, why have you come for me?"

The shell drifted closer, and Sorainya smiled.

"I have searched all Space and Time for you, Denny Lanning. For we are the twain of destiny! Fate has given us the keys to power. Together on the golden throne of Gyronchi, we can never fail. Come!"

Lanning caught a sobbing breath.

"All right, beautiful," he gasped. "I don't know the game. But—you're on!"

HE CLIMBED upon the rail, in the moonlight, and reached out his hand to take Sorainya's.

"Denny—wait!" an urgent voice spoke beside him.

Lanning drew back instinctively, and turned. A ghostly figure in her straight white robe, Lethonee was standing by the rail, holding the prismatic fire of that colossal jewel between her hands. Her face was drawn, desperate.

"Remember, Denny!" her warning rang electric. "Sorainya seeks to destroy you!"

Sorainya stood stark upright upon the shell, her tense, defiant body splendid in the scarlet armor. Slitted, her greenish eyes flamed with tigerish fury. Strong teeth flashed white in a snarl of hate. She hissed an unfamiliar word, and spat at Lethonee.

An Lethonee trembled, and caught a sobbing breath. Her face had drained to a deadly white, and her violet eyes were flaming. One word rang hard from her lips: "Go!"

But Sorainya turned to Lanning again, and a dazzling smile flashed across the blackness of her hate. Her long, bare arms opened again their white invitation.

"Come with me, Denny," she whispered. "And let that lying ghost go back to her dead city of dream!"

Lethonee bit her pale lip, as if to control her wrath.

"Look, Denny," she warned, "where Sorainya would have you leap!"

She pointed down at the black tropic sea. And Lanning saw there the glittering phosphorescent trail that followed a shark's swift fin. The shock of cold dread had chilled him, and he climbed stiffly back from the rail.

For he had touched—or tried to touch—Sorainya's extended hand. And he had felt *nothing at all.*

Shuddering, he looked at the slim, white girl by the rail. He saw the gleam of tears in her eyes, and the pain that ran like a burning river beneath the proud composure of her face.

"Forgive me, Lethonee!" he whispered. "I am sorry—very sorry!"

Her voice was small, stricken: "But you were going, Denny! Going—to *her!*"

The golden shell had floated against the rail. A warrior-queen, regal, erect, Sorainya stood buckling on the golden sword. Her long, green eyes flamed balefully.

"Denny Lanning," the bugle of her voice pealed cold, "it is written on the tablets of Time that we must be enemies, or—one! And Gyronchi, defended by my *kothrin*—by Glarath and the *gyrane*—has no fear of you. But Jonbar is defenseless. Remember!"

One sturdy foot, scarlet-buskined, touched something at the rim of the yellow shell. And instantly, like a projected image from a screen, she was gone.

Lanning turned slowly toward Lethonee. Her face, beneath the band of blue that held her red-glinting hair, was still white and stiff with tragedy.

"Please," he whispered. "Forgive me."

No smile lit her solemn face.

"Sorainya is beautiful," her voice came small and flat. "But if you ever yield to her, Denny, it is the end of Jonbar—and me!"

Lanning shook his head, dazed with a cold bewilderment.

"But why?" he demanded. "I don't understand."

THE WIDE, VIOLET eyes of Lethonee looked at him for a long time. Once her lip stiffened, quivered, as if she were about to cry. But her voice, when at last she spoke, was grave and quiet.

"I'll try to tell you, Denny." Her face was illumined like a shrine by the shimmer of the jewel in her hands. "The World is a long corridor, from the Beginning of existence to the End. Events

are groups in a sculptured frieze that runs endlessly along the walls. And Time is a lantern carried steadily through the hall, to illuminate the groups one by one. It is the light of awareness, the subjective reality of consciousness.

"Again and again the corridor branches, for it is the museum of all that is possible. The bearer of the lantern may take one turning, or another. And so, many halls that might have been illuminated with reality are left forever in the darkness.

"My world of Jonbar is one such possible way. It leads through splendid halls, bright vistas that have no limit. Gyronchi is another. But it is a barren track, through narrowing, ugly passages, that comes to a dead and useless end."

The wide solemn eyes of Lethonee looked at him, over the slumberous flame of the jewel. Lanning tensed and caught his breath, as if a light, cold hand, from nowhere, had touched his shoulder.

"And you, Denny Lanning," came the silver rhythmic voice, "are destined, for a little time, to carry the lantern. And—*yours is the choice of reality.*

"Neither I nor Sorainya can come to you, bodily—unless perhaps at the moment of your death. But, through a partial mastery of Time, we can each *call* to you, to carry the lamp into our different halls. Denny——"

The silver voice caught with emotion.

"Denny, think well before you choose! For your choice will bring life to one possible world. And it will leave another in the darkness, never to be born."

A choking lump had risen in Lanning's throat. He looked at Lethonee, her slim white beauty shining pure and innocent in the jewel's clear light.

"There can be no choice—not now!" he whispered huskily. "Because I love you, Lethonee. Just tell me what I must do, to settle the thing. And if—if I can ever come to you."

Her fine head shook, in the blue halo.

"The time has not come for you to choose, Denny," she said slowly. "And the event is vague and ambiguous in the mist of possibility."

Lanning moved closer to her, and tried again to touch her arm—in vain.

"Just remember me, Denny, and what I have told you. For Sorainya still has her beauty, and black Glarath the *gyrane's* power. Beware of Gyronchi! And the hour will come."

Her eyes dropped to the jewel, and her fingers caressed its bright facets. Splintering diamond lances burst from it, and swallowed her in fire. She was gone.

Shaken with a curious weakness, suddenly aware of complete exhaustion, Lanning caught the rail. His eyes fell to the water, and he saw the glitter of the shark's black fin, still cruising after the ship.

III.

HIS LIFE was a dusky corridor, and the present a lamp that he carried along it. Dennis Lanning didn't forget Lethonee's figure of speech. And eagerly he looked forward to discovering her again, at some dark turning. But he walked down the hall of years, and looked in vain.

Nor could he forget Sorainya. Despite revulsion from a ruthless evil he had sensed in her, despite Lethonee's warning, he found himself sometimes dreaming of the warrior-queen in the splendor of her crimson mail. Found himself even dwelling upon the mysterious menace of Gyronchi, an eagerness mingled with his dread.

The hall he walked was a corridor of war. An old hatred of injustice made him forever a grim champion against the Right of Might. War correspondent, then flying instructor, pilot, and military adviser, he served on four continents.

He fought with pen as well as battle

plane. Once, waiting for Viennese doctors to persuade an obscure African amoeba to abandon his digestive tract, he wrote a utopian novel, *The Road of Dawn,* to picture the world that ought to be.

Again, in the military prison of a dictator whose war-preparations he had exposed, he wrote an historical autobiography—the latest style among journalists—in which he tried to show that the world was nearing a decisive conflict between democratic civilization and despotic absolutism.

His scathing foreign dispatches, laying bare oppression and imperialistic aggression, closed to him the frontiers of several nations.

In all those years, he had no glimpse of Lethonee. But once, on the field with the native army in Ethiopia, he woke in his tent to hear her grave warning voice still ringing in his ears: "Denny, get up and leave your tent!"

He dressed hastily, and walked out through the camp in the thin, bitter wind of dawn. The tent, a few minutes later, was struck by an Italian bomb.

But Sorainya came to him, again.

It was a night in Madrid—the next year—where he had gone to join the Loyalist defense. He was sitting alone beside a little table in his hotel room, cleaning and loading his automatic. A queer little shudder passed over him, grimly reminiscent of the malaria he had contracted in the Chaco, covering the Jungle War. He looked up—and saw that long, shallow shell of yellow metal floating above the carpet.

Sorainya, in the same burnished, scarlet mail—and looking as if it had been five minutes since he had last seen her, instead of nine years—was lounging voluptuously on her silken cushions. A bare arm flung back the golden wealth of her hair, and her greenish eyes smiled up at him with a taunting insolence.

"Well, Denny Lanning." Her voice was a husky, lingering drawl, and her long eyes studied him with a bold curiosity. "The ghost of Jonbar has guided you safely through the years. But has she brought you happiness?"

Lanning had grown rigid in his chair. He flushed, swallowed. The sudden white dazzle of her smile caught his breath.

"I am still the mistress of Gyronchi," came the lazy caress of her voice. "And still the keys of fate are in our hands—if we but choose to turn them."

Her white and indolent arm indicated a space on the silken couch beside her.

"I have come again, Denny, to take you back with me to the throne of Gyronchi. I can give you half a mighty empire—myself, and all of it! Will you go, Denny?"

LANNING tried to control his breath. "Don't forget, Sorainya," he said, in a dead flat tone, "I saw the shark."

She tossed back her head, and her hair fell like a yellow torrent across the colored cushions. And the white lure of her smile set a pain to throbbing in his throat.

"The shark would have killed you, Denny. But death alone can bring you to me—and to the strong new life the *gyrane* gives! For our lives were cast far apart in the Stream of Time. And not all the power of the *gyrane* can lift you out of the time-stream, living—for then the whole current must be deflected. But the stream has small grasp upon a few dead pounds of clay. I could carry *that* to Glarath, to be restored by the *gyrane.*"

She came with a gliding, pantherine movement to her knees on the cushions. Both hands pushed the flowing gold of her hair behind her red-mailed shoulders. And her bare arms reached out, in wide invitation.

"Denny, will you come with me tonight?" urged the golden voice. "The way is in your hand."

Trembling, hot with desire, Lanning looked down at his hands. The automatic had slipped in his unconscious fingers, until its muzzle was pointed at his heart. His finger was near the trigger. One little pressure—it would be so like an accident.

Her indolent voice was seductive music: "Gyronchi is waiting for us, Denny. A world to rule——"

The white and gold and crimson of her beauty was a stabbing pain in his heart. His pulse was hammering. His finger curled around the cool steel of the trigger.

But sanity remained in one corner of his mind, and out of it spoke a voice like the quiet voice of Lethonee: "Remember, Denny Lanning! You are carrying a light for the world to come."

Carefully, he made his quivering fingers snap on the safety. He laid the gun down beside him on the little table. His voice a breathless rasp, he said, "No soap, Sorainya!"

The green eyes glittered, and her red lips snarled with rage. She flashed upright.

"I warned you, Denny Lanning!" All the indolence gone, her voice crackled brittle and sharp. "Take the side of that phantom of Jonbar, and you shall perish with her. I sought your strength. But Gyronchi can win without it."

With a tigerish savagery, she whipped out the long golden needle of her sword.

"When we meet again, it shall be at war. Guard yourself!"

A savage foot stamped down, and she was gone.

THOSE TWO antagonistic women set many a problem that Lanning could not solve. If they were actual visitors from conflicting possible worlds of futurity, he had no evidence of it save his own tortured memory. Many a weary night, pondering the haunting riddle, he wondered if he were going insane.

But a package that presently came to him in Spain contained another thin little book from Wilmot McLan, now the holder of many degrees and professor of astrophysics at a small western university. Inscribed, "To Denny, from Wil—another stitch in Time, to repair my last." The volume was entitled *Probability and Determination.*

One underlined introductory paragraph Lanning searched desperately for a relevant meaning:

> "The future has been held to be as real as the past, no more different from it than right is from left, the only directional indicator being k; the constant correlating entropy and probability. But the new quantum mechanics, destroying the absolute function of cause and effect, must likewise annihilate that contention. There is no determination in small scale events; consequently the 'certainties' of the macroscopic world are at best merely statistical. And probability, in the unfolding future, must be substituted for determination. The elementary particles of the old physics—electrons, photons, etc.—may be retained, located probably in a continuum of five dimensions. But any consideration of this hyper-space-time continuum must take note of a conflicting infinitude of possible worlds, only one of which, at the intersection of their geodesics with the advancing plane of the present, can claim reality. It is this new outlook of which we attempt a mathematical examination."

Conflicting—possible worlds!

Those words haunted Lanning. Here, at last, was light. Here, in his old friend, was a possible confidant—the one man who might understand, who might tell him whether Lethonee and Sorainya were miraculous visitors out of Time, or —insanity.

At once he wrote McLan, outlining his story and requesting an opinion. Delayed, doubtless, by the military censors, the letter at last came back from America, stamped *Removed—Left no Address.* An inquiry to the University authorities informed him that McLan had resigned to undertake private re-

search, and that his whereabouts were unknown.

And Lanning groped his way along, through the dark hall of wars and years, to 1938. Lao Meng Shan's cable found him at Lausanne, recuperating from the war in Spain, the splinter of a shell still aching in his knee. He was writing another book.

Turned philosopher, he was trying to analyze the trends of the world, to pick out the influences of good and evil. The resolution of those conflicting forces, so he believed, would either establish the new technological civilization—or hurl the race into martial doom.

"Denny, American friend," the cable ran, "humanity needs you. Will fly for China?"

Direct action had been the only anodyne for Lanning's tortured mind. And the newspapers, that day, stirred his blood with accounts of hundreds of women and children killed by ruthless aerial bombardment. Ignoring the stiffening pain in his knee, he abandoned the ancient problem of good and evil, flew to Cairo, and caught a fast steamer east.

IV.

WINGED DOOM was awhisper in the sky. Sirens moaned warning of the *pei chee*—"flying engines". Hapless Hankow had been swiftly darkened, but already yellow bursts of ruin and death had flared above in the north and eastward along the river docks, where the first bombs fell.

Stop the raiders! was the frantic, hopeless order.

Limping in his game left leg, where bits of steel still made an excellent barometer of impending weather, Lanning stumbled across the field to the battered, antiquated American plane that jabbering mechanics had roaring in the line. The cool of midnight cleared the sleep from his head, and he shuddered to the drumming in the sky.

Lao Meng Shan, now his observer, was already beside the machine, dolefully shaking his watch. Solemnly, in habitual careful English, he shouted above roaring motors: "Our orders, tonight, are over-confident. For my watch stopped when the first bomb struck. That is a very bad omen."

Lanning never laughed at superstition—few fliers do. But his lean face smiled in the darkness.

"Once, Shan," he shouted in reply, "an ancient warrior named Joshua stopped the sun until his battle was won. Maybe that's the omen. Let's go!"

Adjusting his helmet, the Chinese shrugged.

"I think it means that time is stopped for us. If it is written, however, that we must die for China——"

He clambered deliberately into the rear cockpit.

Lanning tried the controls, signaled the ground crew, and gunned the motor. The machine lifted toward the thrumming in the sky. The fact that most of the defending aircraft had been bombed into the ground on the day before, he thought grimly, was a more conclusive omen than the watch.

Darkness was a blanket on the city northward, hiding cowering millions. Troop lorries and fire trucks shrieked through the streets. Anti-aircraft batteries were hammering vainly. Probing searchlights flared against the white puffs of exploding shells, uselessly seeking the raiders.

Spiraling for altitude, Lanning narrowed gray eyes to search a thin cloud-wisp above. He winced to a yellow flare beneath. For his mind could see the toppling wreckage of a splendid modern city ruined, hear shrieks and groans and wailing cries for aid, even smell the sharp odor of searing human flesh. His body tensed, and he fired a warming burst from twin guns.

The wraith of frozen mist was at last beside them. It burned white, abruptly, in the glare of a searchlight. And a dark bomber dropped out of it, swaying between the gray mushrooms of shells.

Lanning tipped the ancient plane after it, into a power dive. Shan, open-mouthed, yelling, waved cheerfully. Their machine guns clattered. The bomber swerved, and defending guns flickered red. But Lanning held his sights on it, grimly. Black smoke erupted from it suddenly, and it toppled downward.

One——

HE WAS pulling up the battered ship —gingerly—when a roving searchlight caught them, held them for a fatal moment. Black, ominous holes peppered the wings. Glass shattered from the instruments before him. A sudden numbness paralyzed his shoulder.

The betraying light had passed. But gasoline reeked in his nostrils, and a quick banner of yellow flame rippled backward. Twisting in the cockpit, he saw behind them the second enemy, diving out of the cloud still firing.

And he saw the dark blood that stained Shan's drawn face.

They were done for. But Shan grinned stiffly, raised a crimson hand to gesture. Lanning flung the creaking ship through a reckless Immelmann turn. The attacker was caught dead ahead, still firing.

A red sledge of agony smashed all feeling from Lanning's right leg. But he held straight for the other ship, guns hammering. It dived. With flaming gasoline a roaring curtain beside him, Lanning clung grimly to its tail. The tiny puppets of its crew jerked and slumped. Then it, too, began to burn.

Two——!

Explosion buffeted Lanning's head, deafening. Metal fragments seared past. Hot oil spattered his seared face. The motor ceased to run, and a new torturing tongue of yellow licked back.

Strangling, Lanning sideslipped, so that the wind stream would carry away the heat and suffocating fumes. He looked back at Shan. The crimson face of the little Oriental was now a dreadful mask. With a queer, solemn little grin, he held up something in a dripping hand—his watch.

A cold shudder went down Lanning's spine. He had never laughed at superstition. And there was something terrible, now, in this hint that something could perceive the future.

Then stark incredulity froze Shan's grin, and he pointed stiffly. Lanning's eyes followed the crimson-streaming arm. And a cold hand stopped his heart. For something was flashing down beside them.

Something—*incredible.*

It was a queer-looking ship—or the gray, shining ghost of a ship. It was wingless, flat-decked—like no ship the sky had ever seen. Its bright hull suggested that of a small submarine, save that its ends terminated abruptly with two massive disks of metal, which now shone greenishly.

A singular crew lined the rail, along the open deck. At first they seemed spectral and, like the ship, unreal. Several were strange in odd, trim tunics of silver-gray and green. But there were a few in familiar military uniforms—a French colonel—an Austrian lieutenant and a tall, lank captain of the Royal Air Force.

Lanning's mouth fell open, and a sudden agony of joy wrenched his sick body. *For he saw Barry Halloran!*

Unchanged since that fatal April day of ten years ago, even wearing the same baggy cords and football sweater, the gigantic tackle stood among the rest! He saw Lanning, and grinned, and waved an eager greeting.

The phantom craft swept closer, dropping with the burning plane.

Lanning's pain was drowned in wonderment, and he ceased to breathe. He saw a thin, white-haired man—a figure puzzlingly familiar—busy beneath the small, crystal dome that capped a round metal turret, amidships. A crystal gun thrust out of the turret. A broad blinding-yellow ray funneled suddenly from it and caught at the plane.

LANNING felt a momentary wrenching pull. The plane and his body resisted that surge of mysterious force. Red mighty hands of agony twisted his hurt body, squeezed intolerably. Then something yielded. And the spectral ship was suddenly real, approaching.

Yellow flame wrapped Lanning again, for his fingers had slipped useless from the stick. He coughed, strangled, battled a sea of suffocating darkness. Searing torture bathed him. Then he was being drawn over the rail of the stranger, out of the furnace.

The ghost ship seemed real now. Quick, tender hands were laying them on stretchers. But Lanning was staring up at big, red-headed Barry Halloran, magically unchanged by ten years of time.

"Sure, old man, it's me!" boomed the once-familiar voice. "Just hold that line! These guys will fix you up as good as new—or better. And then we'll have a chin. Guess I'm way behind the times."

A spectral ship, manned with a crew of the dead! Lanning had not been superstitious—not even, in the conventional sense, religious. His faith had been a belief in the high destiny of man. He had expected death to blot him out, individually; the race, alone, was eternal. This Stygian ship, therefore, was utterly incredible—but it looked decidedly interesting.

"Barry!" he whispered. "Glad—see you——"

A wave of shadow dimmed his eyes. Blood was welling from his aching shoulder, hot and sticky against his body. A dull throbbing came from his shattered leg. Dimly, he knew that the men in gray and green were picking up the stretcher. Awareness faded.

V.

WHEN Dennis Lanning began to be fully conscious again, it seemed that he had always been in that small, green-walled room. His old roving life, restless and haunted, seemed dreamlike, remote beyond reality—all save, somehow, the visitations of Lethonee and Sorainya.

Dimly he remembered an operating room—blinding lights and bustling men in white masks, the gleam and tinkle of instruments, Barry Halloran standing reassuringly near. Then a whiff of some strange anaesthetic.

Shan was lying in the opposite bed, quietly sleeping. And Lanning, in some forgotten interval, had met the two others in the ward. They were Silvano Cresto, Spanish ace shot down in the Moroccan war; and Willie Rand, U. S. N., missing when the ill-fated airship *Akron* was destroyed at sea.

The latter was now propped up on his pillows, inhaling through a cigarette. He grinned. "Smoke?"

"Thanks." Lanning caught the tossed white cylinder, felt a dull twinge from his bandaged shoulder. He asked, "What's up?"

Willie Rand exhaled white vapor.

"Dunno."

"What is this—ship? Where're we going?"

Rand blew a great silver ring.

"Her name's the *Chronion*. Cap'n Wil McLan. We're bound, they say, for a place called Jonbar—wherever that is!"

Wonder stiffened Lanning. Wil McLan! His old roommate, the student of Time. And Jonbar! Lethonee's city,

that she had showed him, far-off in dim futurity.

"But why?" he gasped. "I don't understand!"

"Nor me. All I know, messmate, I turned loose when the wreckage of the *Akron* was rolling over on me, and tried to dive clear. Something smashed into me, and I woke up on this bed. That was maybe a week ago——"

"A week!" muttered Lanning. "But the *Akron*—that was back in 'thirty-three!"

Rand lit another cigarette from the first.

"Time don't make no difference here. The last man on your bed was the Austrian, Erich von Arneth. He came from the Isonzo front, in 1915. The one in the Chink's bed was the Frenchman, Jean Querard. He was blown up in the defense of Paris, in 1940."

"Forty!" whispered Lanning, softly. Was to-morrow, then, already real? Lethonee? And Sorainya?

A brisk man in gray and green hastened into the ward, gently removed their cigarettes and replaced them with odd-looking thermometers. Lanning took the instrument out of his mouth.

"Where's Barry?" he demanded. "I want to see Barry Halloran. And Wil McLan."

"Not now, sir." The rhythmic accent was curiously familiar—it was like Lethonee's! "It's time for your last *dynat* intravenous. You'll be able to get up when you wake. Now just lie back, sir, and give me your arm."

He put back the thermometer. Another man rolled in a wheeled instrument table. Deft hands bared and swabbed Lanning's arm. He felt the sting of a hypodermic. And quiet sleep came over him.

When at last he woke, it was to a new, delicious sense of health and fitness. The bandages were gone. His shoulder, his shattered leg, felt well and whole again. Even the steel no longer ached in his knee.

Shan, he saw, was gone from the opposite bed. In it lay a big man, swathed in bandages, regarding him with dark, stolid Slavish eyes. A silent orderly came in, thrust a dozen little glowing needles into the Russian's bandages, and laid Lanning's old uniform, cleaned and neatly repaired, beside his bed.

"Boris Barinin," he gave brisk information. "Soviet rocket-flier. We picked him up near the pole in 1942. Smashed, starved, frozen. The *dynat* repair-hormone activators will take him through, however. You may go above, sir."

LANNING put on the uniform, elated with his new sense of well-being, and eagerly mounted a companion to the deck of the *Chronion*. It was seventy feet long, between the polished faces of the great metal disks, broken only with the domed turret amidships. Some mechanism throbbed softly below.

The ship must be moving. But where?

Looking about for a glimpse of the sun, or any landmark, Lanning could see only a curiously flickering blue haze. He went to the rail, peered down. Still there was nothing. The *Chronion* hung in a featureless, blue abysm.

The flicker in the azure mist was oddly disturbing. Sometimes, he thought, he could almost see the outline of some far mountain, the glint of waves, the shapes of trees or buildings—incongruous, impressions, queerly flat. Two-dimensional things piled one upon another. It was like a movie screen, he thought, upon which the frames were being thrown a thousand times too fast, so that the projected image became a dancing blur.

"Denny, old man!"

It was a glad shout, and Barry Halloran came to him with an eager step. Lanning gripped his hand, seized his

big shoulder. It was good to feel its hard young power, to see the reckless freckled grin.

"You're looking fit, Barry. Not a day older!"

The blue eyes were wide with awe.

"Funny business, Denny. It's ten days since they picked me up, trying to swim away from that smashed crate in the Charles, with both legs broken. But—you've lived ten years!"

Lanning shook his fine-chiseled head, bewildered.

"What's ahead of us, Barry? What's it all about?"

The big tackle scratched the unkempt tangle of his red hair.

"No savvy, Denny. Wil has promised us a scrap, all right. And it's to save this place they call Jonbar. But what the odds are, or who we're going to fight, or how come—I don't know."

"I'm going to find out," Lanning said. "Or try. Where's Wil McLan?"

"He's on his bridge. I'll show you the way."

They met four men in the gray and green, just coming on the deck carrying two rolled stretchers. Following them was the little group of fighting men in their various uniforms. Lao Meng Shan grinned happily to see Lanning, and presented the rest.

They were the Spaniard, Cresto; Willie Rand; the lank British flier, Courtney-Pharr; hard-faced Erich von Arneth; dapper little Jean Querard; and Emil Schorn, a blue-eyed herculean Prussian, who had been taken from a burning Zeppelin in 1917.

"Where we go?" Cresto shrugged, white teeth flashing through his swarthy grin. *"Quién sabe?* Anyhow, *amigos,* this is better than hell! *Verdád?"* He laughed.

"We are fighting men," rumbled Emil Schorn, grimly smiling. "We go to fight. *Ach, 's ist genug!"*

"Quite a gang, eh?" Barry Halloran led Lanning on, to a small metal door in the turret. Inside, another man in gray and green waited alertly behind a bulky thing like a cannon with a barrel of glass. "You'll find Wil up under the dome."

Lanning climbed metal steps. Standing behind a bright wheel, under the flawless shell of crystal, he came upon a slight, strange little man—or the shattered wreck of a man. His breath sucked in to the shock of sympathetic pain. For the stranger was hideous with the manifold print of unspeakable agony.

THE HANDS—restlessly fumbling with an odd little tube of bright-worn silver that hung by a thin chain about his neck—were yellow, bloodless claws, trembling, twisted with pain. The whole thin body was grotesquely stooped and gnarled, as if every bone had been broken on a torture wheel.

But it was the haggard, livid face, cross-hatched with a white net of ridged scars that chilled Lanning with its horror. Beneath a tangled abundance of loose white hair, that face was a stiff, pain-graven mask, terrible to see. Dark, deep-sunken, the eyes were somber wells of agony—and of a deathless, brooding hatred.

Strangely, those dreadful orbs lit with recognition.

"Denny!" It was an eager whisper, but queerly dry and voiceless.

The little man limped quickly to meet him, thrust out a trembling hand that was thin and twisted and broken, hideous with a web of scars. His breath was a swift, whistling gasp.

Lanning tried to put down the wondering dread that shook him. He took that frail dry claw of a hand, and tried to smile.

"Wil?" he whispered. "You are Wil McLan?"

He choked back the other, fearful question: *What frightful thing has happened to you, Wil?*

"Yes, Denny," hissed that voiceless voice. "But—I've lived forty years more than you have. And ten of them in Sorainya's torture vault." Lanning started to that name. And the old man stiffened as he spoke it, and something flared in his hollow eyes—the baleful fire of hate, Lanning thought it was, that kept his shattered body alive.

"I'm an old man, Denny," the dry rasping ran on. "I was fifty-three when the *Chronion* was launched on the time-stream, in 1960. The ten years in Gyronchi——" The seamed face went white, the whisper sank. "They were a thousand! And the last four years, in Jonbar, I've been preparing for our campaign."

His gnarled body came erect with a tense and desperate energy. A grim light flamed in his sunken eyes.

"An old man!" he husked again. "But not too old to fight Gyronchi! The *dynat* has given me life enough for that."

A sudden eager hope had risen in Lanning, above his wonder and dread.

"Jonbar?" he cried. "Then—then have you seen a girl named Lethonee?"

Desperately, he searched that scarred and tortured face. A painful pulse was throbbing in his throat. The tension of his hope was agony. Was it possible—possible that that "gulf more terrible than death" could now be crossed?

The old man nodded, slowly. The stern strength of hate seemed to ebb out of him, and the bleak grimness of his face was lit with a stiff little smile.

"Yes, Denny," his whisper came softly. "Indeed I know Lethonee. It is she who set me free from the dungeons of Sorainya. It is for her, and her people, that we must fight—or Gyronchi will obliterate them."

Lanning caught his breath. Trembling, his fingers touched Wil McLan's twisted, emaciated shoulder.

"Tell me, Wil," he begged. "This is all a riddle—a crazy, horrible riddle. Where is Jonbar? Can I go to Lethonee, help her? And, Sorainya——" Dread choked him, "What—what did she do to you?"

"I'll tell you, Denny—presently."

McLan's hollow eyes flashed to the dials of a bewildering instrument board. Moving with a swift precision that amazed Lanning, his gnarled fingers touched a series of levers and keys, spun a polished wheel. He whispered some order into a tube, peered ahead through the crystal dome. An alert, surprising strength moved his shattered frame.

"Presently," his hoarse whisper came aside to Lanning. "As soon as this task is done. Watch, if you like."

STANDING wonderingly behind him, Lanning stared out through the crystalline curve of the dome. The blue, enveloping haze flickered more violently. Bent over a creeping dial, McLan tapped a key. And the blue was gone.

The *Chronion* was flying low, over a gray, wave-tossed sea. It was late of a gloomy afternoon, and thick mists veiled the horizon. The little craft shuddered, abruptly, to the crash of mighty guns.

Lanning looked questioningly at Wil McLan. A twisted arm pointed, silently. And Lanning saw the long, gray shapes of battle-cruisers loom suddenly out of the haze, rocking as they erupted smoke and flame.

McLan tapped the keyboard beyond the wheel, and the *Chronion* slipped forward again. The turret revolved beneath them, and the crystal gun thrust out. Below, the stretcher crews moved alertly to the rail.

Peering through the fog of battle at the reeling ships, Lanning distinguished the Union Jack, and then, on another vessel, the German imperial standard. Suddenly, breathless with incredulous

awe, he fitted this chaotic scene into his knowledge of naval history.

"The *Defense* and the *Warrior!*" he gasped. "Attacking the *Weisbaden!* Is this—Jutland?"

Wil McLan glanced down at the dial.

"Yes. This is May 31, 1916. We await the sinking of the *Defense.*"

Through the haze of acrid smoke, the *Chronion* slipped nearer the attacking British vessels. Suddenly, then, the German cruiser fleet loomed out of the mist, seeking with a hurricane of fire to cover the stricken *Weisbaden.* Two terrific salvoes rocked the doomed flagship *Defense,* and it was lost in a sheet of flame.

The intermingled battle-cruisers of both fleets were still plunging through the clouds of battle, great guns thunderously belching smoke and death, as Wil McLan brought the *Chronion* down where the *Defense* had vanished. Shattered wreckage littered the sea, rushing into a great whirlpool where the flagship had sunk.

A long helix burned incandescent in the crystal gun, and a broad yellow ray poured out into the drifting smoke. His sweater stripped off, Barry Halloran leapt overboard, carrying a rope. He was dragged back, through the ray, towing a limp survivor. Dripping blood and brine, the rescued sailor was laid on a stretcher, rushed below.

Courtney-Pharr was poised to dive, when the steel prow of the disabled *Warspite* plunged suddenly out of the blinding smoke. He stumbled fearfully back. Lanning caught his breath. It had run them down!

But Wil McLan tapped a key, spun the shining wheel. Green radiance lit the great terminal disks. And the battling fleets were swept away into blue, flickering twilight. The broken old man sighed with weary relief, and rubbed tiny beads of sweat from his scarred forehead.

"Well, Denny," he whispered. "One more man to fight for Jonbar."

"Now!" demanded Lanning, breathless. "Can you explain?"

VI.

LEANING against the bright rim of his wheel, Wil McLan pushed back the snow-white shock of his hair. Then, as if arranging his thoughts, he began fingering with twisted broken hands the white scars that seamed his face, and the pendant silver tube.

"Please forgive my lack of a voice, Denny," his hoarse whisper came at last. "But once in the dungeon, when I had had nothing to drink for a week but the blood of a rat, and was delirious and screaming with thirst, Sorainya had molten metal poured down by throat. And not even the *dynat* can grow new vocal cords. She'll pay for that!"

Hate had flared in the sunken eyes again, and drawn the gnarled body to a taut rigidity. But the old man seemed to make an effort to compose himself. He unclenched his hands, and his twisted face tried to smile. He spoke more deliberately. "Time was always a challenge to me. When science lived in a simple continuum of four dimensions, with Time the fourth, its conquest appeared relatively simple—through some application, perhaps, of the classical Newtonian dynamics.

"But Max Planck with the quantum theory, de Broglie and Schroedinger with the wave mechanics, Heisenberg with matrix mechanics, enormously complicated the structure of the universe—and with it the problem of Time.

"With the substitution of waves of probability for concrete particles, the world lines of objects are no longer the fixed and simple paths they once were.

Geodesics have an infinite proliferation of possible branches, at the whim of subatomic indeterminism.

"Still, of course, in large masses the statistical results of the new physics are not much different from those given by the classical laws. But there is a fundamental difference. The apparent reality of the universe is the same—but it rests upon a quicksand of possible change.

"Certainty is abolished.

"Let a man stand on a concrete floor. It is no longer certain that he will not fall through it. For he is sustained only by the continual reaction of atomic forces, and they are governed by probability alone.

"It is merely a very excellent statistical probability that keeps the man from radiating heat until his body is frozen solid, or absorbing it until he bursts into flame. From flying upward into space in defiance of Newton's laws, or dissolving into a cloud of molecular particles.

"Mere probability is all that is left. And my first actual invention was a geodesic tracer, designed for its analysis. It was a semi-mathematical instrument, essentially a refinement of the old harmonic analyzer. Tracing the possible world-lines of material particles through Time, it opened a window to futurity."

The hoarse whisper paused, and old Wil McLan limped to the side of the dome. His scarred, trembling hands lifted a black velvet cover from a rectangular block of some clear crystal mounted on the top of a metal cabinet.

"Here is the *chronoscope,*" he said. "The latest development of the instrument. Scansion depends upon a special curved field, through which a subetheric radiation is bent into the time-axis, projected forward, and reflected from electronic fields back to the instrument. A stereoscopic image is obtained within the crystal screen, through selective fluorescence to the beat frequencies of the interfering carrier waves projected at right angles from below. But I'll show you Gyronchi."

THE OLD MAN snapped a switch, manipulated dials at the end of the crystal block. It lit with a cloudy green. The green cleared, and a low cry escaped Lanning's lips.

For, microscopically clear within the crystal, he saw a miniature world. A broad, silver river cut a fertile green plain dotted with villages. Beyond the river rose two hills.

One was crowned with a tremendous castellated citadel. Its frowning walls and mighty towers were gleaming red metal. Above them flowed banners of yellow and crimson and black. A massive gate opened in the foot of the hill, as he watched, and an armored troop poured out.

"Watch the marchers," rasped McLan.

Lanning bent closer to the crystal block. Suddenly it seemed that he was looking through a window, into an actual world. He found the soldiers again, and uttered a muffled cry.

"They aren't men!" he gasped. "They're—insects!"

"They are ants," came the whisper of McLan, "hypertrophied mutations produced by the *gyrane.* They are the *kothrin,* Sorainya's savage horde. That is her castle on the hill, where she—held me. But look at the other hill."

Lanning found it, topped with a temple of ebon black. The building was vast, but squat and low, faced with endless colonnades of thick, square columns. From the center of it rose a beam of *blackness,* of darkness thick and tangible, that widened into the sky like the angry funnel of a vast, symmetrical tornado.

"The temple of the *gyrane,*" husked Wil McLan, "where Glarath rules." He

was adjusting the dials again. "But watch!"

A village of flimsy huts swam closer. The marching column of gigantic, upright ants was swiftly surrounding it, driving the villagers—a fair-skinned, sturdy-looking folk, although ragged and starved—before them from the fields.

"This happened while I was in prison," the old man rasped. "The offense of the people was that they had not paid their taxes to Sorainya and their tithes to the *gyrane*. And they had no grain to pay them, because Sorainya and her lords—hunting a convict for sport—had trampled and destroyed the fields."

Armed with heavy golden axes and short thick guns of crimson metal, as well as with frightful mandibles, the six-limbed force made a terrible ring about the frightened village. And now an armored tanklike vehicle came down from the red citadel, and through the line of ants. A hot white beam flickered out of it, and miserable buildings exploded into flame. The wind carried a wall of fire across the village.

A slim human figure, in black-plumed scarlet armor, sprang from the tank to join the great black ants. A thin yellow sword played swiftly, cutting down the men and women and children that fled from the merciless flames.

The slaughter soon was done. That figure turned away from the smoking desolation, flung up the crimsoned sword in triumph, slipped back the helmet. A flood of yellow hair fell across the scarlet mail.

Lanning's breath sucked in, and a bright pain pierced his heart.

"Why, that—" he gasped, "that's—Sorainya!"

"Yes, Sorainya," whispered Wil McLan. "The warrior-queen of Gyronchi."

HE SNAPPED a switch, and that grim scene dissolved in the pellucid transparency of the crystal block. His hollow eyes lifted slowly to Lanning, and in them was rekindled the slumberous flame of hate. His gnarled hands knotted and relaxed, and lifted once more to fondle the little, worn, bright cylinder of silver that hung from his throat.

"It happened," the hoarse voiceless gasp went on, "that Gyronchi was the first future world, out of all those possible, that the *chronoscope* revealed. And I saw Sorainya, splendid in her armor, flying on the back of a gigantic winged ant.

"You have seen that she is—well—attractive. And at first, the range of the instrument was limited to her youth, where scenes of—barbarity are less frequent. Remember, Denny, I was thirty years younger when I first saw her, in 1945. Her glorious beauty, the military pomp of her empire—they seemed very foreign to my old scholar's life. But I—" the old man gulped, "I— loved her.

"Neglecting other possible worlds that I might have explored, I followed her, for months—years. I didn't know, then, the fatal change the temporal ray was causing." His white head bowed. For a moment he was speechless. "But no process whatever can reveal the state of an electron *without changing that state*—a consequence of indeterminism. Even the sub-quanta of my scanning ray were absorbed by the atoms that reflected them. The result was an increase in the probability factor of Gyronchi—that is the root of all the tragedy."

The scarred face made a grimace of pain.

"The blame is mine. For—before I was aware of it—the absorption had lessened the probability of all other possible worlds, so that Gyronchi was the only one the limited power of my instrument could reach. And that blinded me to the crime that I was doing.

"I hope you can understand my passion for Sorainya."

Lanning's hoarse and breathless whisper was an echo of his own: "I can."

The sunken eyes flamed again, and McLan fondled the silver tube.

"I watched her, with the *chronoscope,*" the rasping words ran on. "Sometimes I was driven to despair by her remoteness in Time and probability—and sometimes to desperate effort. For I resolved to conquer Time, and go to Gyronchi.

"In 1952, after seven years of effort, I was able to communicate. By increasing the power and focal definition of the sub-etheric temporal radiation, I was able to project a speaking image of myself to Sorainya's fortress."

Agony stiffened McLan's scarred face. His lean jaw set. His breath came in rasping gusts, and it was half a minute before he could speak again.

"And so I made suit to Sorainya. At first she seemed puzzled and alarmed. But, after I had made several bodiless visits to her apartments, her attitude changed suddenly. Perhaps she had got advice from Glarath!"

His clenched hands cracked.

"She smiled," the old man rasped. "She welcomed me and asked me to return. And she began to ask about my discoveries—saying that perhaps the priests of the *gyrane,* being themselves able scientists, could solve my remaining problems. If I could come to Gyronchi, she promised, I might share her throne."

Lanning bit his lip and caught a gasping breath. Memory of Sorainya's visits mocked him. But he did not interrupt.

"A mistrust of the priests, fortunately," McLan went on, "kept me from divulging very much. But Sorainya's bland encouragements, her lying smiles, redoubled my frantic efforts.

"THERE IS a terrific resistance to the displacement of any body in time. For the geodesics are anchored in the future, as well as in the past. The removal of a living person—which might warp all futurity—is impossible. And even to dislodge inert matter requires tremendous power.

"Nothing less than atomic energy, I soon perceived, could even begin to overcome that resistance. I set out, therefore, with the searching ray of the *chronoscope,* to discover the secret of the atom from future science. And there I met a curious difficulty.

"For the instrument—which, after all, can only analyze probabilities—sometimes queerly blurred the fine detail of script or printing. I studied the works of many future scientists—of John Barr and Ivor Gyros and many more. But essential words always faded.

"There is a law of sequence and progression, I found at last, operating along the fifth, rather than the temporal dimension, which imposes inexorable limits. It is that progression which actually creates reality out of possibility. And it is that higher law which prohibits all the trite absurdities met with in the old speculation about travel in Time, such as the chronic adventurer who returns to kill himself or his grandfather. The old logic of cause and effect is by no means abolished, but merely elevated to a higher dimension.

"The principle of the atomic energy-converter came at last only through independent research based on various scraps of knowledge. I built the first successful working model in 1958. It developed eight thousand horsepower—and I could carry it in one hand! But listen."

He paused, leaned his haggard, scarred head to hear the soft thrumming that pulsed up through the deck. His hollow eyes shone with a weary triumph.

"There you hear the power of three

hundred Niagaras, fed from the merest trickle of water. For each gram of matter converted yields 900 quintillion ergs of energy—enough, if it escaped, to turn the ship into a puff of highly incandescent gas.

"The very absorption of the temporal ray, which had so troubled me, now provided a resistance against which reaction was possible. An adaptation of the special field gave me a definite moment along the time axis.

"Those two discoveries—driving power and reactive medium—made the *Chronion* possible. For two years I worked on it desperately. Designed only for travel in time—not for a fighting machine—it was finished in June, 1960.

"At once, from my lonely laboratory in the Colorado Rockies, I set out for Gyronchi." The rasping whisper fell raw-edged, bitter. "Fool, blind with passion, I hoped to reach Sorainya and share her throne!"

A spasm of agony racked the white, tortured face.

VII.

THE GASPING whisper paused. The old man limped swiftly about the dome, reading dials and gauges. His gnarled, scarred hands deftly set controls, moved the shining wheel. Aware of the soft, steady thrum of the atomic converters beneath, Lanning realized that the *Chronion* was moving again, through the blue flickering chasm. On another incredible flight through Time?

Wil McLan at last looked back to him, with hollow, haunted eyes.

"I went alone," resumed the painful rasp. "The *Chronion,* with all her millions of horsepower, could not have drawn a crew of sound men from their places in Time. Even alone, I had difficulty. An overloaded field coil burned out. The laboratory caught fire, and I was badly injured. The very accident, however, so weakened my future geodesics that the converters could pull me away. And, at the very instant the burning building collapsed, the *Cronion* broke free into the time-stream."

The dark, smouldering eyes stared away into the shimmering abyss beyond the crystal dome. The old man shuddered.

"You have seen Gyronchi, in the *chronoscope.*" The husky whisper was slow and faint. "And one look at my body can tell you enough of what reception I had from Sorainya, when at last I came to her red citadel."

The lean, white-wealed face went hard again with agony and hate. Great tears burst suddenly from the sunken eyes. The broken, bloodless claws of hands came up again, unconsciously, to the bright enigma of the tiny silver tube. Lanning looked quickly away, until the hoarse whisper went on:

"Excuse my self-pity, Denny. I shall spare you the details of Sorainya's treachery. But, the instant her smiling greeting had lured me from the deck of the *Chronion,* she commanded her warrior ants to seize me. She mocked my audacity in desiring the queen of Gyronchi, and then demanded that I surrender the secrets of the ship.

"When I refused, she threw me into the dungeons beneath her fortress, and turned the *Chronion* over to the priests of the *gyrane.*" The whisper had become a dry, terrible sob. "For ten years, in her torture vaults, Sorainya tried to make me talk. And the priests studied the ship——

"It was Lethonee who set me free," whispered the shattered man. "You have seen Lethonee."

A little tremor of eagerness and dread ran over Dennis Lanning. He tried to speak, made a little gulping sound, and nodded. Listening eagerly, he waited.

"She came to me in Sorainya's dun-

Microscopicly clear within the crystal of the chronoscope, he saw a miniature world.

geons," softly whispered Wil McLan. "She was white and beautiful, holding in her two hands the jewel of her *chronotron*—that is another geodesic tracer, similar in principle to my *chronoscope*.

"Lethonee forgave the unwitting injury my experiment had done Jonbar. She planned my escape. She searched Time for the hour when the disposition of the guarding ants would make it possible. She examined the locks, and brought me measurements of the keys. I carved them from the bones of a previous occupant of that cell.

"WHEN THE chosen night came, she guided me out of the dungeons, across the body of a drunken, sleeping ant. Sorainya had that beast roasted alive when the escape was discovered. Lethonee picked out a safe way for me down the cliff, and across Gyronchi to the black temple.

"Glarath and his priests had carried the *Chronion* there. Apparently they

had dismantled and re-assembled all the mechanism. Perhaps they had not understood it completely, however, for they had not ventured into Time. But, utilizing the principle of the *chronoscope,* with power supplied by the *gyrane,* they had made a golden shell——"

Lanning caught his breath.

"I've seen that!" he gasped. "Carrying Sorainya!"

"Or the projected image of Sorainya," corrected Wil McLan. "But Lethonee guided me into the temple." His whispered narrative went on. "The alarm was spread. The pursuing ants roused the priests.

"With seconds to spare, I got safely aboard the *Chronion,* started the converters, and escaped into Time. I returned to the early twentieth century. And then at last, guided by Lethonee down the fainter geodesics of her possible world, I came to Jonbar."

"Jonbar——" Lanning interrupted again, with a quick gesture at the crystal block of the *chronoscope.* "Can we see

"They are the kothrin—Sorainya's savage warriors," McLan husked. "Hypertrophied ants produced under the gyrane."

Jonbar, in that? And—Lethonee?"

Very gravely, Wil McLan shook his white, haggard head.

"Presently, we shall try," he whispered. "But the probability factor of Jonbar has become so small that I can reach it only with the utmost power of the scanning beam, and then the definition is very poor. Jonbar is at the brink of doom."

His broken fingers touched the thin white cylinder that hung from his throat.

"But there is still one chance." A stern light flashed in his dark sunken eyes. "Jonbar hasn't given up. It was Lethonee's father, an archeologist digging in the Rockies where my laboratory used to be, who found there the charred notebooks and age-rusted mechanisms from which he rediscovered the secret of time.

"He constructed the *chronotron;* and, with it, Lethonee soon discovered the menace born of my unwitting tampering with probability. And she brought me to Jonbar to aid the defense. That is why I have been picking up you and your men, Denny."

Lanning was staring at him, frowning. "But I don't understand," he muttered. "What can we do?"

"These two possible worlds—each armed with the secret of Time—are engaged in a desperate struggle for—no, not survival. Perhaps existence, would be better.

"Denny," the whispering husk of voice grew confused and troubled, "it is almost impossible to explain, or understand. Time involves the fourth dimension, and its fixation and ultimate determination involves the fifth dimensional progression of the continuum. It is as difficult to grasp the inter-weaving actions of the geodesics, as to picture mentally that necessary phenomenon of the fourth dimension; that a body may rotate not around a point, as in two dimensions, nor about a line, as it would in three, but about a *plane*.

"I have not time now to show you the mathematics of the geodesic interactions. But this is the meaning in practical things: neither Lethonee nor Sorainya is fixed in that fifth dimensional progression. In that sense, neither is yet real. Neither Jonbar nor Gyronchi. Somewhere, there is a turning in the Path of Time that leads, one way, to Jonbar. The other branch leads to Gyronchi.

"THE CRUX of it all is this: If Jonbar exists, *Gyronchi can not.* And equally, if Sorainya exists—Lethonee never comes to be. Each of those cities —each of those women—represents a possible future, a possible epoch. And —they represent different possibilities of *the same epoch.*

"Each has the secret of Time. But neither can, by any means whatever, reach the other! They can see each other —but they cannot reach or affect each other. Those doctors of Jonbar aboard the *Chronion*—they cannot reach Gyronchi, even though this ship goes down the geodesics that lead there. They cannot—for Gyronchi and Jonbar, and all things of either city are *mutually exclusive.* Either is possible—*but not both!*

"Each is possible—but because of my blundering, I know now that the geodesics of Gyronchi are far stronger. The probability of Gyronchi is far greater."

"But we can help!" Desperately Lanning clutched the thin, old shoulder. "What is our part?"

"No direct geodesics link Jonbar and Gyronchi," rasped McLan. "Therefore they have no common reality. They are contradictory. They can explore each other's trains of probability, but there can be no physical contact, remember, because the existence of each is a denial of the other. *Their* forces, therefore, can never come to grips.

"But our contemporary world is joined by direct geodesics with all possible worlds. It has a common existence with *both* those possible—but mutually impossible—worlds of futurity. That accounts for your place in the picture, Denny."

"Eh," Lanning leaned forward, desperately urgent. "Lethonee and Sorainya both talked of destiny. You can tell me what they meant?"

The blue, haunted eyes looked at him steadily, from beneath that startling shock of snowy hair. "Yours is the key position, Denny," the whispering husk responded. "Your triumph alone can save Jonbar. With your failure—it fails."

"And that's why they both came to me!"

The old man nodded. "Sorainya sought to cause your death in a way we could not restore. The life-giving powers of *dynat* are great—but we could not restore life to bomb-shattered flesh, or to a shark-torn body. And that type of destruction would insure her victory. Had you, instead of Barry, flown that day, the plane would have exploded. Lethonee took it upon herself to watch over you, until such a time as Fate ruled your death in a way we could restore. Then we could take you aboard the *Chronion*. And only then."

"Death——" Lanning whispered the echo. "Then we are a Legion of the Dead."

"I came back to find you and a band of your contemporaries to serve Jonbar," McLan whispered gravely. "Since it is impossible to draw a sound, living man from his place in Time—to do so would warp the whole continuum—we had to wait until the moment when each of you was actually dead to draw you aboard through the temporal ray.

"THERE ARE two civilizations for the future, and while neither yet exists to us, each exists to its inhabitants. For in the fifth dimensional view, all things are co-existent, some more fixed than others. Like the exposed film of a camera, wherein the images already are. Part of the long scroll of film—Time—has passed into the fixing bath of the fifth dimensional progression, and may not be changed. Part—that we call the future—has not, and the film is yet sensitive to change.

"But to those future beings, their yet-to-be civilization is real. And—they are fighting for it. But to do so, they must fight through us, they must reach us and influence us. *Those two futures must fight over a modern, since they cannot fight each other.*"

"And—we are the dead!" whispered Lanning.

"Not dead now," the husked whisper of the old man came. "Jonbar has provided the corps of surgeons and doctors to revive you immediately as the temporal ray drew you aboard the *Chronion*. The *dynat* can revive any reasonably whole man."

"*Dynat?*" Lanning caught at the term. "I heard Lethonee use that word, and the doctors. What does it mean?"

"It is the vital scientific power upon which the whole civilization of Jonbar is based," said McLan. "The slow evolutionary adaptation to the use of its illimitable power is what will give birth to the *dynon*, the perfect race that may exist—if you win for Jonbar!

"The *dynat* is as important to Jonbar as the *gyrane* is to the Gyronchi. But there's no time for that. I've explained the situation, Denny. What about it?"

The dark, hollow eyes searched his face with a probing keenness almost painful. Wil McLan thrust his white head forward. The hoarse whisper rasped, desperately: "Will you accept the championship of Jonbar—knowing that it is a nearly hopeless battle? Will you set yourself against Sorainya, and

give up all that she may have offered? And remember, Denny, an act of yours must kill Sorainya—or Lethonee!"

A COLD shudder passed over Dennis Lanning, and a choking ache closed his throat. The serene white image of Lethonee was before him, holding the jewel. And the proud, red-mailed splendor of Sorainya pushed it away. He couldn't, he thought, endure the death of Lethonee. But could he—even if he would—destroy Sorainya? An agony crushed his heart, but slowly he nodded.

"Yes, Wil," he said. "I accept."

Broken fingers gripped his hand.

"Good for you, Denny," gasped Wil McLan. "And now I give you command of our Legion of Time."

"No, Wil," Lanning protested. "I've earned no right to command."

"Gyronchi must be destroyed—and even Sorainya." A stern bitter light flashed in the hollow eyes again, and the gnarled fingers touched the worn silver tube. "And I'll do my part." The whisper quivered. "But I've no knack of leadership. My life has been spent too much with abstractions. But you're a man of action, Denny, and in the crucial place. You must command."

Lanning met the tortured eyes.

"I will."

A scarred hand lifted in a salute almost gay.

"Thank you, Denny. Now I suggest that you go down and lay the situation before the men, in the way you think best. They have this choice: to follow your command, or to be returned to where we found them in Time."

"Which would mean—death?"

Wil McLan nodded. "There is no niche for them in Time—alive. If we win, a place can be made for those who survive, where the fifth-order progression has not yet fixed the continuum—in Jonbar. If we fail, there is death—or Sorainya's torture vaults."

"In Jonbar——" repeated Lanning, huskily. "Can I go to Jonbar, if we win? To Lethonee?"

"If we win," the old man told him. "Now, if you will go down to your men, I'll try to pick up Jonbar with the *chronoscope*."

Eagerly, Lanning asked, "May I——"

A solemn twinkle flashed briefly in McLan's hollow eyes.

"If I get Lethonee," he promised, "I'll call you. But it's very hard to get Jonbar."

Lanning went back down through the turret to the deck, and requested Barry Halloran and Lao Meng Shan to call the rest together. Facing the expectant little group, in their oddly assorted uniforms, he began: "I've just talked to Wil McLan." He waited, for the flash of eager interest. "He has gathered us out of Time, saved each one of us from certain death. In return, he wants us to fight, to save one world that is struggling for survival against another. I know the cause is good.

"He has offered me the command. And I must ask you either to follow me, or to be returned to your own place in Time—to die. That may be a hard choice. But it is the only one possible."

"Hard?" shouted Barry Halloran.

"Nein!" grunted Emil Schorn. "Are we craven, to turn back from Valhalla?"

"Viva!" shouted Cresto. *"Viva el capitán!"*

"Thank you." Lanning gulped, blinked. "If we win, there will be a place made for us in Jonbar. Now, if you will follow me, repeat: *I pledge loyalty to Jonbar, and I promise to serve dutifully in the Legion of Time.*"

The eight men, with right hands lifted, shouted the oath. And then, led by Willie Rand, roared out a cheer for "Jonbar and Cap'n Denny Lanning."

ONE OF THE orderlies from Jonbar beckoned to Lanning, and he returned hastily to the bridge, his heart thumping.

"Did you—" he asked breathlessly, "did you——?"

Wil McLan shook his haggard head, and pointed to the cabinet of the *chronoscope.*

"I tried," he whispered hoarsely. "But the enemy have moved again. One more triumph of Sorainya is fixed on the fifth axis. And Jonbar is one step nearer extinction. The image flickered, and went out. And that is what I got."

Looking into the crystal block, Lanning once more saw Gyronchi! But it was strangely changed. Sorainya's proud citadel on the hill had collapsed into a heap of corroded, blackened metal. The black temple of the *gyrane,* on the other eminence, had fallen to a tremendous mound of shattered stone. Beneath, upon the denuded wastelands where fields and villages had been, was a desolate, untrodden wilderness of weeds and brush, leprously patched with strange scars of white, shining ash.

"Gyronchi?" breathed Lanning. "Destroyed?"

"Destroyed," rasped Wil McLan, "by its own evil! By a final war between the warlords of Sorainya's class and the priesthood of the *gyrane.* Mankind, in the picture you witness, is extinct."

His hoarse whisper sank very low.

"If we fail—if mankind follows the way of Gyronchi—that is the end of the road." Wearily, he snapped off the switch, and the bleak scene vanished. "And now it seems that that road has been chosen. For the geodesics of no other remain strong enough for the instrument to trace."

His hands knotted impotently, Lanning stared bewildered and helpless out through the dome, into the haze of flickering blue.

"What—" he demanded, "what could have happened?"

Wil McLan shook his head.

"I don't know. Gyronchi has done something. We must try to discover what it is, and undo it if possible. We had best return to Jonbar, I think, to secure the use of the new geodesic analysis laboratory that Lethonee has organized—if we can!"

Anxiously, Lanning gripped his thin shoulder.

"If——"

"It may be," Wil McLan whispered, "that this latest move has so far attenuated the probability of Jonbar that its geodesics will not serve to lead the *Chronion.* That—we can never again reach it!"

"But we can try," Lanning snapped with a sudden fierceness.

"Yes, try." The old man shook his head slowly. The fumbling, broken hands twisted at the shining wheel of the *Chronion.*

TO BE CONTINUED

"But—they don't understand us! Eight light-years—we will be dead long before we arrive——"

The Incredible Visitor

by Clifton B. Kruse

A tiny, fragile spaceship—a miniature—but it sailed through a battleship!

CHIPPER WHITNEY scrooched up his freckled face in order to get a clearer view of the strange bird flying about the upper story of the Jamestown City Hall. For a full five minutes he had neglected to sing out in his adolescent falsetto concerning the attractions of the latest edition of the *Morning Times*. Somebody clapped him on the shoulder.

"Selling papers today, Chipper, or star gazing?"

"Gosh!" Chipper grinned broadly as he flipped a paper from under his arm. "Thanks, Mayor Smithhurst. But say —what the heck kind of a bird's that up there? It just keeps floatin' round. Kinda grayish in color, only I don't see any wings, and it ain't one of those pigeons from the park 'cause how could a pigeon kinda ease round a buildin' like that, I wanta know?"

"Hmm." Mayor Smithhurst shielded his eyes with the paper. "By George, you're right. It can't be a bird and yet —yes, indeed! It is flying about. There! It's stopped before the window to the County Attorney's office."

"But it's hangin' there!" Chipper shouted.

"What is it?" "Something the matter?" Passers-by began to stop and stare along with the Mayor and the newsboy. "Queer looking bird!" "But that's not a bird."

"I think I'll go up to the Attorney's office," Mayor Smithhurst muttered as he started hastily toward the City Hall entrance.

Chipper Whitney took a few steps after the Mayor then halted abruptly. The group had become a crowd for a city the size of Jamestown, Arizona. Chipper's face broke into a crafty grin.

"Paper," he shouted. "Latest 'dition, th' *Times!* Read all about it." Enough of the later arrivals, sensing something peculiarly amiss, shelled out the nickels to relieve Chipper of his bundle. Then he looked up again.

The window of the County Attorney's office was open. Both the Attorney and Mayor Smithhurst were leaning out, getting a close look at the strange bird-like thing which seemed to be suspended in free air. The rumbling of the crowd in the street reached a climax when Chief Morland came clanging around the corner with the Jamestown ladder-truck.

For an instant the small, grayish ellipsoid wavered, as if to ascertain the purpose of the shouting. The top of the fire-ladder swung within inches of the mystery. Chief Morland had stepped upon the bottom rung. The crowd gasped as the "bird" shot straight toward the window ledge and the two officials up there bobbed back into the building, slamming the window down. Yet even as the thing alighted there came a thunderous crash of smashing timber and masonry. The crowd in the street screamed, falling back in a mad scramble to get out of the way of down-crushing débris.

Chipper Whitney alone held his ground. Eyes wide in breathless wonder he placed curiosity above safety. "The bird's ridin' down," the boy murmured. "Like a hunk of iron on a house made of stacked-up playin' cards. Gosh—that piece of roof fell on it!"

Squinting his eyes against plaster dust, Chipper dashed to the pile of wreckage which had been the corner wall of the City Hall. For a minute he pried eagerly then jumped back and stared skyward.

"Get back, kid!" It was Chief Morland, red faced and visibly shaken, who was yelling. "You might have got yourself smashed in that mess."

Chipper grinned weakly. "Maybe it was a sort of bird after all," he said. "'Cause it flew away. I saw it shoot right up through that big rock and bust it to pieces and it just kept going right on up!"

PROFESSOR Lewis Tanberry regarded the one-fifteen Physics Lecture class without enthusiasm. Of the sixty-two high school seniors there were five, he felt sure, who really had an intelligent appreciation of the subject.

Perhaps he should be thankful for the inspiration those five furnished his harried pedagogical soul. Nevertheless, with the subject of "Matter" before him, the prospect was none too bright. Now if he could just excuse the fifty-seven who were after grades, and give his enthusiastic attention to those precious five—oh, well! He rapped for attention.

Professor Tanberry's voice reverberated through the hall as his eyes, undirected by conscious volition, sought out the five who knew how to think with him.

"Thus we picture the atoms composing this bar of iron as remote nuclear suns surrounded by negatively charged electrons, each single atom comparable to our own solar system, with the sun as the positively charged nucleus of the atom. The comparatively vast volumes of space between these apparently close-packed atoms within the iron bar——"

The sudden swell of half-muffled whispering drowned the instructor's voice. For a second he stared open-mouthed at the assembly. Not one pupil—not even one of the five—was paying him any attention. Hands gestured wildly toward the high ceiling. The pupils were getting out of their seats now. Voices broke out in bold shouts.

The cause of the disturbance was only a bird! Professor Tanberry felt a stab of resentment surge through him. But no! It was not a bird either. Slowly, deliberately, the strange oval swung about as if intently observing the amazed student body. Professor Tanberry, without removing his gaze from the peculiarly suspended object, mechanically replaced his notes on the desk, weighting them securely with a physics textbook.

"What in the world's the trouble?" an agitated voice shouted in his ear.

The young professor started guiltily. But explanations were unnecessary. The perplexed principal, too, was staring gapingly at the strange swaying motion of the birdlike thing.

"It's alive!" someone cried out. "Come on, fellows, let's get it."

A book swirled through the air, striking the curious object head-on.

"It didn't budge," the principal muttered in Professor Tanberry's ear. "But we've got to do something. These pu——"

Books were hurling from every direction. Voices rose in shrill cries. The more cautious among the assembly were jamming the exits.

"It's as solid as a pillar of stone," Professor Tanberry remarked aloud, although by this time the clamor and shouting made ordinary speech inaudible. "But I say—here comes that thing—look out!"

For a moment the incredibly stolid gray oval hung there a scant arm's length from the lecturer. Professor Tanberry's act was purely instinctive. With both hands he grasped the object, interlocking his fingers and pulling with all the strength he could exert upon the almost imperceptibly corrugated metal ellipsoid, the length of which could not exceed six inches and the breadth three.

"I—I can't—budge——" he gasped out.

The cries of the students blended into a concerted groan of amazement. Before their wide-staring eyes the gaunt body of Professor Tanberry sailed swiftly overhead and out through an opened window. The man's hands remained cupped about the fearful ovoid menace. His outstretched legs dangled helplessly. The few who dared rush to the windows saw the body shoot with

astounding acceleration far above the tree tops.

"He's going straight up," someone uttered in a hoarse, terrified tone. "Clear up out of sight. He's hanging onto that thing still. It's carrying him up——"

DESPITE THE FACT that it was already well past midnight, the famous research laboratory of the American University of Science was brilliantly illuminated. Dr. Henry Debruler sat hunched above the peculiarly complex controls of a strange apparatus. The opening and closing of a door followed by hurrying footsteps aroused him from his preoccupation.

Dr. Debruler smiled wearily up at the young woman who was approaching with what appeared to be several telegrams in her hands.

"You shouldn't be here this late, Miss Martin," he reproached her mildly. Then as if in answer to her questioning glance he added: "Not a thing yet. I've been in tune with every known wavelength. If the menace is really controlled by some intelligent force, I should be able to detect it. And I'm certain that it is. Every report indicates that the mad oval is being consciously directed in its prying operations over the face of the globe. But speaking of reports, I see you have something there."

"Two more wires from Washington, Dr. Debruler. Also four more stories of depredations," Miss Ann Martin sorted the messages as she spoke.

"Ah, yes." Dr. Debruler mopped his bald head with a nervously clutched kerchief. "They're sending duplicate notices directly to me now. What are they?"

"Only one more here in the United States. But it's frightful enough. Two hours ago the gray oval was sighted slowly encircling the battleship *New Hampshire*. The commander ordered the gun crew to fire. A direct hit was recorded but——"

Dr. Debruler jumped to his feet. "Then they've destroyed the menace!"

"No, no," Miss Martin hastened to correct him. "A six inch shell exploded on contact. The gray oval was repelled a distance of two or three yards but was apparently undamaged. A moment later, as though in retaliation, it flew straight toward the battleship, crashed the forward gun turret and completely penetrated two walls of heavy armor before disappearing into the night. It is thought that it was coming westward across the United States again."

Dr. Debruler slumped in his chair. "Twelve appearances since that report from Jamestown, Arizona, today noon. Or yesterday noon I should say." For several minutes he sat there staring rigidly at his ultra sensitive all-wave receiver.

"It's just—unearthly," Ann Martin uttered softly. "Nothing can stop it. That brave young professor out in Arizona who tried to grab it——"

"They haven't located his body yet?"

"He was observed at two different points. Both times his body seemed to be sailing high above the clouds, like some grotesque bird."

Dr. Debruler shook his head slowly. "Yes, I know. The last time he was at an altitude of fifteen thousand feet above Cleveland, Ohio, and headed north. But do you know! Yes, that's a clue."

"What do you mean?" Ann Martin brushed her hair back from her forehead as she regarded the scientist intently.

"Just this. It is a physical impossibility for any human being to remain clinging to such a tiny lobe of matter for the more than ten hours between the time Professor Tanberry was snatched from the high school lecture hall, and when he was sighted above Cleveland. The distance covered indicates a velocity not less than one hundred miles per

hour. And the elevation—why, no one could retain consciousness under those conditions. Miss Martin, I tell you some force was deliberately holding on to Tanberry's body. Do you follow me? Tanberry was captured by an intelligent entity—the same alien being or beings now exploring this planet. *I said exploring.* That's a significant word. We can't explain this mad, unbelievably powerful gray oval in terms of any known terrestrial strength or endurance. Why, our buildings, our guns, every man-made material force or obstruction is like so much tissue paper to this thing."

ANN MARTIN nodded slowly. "I agree with you, Dr. Debruler." Her voice came in a hushed, near tremulous whisper. "This—this tiny menace which has the whole world amazed and trembling is—is a visitor from space!"

"Exactly," the scientist spoke with augmented fervor. "Recapitulate only those authentic reports which Washington has sent us, disregarding the wild tales on the radio, and what do we have? First, the gray oval has merely to alight upon a building in order to crush through solid masonry. Without visible effort, it hurtles through the sky, bearing a man's weight as though nothing retarded it. A six-inch, high-explosive shell can't smash it. On the other hand, the gray oval can plunge through several inches of modern steelarmor.

"Unquestionably, there is no metal known to planet Earth—nor even to the entire solar system—which can either withstand such shocks, or hold up under such enormous pressures as these crushing forces would indicate."

"But where? I mean——" Ann Martin's voice faltered as she stared anxiously toward the scientist.

Dr. Debruler's eyes narrowed in concentration. "The matter composing that small, gray oval must be inconceivably dense. If I could only test it! Far out in space, we know of a few suns where the atoms are so closely packed that a cubic inch of that sun's substance would weigh more than a ton. Sirius B in Canis Major for example. Or the even denser van Maanen's star. Both are relatively small astral bodies. However the density of the tiny Companion of Sirius is 60,000 times that of water. If such a star as Sirus B had a satellite, born of its own matter, upon which existed intelligent life——"

Ann Martin's piercing scream brought Dr. Debruler to his feet. She was backing toward the door, her eyes wide with terror. The scientist whirled around in the direction of her horrified stare. A low-voiced moan escaped his tautly compressed lips.

There before him, for the moment motionlessly suspended in the air, hovered the innocuous-looking, dull-gray ellipsoid. Ann Martin's pleading cries were agonizingly shrill.

"Don't—Dr. Debruler, don't let it come——"

Even as he ran toward the hysterical young woman the menacing gray oval shot forward.

"Miss Martin!" Dr. Debruler gasped out as his secretary crumpled in sudden unconsciousness. For the fraction of a second, her limp body swayed as though arrested in its fall.

Dr. Debruler screamed her name in amazement.

Ann Martin moved lifelessly through the air, her stiffly stretched arms seeming instinctively to reach for the oval. Dr. Debruler grasped for her as he threw himself forward. Frantically clutching the floating body he sought to pull her free of the magnetic hold of the ominous gray oval. She slid effortlessly through his arms.

Getting to his feet from an awkward sprawl to the floor, the elderly man saw Ann Martin's wraithlike form sail swiftly beyond the window, out and skyward into the moonless dark of night.

MORD ZYGARTH, second in command of the science expedition into the Metagalaxy, shifted his ponderous, crystalline body into the magnetic tube. Surging lines of force carried him through the tube to the expedition's museum hall. His sensitive antennæ picked up the swift etheric vibrations which informed him beforehand of the heated discussion among the officers in charge of the exploration.

The single eye in the bulbous body of each officer turned questioningly upon Mord Zygarth as his two absurdly short, stocky legs brought him before them.

"And now what do you say, Mord?" Aanth, first in command of the spaceship from the world of the lesser sun, spoke sharply. The score of wiry antennæ bristling from the top of each monstrous, bipedal body were rigid in attention.

"You were right," Mord Zygarth replied. "It is fruitless to attempt communication with these ethereal creatures. Nevertheless I have succeeded in intercepting a few of their thoughts. They call themselves 'humans' and this world of theirs 'the Earth.' They are not sure about us. In the mind of one of them is the idea that this is indeed a spaceship, and that we came from a distant and unimaginably dense star known to them as Sirius B."

Aanth gestured his appendages excitedly. "Then the creatures of planet Earth have wisdom, science!"

"It is only in the process of developing," another of the officers spoke up. "I am sure that Mord's two specimens are exceptional. Yet it is incredible that life can develop upon this gaseous planet."

"The planet Earth is not gaseous," Aanth exclaimed. "Obviously, the tenuous state of matter is truly solid despite the fact that, back upon our own world, their heaviest atoms would immediately react as such thin stuff should. But let's hear further from Mord Zygarth."

"I'm afraid I can't add more to our observations, sir. As you suggested the 'humans' are clearly man and woman. I observed them carefully through the small telescope. Their actions toward each other are not greatly unlike the normal responses of our own people. To me, it seemed that the man-creature is endeavoring to console the woman."

"But you were unable to speak to them?"

"No, Aanth, I was not. Moreover, I am not certain that they could even see me. They are so vast themselves that we would be virtually microscopic in their eyes. Even our entire ship is less in measurement than a small part of one of their bodies."

"If only we could talk with them," Aanth mused, pivoting his tough, pear shaped trunk around, and carefully adjusting certain controls upon a strange apparatus with the two ropelike appendages which were joined to the bulbous body just below the single, deep eye-socket.

"Below is one of their cities," he announced as the distant sparkle of thousands of incandescent bulbs showed in the view plate above the controls.

"The lights they use are much easier to distinguish than the cloudlike material of their bodies," one of the explorers suggested.

"I should like to go down again," Aanth remarked. "But it is useless. No matter how carefully we maneuver the ship, there is inevitable damage to these humans of planet Earth. Not even the surface of the planet itself will bear the density of our ship. And it is evident that the very sight of the ship strikes terror to these creatures."

"That is because they are unable to receive our signals."

"Yes, that is so," Aanth blinked his single great eye sadly. "I had hoped that we might reach them through these two we captured."

Mord Zygarth spoke up. "But that

seems useless, Aanth. I attempted every antennæ vibration under our control. They are totally deaf to us—but not to each other!"

"You mean because of the speaking slit just below their two eyes, of course?" Aanth replied. "However we have much valuable data, many pictures and samples of this strange world of solid gas, with its amazing life form——"

MORD ZYGARTH interrupted. "Pardon me, Aanth, I was thinking of these two whom we have captured. We could never bring their strange, mammoth bodies to our own planet. They could not endure the journey. I fear that the lifetime of human men and women upon this strange 'Earth' is all too short. Why, they would grow old and die even before one half our return journey will have been completed.

"You are indeed observing, Mord Zygarth!"

"Thank you, Aanth. It is true. I have—a very odd feeling about them! They suffer much more than our kind. Especially in the woman's face I distinguished intense grief. The man's too was sad—as though the woman's sorrow were more bitter to him than his own fears. Truly, I am convinced that life in the tenuous matter of this world is necessarily short, and exquisitely emotional."

"Splendid attention to details, Mord," Aanth arose upon his thick legs in a gesture of respect for his fellow scientist and explorer. "And I thought you said your period of study had been in vain? You will record all that in scroll for the museum."

"Indeed, sir."

"Is there anything further from any of you?" Aanth inquired. "If not, I suggest we prepare to chart the remainder of this solar system quickly, and then be on our way. Let me see. Of the nine planets about this sun we have discovered intelligent life upon but this one. There remains only the calculations of the planetary orbits to be done."

Mord Zygarth stepped forward. "Then I may return the two prisoners to the surface of this world?"

Aanth seemed almost to sigh. "If that be your wish, Mord. You are sure we can learn no more by observing them?"

"I am sure of it, Aanth. I have made strict account of every movement. And their fear is not good to see."

A gentle sound as of good natured laughter came from another of the officers. "Poor Mord's feeling is shared, of course. Yet I wonder if these living, mountain-high man and woman would be so kind to one of us in his laboratory?"

"Perhaps not," Mord Zygarth responded quickly. "But we are to remember that these creatures are of a race which has evolved infinitely slower than our own. Doubtlessly that is because they must live for only a tenth of a normal life span, according to our standards."

"And as to science," Aanth joined the discussion. "I wonder whether or not these monstrous, weightless humans know even the meaning of pure science. They may, of course, in view of their clever mechanical devices, but I——"

Aanth's voicelike vibration halted abruptly. A strange, almost fearful tension thrilled the assembly of explorer-scientists from afar.

"It is from your own laboratory, Aanth," two of the officers exclaimed simultaneously.

"A contact!" Mord Zygarth exulted. "The beings of this planet have chanced upon a vibration which is known to us."

"Quick!" Aanth led the way, his ponderous globular body swaying heavily upon the short, stout legs. "Into the laboratory."

DR. HENRY DEBRULER turned pleadingly toward the five, grim-faced

men who were regarding both him and his remarkable make-shift apparatus intently.

"We have no right to adopt such an attitude, gentlemen. After all, the gray oval has not been actually belligerent. It isn't war. I'm sure of that."

"Nonsense, Debruler," Colonel Lavielle's voice reverberated throughout the laboratory. "I've never heard such utter rot. That oval thing is a mechanical spy contrived by certain powers to destroy us. Why, stop to think. What would fifty or a hundred such weapons —obviously operated by remote control —do to this country? Within twenty-four hours every munition plant, food center, aviation field and battleship owned by the United States would be wiped out——"

"I agree with you, Colonel Lavielle," Meehan, the great chemist, interrupted heartily. "We must destroy that oval at all costs, and immediately impress every scientist into over-time shifts in order to devise means of countering the devilishly ingenious attack."

"No, no," Dr. Debruler gasped. "Will you gentlemen of the Investigation Committee hear me? I tell you I have studied it. According to the attraction in the platinum-foil gauge, the weight of that small oval is in excess of *twelve tons!* By that alone we know it must necessarily have originated far outside our solar system. But listen now. They're sending again. That clicking comes from the sound relay on the photon vibrator. I can signal them and get a response!"

Colonel Lavielle gestured in impatience. "A moment now, Debruler. Do you, a man famed as scientist and honored by our government, dare to stand there and say that this thing is a spaceship? That some microscopic life-form, hundreds of times heavier than lead, is actually inside that shell?"

"I certainly do. Furthermore I——"

"I have heard enough." The colonel turned to the other members of the committee. "My suggestion is that Debruler has overworked. We should take over this contact of his, and follow Meehan's idea for bombarding the gray oval with the neutron death beam."

"To be sure," Meehan spoke up. "The first thought must be to safeguard the nation. I can burn that thing to a cinder in thirty seconds."

Slightly less determined, the other members of the committee assented.

Dr. Debruler, white faced, regarded them grimly.

"That is your decision?" he inquired softly.

"I am afraid it is, Debruler," Colonel Lavielle responded curtly. "The President has delegated us power to act as we see fit, in order to preserve life and property in the face of a grave, international emergency. Of course, your fanciful theory—the spaceship idea—will not go beyond this committee in respect to the services you have already——"

Dr. Debruler's voice rose sharply. "You will be able to do nothing. Listen to me. The beings in that oval are seeing Earth as you and I would view their world if we were intelligent enough to build a spaceship——"

"Spaceship!" Colonel Lavielle exclaimed. "You talk of spaceships when we can't even build a rocket to reach the moon! Debruler, you——"

"Please!" Dr. Debruler raised a hand for silence. Hastening to his apparatus he touched certain controls with trembling hands. "That's a message," he uttered in a hushed, awed tone as if oblivious to the hostile audience. "Ever since I contacted them, they've been trying to communicate. That code—it sounds like——"

At a signal from Colonel Lavielle a squadron of soldiers marched into the room. The other members of the Investigation Committee stepped back as

Colonel Lavielle motioned that Debruler was to be removed by force.

"All right, Meehan," the colonel ordered. "Get your gun in order. Debruler's done us some good, in spite of his crack-brained dreams about a spaceship. The signals, or whatever they are, seem to be getting much stronger. We'll lure the device here—and then——"

BEYOND the glasslike walls of the imprisoning sphere, the frigid, star-studded maw of space seemed to press in upon them. Lewis Tanberry shuddered, unconsciously tightening his arms about the sleeping young woman. Now and then, as the invisible craft shifted, he would have to turn his face away from the vicious glare of the sun. And always, far below them, the great globe of Earth reflected softened, scattered hues of light from sun, moon and stars, so that it was much like peering down into some infinite pool of murky, slowly churning water.

Ann Martin stirred restlessly. Tanberry looked down into her face anxiously. Her eyes opened, staring only at his face, as if she feared to look again into the awful vastness of space.

"Still the same," Tanberry answered her unspoken question. "We do not seem to be moving outward again."

Ann Martin attempted a smile. "At least we've seen the moon. We were even on it, Lewis. We can say we were, even if this shell was still around us."

Tanberry laughed softly. "That's being brave, Ann. Yet we can be thankful for this shell. Our lives would go out quicker than any candle otherwise. But then, on second thought, maybe it isn't such a cause for thanks after all."

"Please, Lewis." The girl released herself from Tanberry's arms. "It—it's our world. If it hadn't been, then you and I——"

Tanberry clasped her hands impulsively. "Forgive me, Ann. I didn't mean it that way. I'm not complaining for myself. Knowing you—having this world for even this long—has been worth whatever it could cost me."

"That's nice." Ann Martin smiled. "But now, what do you think might happen? The gray oval——"

Tanberry pointed up. "We're still connected to it. Like an ant dragging a balloon, isn't it?"

"Lewis, I'm sure they—whatever intelligence is in that oval——"

"Or spaceship?" Tanberry suggested.

"Yes. I do mean spaceship," the girl's voice became more firm. "And I believe that tiny speck of light we saw was a signal from the intelligent life inside. They must have been trying to communicate with us. Somehow I could almost feel as if a force from some speck up there was trying to contact my mind."

"I felt the same thing." Tanberry agreed. Even now he was staring up at the pin-point contact between the gray oval and their strange, mist-filled invisible cage. "You said that Dr. Debruler thought the oval might have come from Sirius B? But listen, Ann, if I remember correctly the two suns of Sirius are over eight lightyears away."

The girl nodded thoughtfully. "If they go back—and take us with them! Oh, Lewis, we couldn't live on a planet as dense as theirs must be. Think of a cupful of ordinary matter weighing as much as a modern locomotive!"

Tanberry's gaze traveled slowly about the fearful vista of black empty space. "Yes, but before we think of it, we should remember that before these massive mites could return to their home planet, we would long since have died of old age. Why, even if they could equal the speed of light——"

"Lewis!" Ann Martin's whisper came tremolously sharp. "That spark—up there where the oval touches this transparent shell. I see it again."

Ann Martin clutched Tanberry's arm.

"Lewis, I have a feeling that they're trying to tell us we are going to be returned safely."

Tanberry merely nodded as he stared down upon the city below them. His voice broke into a sharp cry: "Ann, look! Isn't that the American University?"

"Yes! Oh, we're coming right back to Dr. Debruler's laboratory. The oval people are—Lewis!"

Tanberry clutched the girl's rigid body as if to shield her from the sudden lash of flame which shot from the laboratory to envelop the transparent sphere. For an instant, his senses were bared to the thunderous discharge as wave upon wave of burning light swept through their cringing bodies.

FOR MANY HOURS, even according to the slow measurements of his kind, Mord Zygarth labored over the two vats of electrically activated solutions. Abruptly conscious of another's approach Mord Zygarth pivoted around to meet the anxiously staring eye of Aanth.

"Then they'll live?" Aanth inquired softly.

Mord Zygarth gestured affirmatively with his two ropelike appendages. "The neutron blast from their own people served only to remove the orbital electrons composing the body-forming atoms of the human man and woman. It was fortunate, however, that I chanced to be observing them at the time, so that I was able to control and condense virtually all the nuclear matter of their bodies. Come see them, Aanth. Their bodies are no larger than our own, but I am sure that every detail of their previous formation has been preserved."

Eagerly Aanth peered into the two tanks. "They seem to sleep normally," he mused.

"Yes," Mord Zygarth responded. "I have succeeded in maintaining their peculiar metabolism even in our comparatively condensed structure of matter. But I shall not awaken them until our journey is over. And then——"

Aanth turned toward the second officer of the expedition. "It is a beautiful experiment, Mord! The man and woman of Earth shall be one of us. We shall learn of human life and Earth, even as they will learn of ours."

"Yes," Mord Zygarth replied with the gentleness of his kind. "And do you know, Aanth? For just a moment before the neutron blast, I fancied I had contacted their minds again. The thought came, that this man and woman wished to journey together with us. I am sure of it, Aanth. And greater than the mere scientific achievement, is the knowledge that I have been a means toward a glorious fulfillment of their dreams."

ISLAND OF THE INDIVIDUALISTS

Another of

NAT SCHACHNER'S

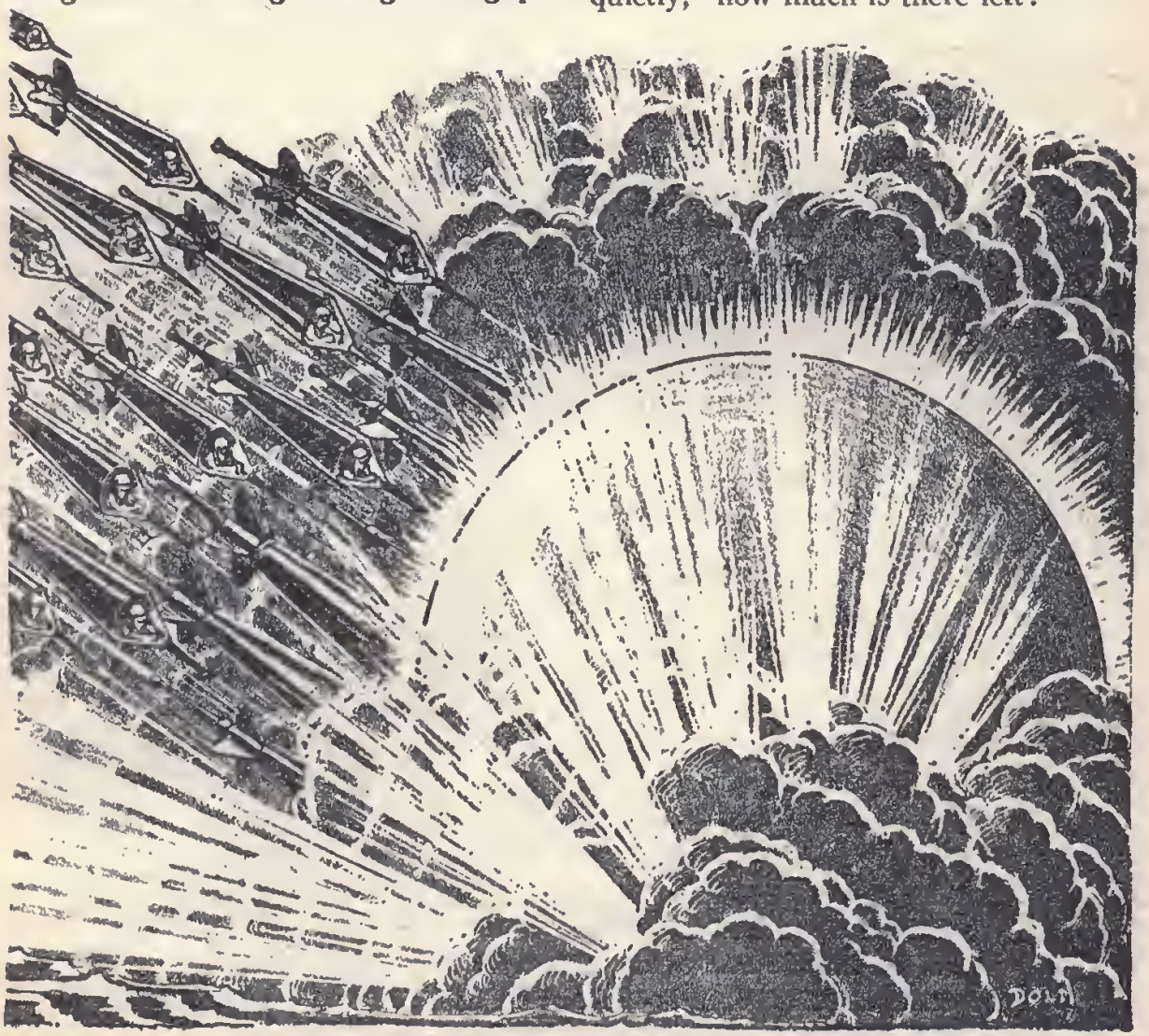
excellent "Past, Present and Future" stories.

THE stolen rocket ship winged swiftly over the shoreless sea. Within its slender hull three men peered down upon the moveless waters, faces haggard with hope deferred, eyes tense with a similar despair.

A hundred thousand warriors of Harg were blasting through the gap!

Sam Ward—man of the twentieth century—ducked his lean head toward the fuel tank, read the gauge for the hundredth time.

Beltan, Olgarch of Hispan, refused to turn his proud, aristocratic head. His sensitive fingers seemed engrossed with the controls. "Well, Sam," he asked quietly, "how much is there left?"



Kleon—the Greek who once had marched with Alexander the Great—did not even inquire. His Macedonian armor was tarnished from many suns and many rains, yet he clutched with still-fierce grip his keen-tipped javelin and battered shield. His sun-bright locks framed features clean-chiselled as on a medallion, his blue eyes swept the interminable wastes beneath.

Sam forced a grin to his cracked lips. "Less than there was ten minutes ago, Beltan," he replied, "and more than there will be ten minutes from now."

"Which means," remarked the Olgarch without a tremor, "that in ten minutes the fuel tank will be empty, and this rocket ship in which we fled from Harg will plunge headlong into the Pacific."

"Yes," said Sam.

Again there was a long silence, punctuated only by the soft roaring of the jets.

Kleon shaded his eyes, stared out at the dappled haze that seemed to stretch as far as the eye could see. "This is what comes of new-fangled inventions," he groaned. "At least when my trireme was driven from Nearchus' fleet by fierce storms, we hoisted sail and found our way to a land where the Cimmerians hailed me as Quetzal. But now we cleave the air, bound helplessly to a little tank of fiery liquid. It evaporates—and behold, we are no longer birds; instead, we emulate the fish of the sea. But—" he glanced sadly at his shield, at his rusted armor, "it is too long a way to swim."

"How far is it to land?" asked Beltan.

"As near as I can calculate," said Sam, "almost a thousand miles. Too far to swim, as friend Kleon has justly remarked."

The Greek shrugged. "I never did like the sea," he declared. "I prefer solid ground underfoot, where I can brace myself and charge the enemy with my good sword flashing. It is my fault. Had I not remarked about the sleeping Gymnosophists in the mountains of Tibet, this would never have happened."

"No more your fault than mine," Sam Ward told him warmly. "They were our last chance. We ranged over most of North America seeking evidences of other cities, other civilizations. Aside from Hispan we could find nothing. And always behind us, hemming us in, hunting us like rabbits, were the rocket hordes of Harg, headed by Vardu. Our only chance lay in escape across the Pacific, to find the sleepers who had given you the life-immobilizing formula."

"It is a pity that there was a leak in the tank," observed the Olgarch with calm indifference. "Otherwise we could have made it. As it is, I regret nothing. I have lived more completely this past six months with you two as comrades, than in all the prior years of purposeless luxury within the neutron walls of Hispan." He smiled reflectively. "A strange thing, our association. A Greek from the time of Alexander—an American from the twentieth century—and I, an Olgarch of Hispan, who once thought myself the proud apex of the ninety-eighth century. Nevertheless we——"

KLEON LIFTED his head; his straight, classic nose quivered. "Look!" he cried, and his voice sounded slightly cracked. "Look, my friends—yonder, to the left. There is a thicker haze upon the waters that——"

Sam jerked erect. His lean face tightened, his gray eyes stared unbelievingly. "Land!" he shouted. "An island where there should be no island. But of course! Eight thousand years is a long time in the Pacific. A volcanic eruption; a rising of the sea floor——" He swung feverishly on the Olgarch. "Point the rocket's nose straight for it," he cried. "We are saved! Do you un-

derstand what I am saying, Beltan? We are saved!"

"Temporarily at least," Beltan amended quietly. Nothing ever ruffled his proud, aristocratic calm. "It seems like uninhabited land, and we have neither food nor means to leave again, once we come down. And remember, Vardu will hunt us relentlessly. His advance horde saw us wing out upon the ocean. They will follow."

Sam experienced a sudden sinking sensation in the pit of his stomach. The Olgarch was right. Already the steady roar of the rocket jets had given way to irregular sputterings. The tanks of liquid hydrogen and liquid oxygen were practically empty.

They were close enough now to view their alien haven with an attempt at detail. But a shimmering haze hid its surface from the view—a haze such as none of them had ever seen before.

The vast reaches of the ocean had cleared with the magical suddenness familiar to those who in all ages had sailed its magnificent bosom. The sun beat down with unobstructed glory, dazzled the blue surface into a burnished shield. Not the tiniest wisp of cloud fouled the expanse of sky and water.

But over the island—or what had seemed to be an island—an impalpable vagueness shimmered and danced. Its edges were confused and indeterminable, its domed obscurance a strange indefiniteness. Slight as gossamer, yet quenching the fierce heat of the sun—pulsing and vibrating with an inner life, yet neither refracting nor reflecting the beating blaze. The eye tried in vain to grasp its form and nature. It eluded the sight, it slid away in protean manifestations. Yet what lay underneath was as starkly invisible as though it were clad in many thicknesses of lead.

Kleon was a Greek of the Enlightenment, yet as he stared, ancient superstitions arose to trouble him. "By Zeus and Poseidon!" he cried in amaze, "these are but enchantments similar to those that the sorceress, Circe, employed. Let us not land, my comrades; let us rather go on."

"Easier said than done," Sam remarked dryly. "Listen to those rocket blasts. They're coughing their lungs out." Yet even Sam Ward, practical, coldly scientific, matter-of-fact, felt a queer tightening of his scalp at the sight of that shifting totality.

"What do you make of it, Beltan?" he asked anxiously as the slender craft hurled downward.

The Olgarch shook his tawny head. His eyes were troubled. "I had thought," he murmured, "that we of Hispan knew all things that were to be known. Even the fanatic science of Harg was no mystery to me. But this is something new—something beyond my knowledge. It is no mist, or novel refractions of layers of air. It seems impalpable, yet there is a sense of strength beyond that of stellene and neutron walls themselves. More, there comes up at me a strange impact—as if it held a queer sentience of its own. A withheld life that examines and weighs us in the balance even as we drop."

"I've had the same feeling," husked Kleon. "That is why I say——"

IT WAS too late. With a final gasping cough the rocket motors died. Beltan wrestled with the controls. Down, always down, in great, swinging circles, the ship sank like a wounded bird. The sea rushed up to meet them.

And the shimmering mist beneath!

Sam forced back a cry as they struck. There was nothing beneath—nothing that could be seen, that could be evaluated. In the distance, the moveless waves of the Pacific were hundreds of feet below.

There was nothing—yet the rocket ship shook in every stellene strut, swerved sideways, and slid along im-

penetrable nothingness. Down, down ——

Beltan worked feverishly at the controls. Great globules of moisture beaded his brow. Kleon thrust vainly with heavy javelin at that along which they tumbled. Sam clung to the side as the craft tumbled and fell.

Waves of force seemed to pluck at his brain. Mighty sluices of energy poured into his being, drained his veins of all volition, of all movement. The glittering mist swarmed over him, engulfed him. Keen lances probed his mind, sucked out his energy, flung him limp to the bottom of the hull. As in a daze he saw Kleon stagger from the rim, pitch moveless to his side. Dimly he heard the Olgarch's cry, saw the proud aristocrat struggle with the unseen influence, saw him stand upright, away from the controls, pitting his will against the immaterial shimmer that engulfed them all.

A moment Beltan stood, erect, battling with clenched teeth and white-drawn features, holding his own. Then, slowly but surely, he gave way. His tawny head bowed, his tall body arced away like a taut-strung bow, his eyes clouded and went blank.

Triumphantly the irresistible waves beat upon them, within the very fiber of their beings. Dimly, Sam felt keen sentience behind it all, probing, prying, searching——

Suddenly the rocket ship of Harg accelerated along the downward-curving mist, slid smoothly to a shuddering halt. The sheen of force-waves lifted, vanished. The plucking fingers within their brains ceased their restless prying. Strength surged back into their limbs. Astonished faces lifted from the hull. The three adventurers rose lithely to their feet. Once more they were masters of their wills, assured of the privacy of their brains.

"In the name of Castor and Pollux," swore the Greek, "what happened?"

"We are," said the Olgarch with tense calm, "in the presence of forces beyond any conceived of in Hispan."

But Sam Ward, the practical, darted keen eyes around. "I see a man—a human being!" he said softly, and gripped his Colt hard.

THE MAN was seated on a cushioned mound, cross-legged, like the ancient fakirs of India. His body and limbs were shrunken and puny, and seemed unable to support the structure of his enormous head. From a spindle neck it rose, swelling upward like a top, from thin, small lips, a flattened nose, to colorless eyes turned introspectively inward, and a bulging, hairless forehead. Only a tiny tuft of hair—a scalplock—relieved the aridity of the ballooning skull.

He sat with great head resting on emaciated fingers. He seemed not to have seen his visitors, the differently modelled humans and their strange craft that had dropped upon him from the sky. He seemed unaware of all else in the universe but the ingrowing of his own contemplation.

"Bah!" snorted Kleon with a vast scorn. "Is he then the enchanter who inhabits this fantastic island? Why, I could break him in two with but a twist of my wrist."

"Don't try it, friend Kleon," warned Beltan. His gaze smoldered upon the oblivious creature. A strange respect crept unwillingly into his eyes. "Physical prowess is but an early stage of evolution. You typify that quite well. Sam Ward here represents the commingling of the mind and the brute. I had believed myself to be advanced in mental force. But here, before us——"

"You mean that this puny creature, who does not even know that we have intruded upon him, is superior to you?"

The Olgarch nodded his head. "He made me yield the very secrets of my existence," he answered simply, "of every-

thing I had ever known or dreamt. Therefore——"

"Hey, there!" called Sam. "Who are you and what is this land?"

The seated man lifted his head slowly. He seemed to have awakened from a dream. His colorless eyes stared at his visitors. Sam reeled back. A wall of invisible force had struck him full in the face. It was like a physical blow.

"Sssh!" said the puny creature. His voice was rusty, halting, as though he had few occasions to use it. "You have disturbed my contemplation. I have lost the thread of my inner discourse."

Kleon, magnificently animal, looked down with open scorn at this defenseless, wretched apology for a human being. He had regained his usual composure, lost the first fright that had assailed him.

"Listen, old man," he said contemptuously, "we are strangers cast upon your desert island, in need of food and drink and shelter. Instead of mumbling nonsense at us, bestir yourself to hospitality."

The bulging head lifted slowly. The eyes veiled themselves. "Strangers?" he queried reflectively. "Not at all. You are Kleon, an Athenian, who dwelt in an unbelievably primitive world ten thousand years ago. With queer slavishness you followed a barbarous leader, hewing and slaying, into countries peopled with diverse races."

Kleon gasped. His particular god, the great Alexander, a barbarous leader? In his anger he forgot to be amazed. "How dare you——?" he started furiously.

The man ignored him, turned his veiled eyes to Beltan. "You," he said in halting phrases, "believe you are contemporaneous with me. But time is a function of thought, not of space and directive motion. Therefore I, Ens, who seemingly exist in the same time flow, actually am separated by many ages from you, Beltan, man of the ninety-eighth century, and denizen of the enclosed city of Hispan. It is true that you show evidences of an inner fumbling after the truth, but as yet it is but a blind groping."

The proud Olgarch said nothing. His handsome face betrayed no sign of his emotions.

CALMLY the large head twisted on its stemlike neck. "As for you, Sam Ward," he spoke, "you are a puzzle. You come from the twentieth century, a strange mixture of the unbelievably primitive and of dim aspirations. Kleon and Beltan are simple—pellucid—like their times. The mold was fixed—determined. But your age was a shifting complex. It was a fearsome stew in which the animal and the mental fought for mastery." His bulbous head swayed on its stem like an overgrown pod. "A bastard age, which even I, observing you, cannot wholly fathom."

"How in blazes do you know all this?" Sam exploded involuntarily.

Ens was no longer looking at them. His gaze was withdrawn, turned inward upon himself. He did not answer. He seemed to have forgotten their very existence. His shrunken body stiffened, his thin lips were closed.

Then slowly, even as the three adventurers stared, a queer shimmering haze moved outward in concentric waves, coalesced, deepened into a surrounding shell, cutting off the cross-legged man from their view.

Once more they were alone, next to their fuelless plane, on a barren, volcanic soil.

"Well, I'll be damned!" breathed Sam.

Kleon flung up his shield as if to guard himself, called on Pallas Athene for protection.

But Beltan said in a strange voice, "He explored our minds, our ages, found them valueless. Wherefore we no longer exist to him. He has returned to the contemplation of his own thoughts as

the most important thing in all the universe."

"And that wall of force?" Sam demanded.

"The emanations of his thought."

"But," Kleon protested, "how can thought have physical being— texture?"

"Why not? Long ago it was determined that there was an electrical basis for thought. Some even went so far as to venture that it had an independent being of its own—that the universe itself was but the outer manifestation of the inner thought-structure. Here, on this barren island, there has been a curious evolution through the centuries. Ens and his predecessors, cut off even as Hispan and Harg from all contact with the rest of Earth, had disregarded the physical, the well-being of the body. Instead, they concentrated on the mind—upon the abstract contemplativeness of themselves and the inner universe. They developed powers of which even we in Hispan had no conception.

"Evidently Ens has discovered a method of projecting his thought waves, of interlacing them around himself in a web of force. Invisible—but without doubt more impenetrable than any material substance of which we have any knowledge. Within that shell, he is withdrawn from all outer distraction and interference, and able to pursue his absorbing abstractions in utter peace."

Sam whistled. "At Harg I complained that their science was too practical, too immediate in its purposes. Here this strange being who calls himself Ens has gone to the opposite extreme. He just sits and sits and contemplates his own navel in complete satisfaction."

The Olgarch smiled. "Evolution plays queer tricks. This is one of them. Yet I have no doubt that if aroused, Ens and his immaterial thought could prove more powerful than all the legions of Harg."

Sam started. "Say, that's an idea," he exclaimed. "I wonder——"

BUT KLEON was growing impatient. "Are we going to starve in fruitless discussion," he complained, "or are we going to find some way of getting off this meaningless island?"

The American stopped. "As always, you are right, friend Kleon," he grinned. "I'm getting hungry myself, and there isn't a morsel of food in the plane."

They looked around them for the first time, then. The island was of volcanic origin, and about ten miles across. There was not a tree, not a blade of grass, not a human habitation or sign of animal life. A more desolate, wasted surface could not be found outside the bleaknesses of the moon. Overhead, the sky was wholly obscured, secreted from view by the strange, shifting patterns of impalpable waves.

"Does this Ens, who so most discourteously withdrew himself from our sight, inhabit this desert by himself?" the Greek demanded. "If so, then we are indeed in parlous straits."

Sam squinted upward at the doming interlacements of thought. "It looks that way," he murmured. "Yet he's a wizard to have made all those emanations alone."

"By Ares, God of War," exploded Kleon. "I shall make him come out of his shell and help us. I do not believe in this metaphysical nonsense that stems from Plato. I myself am rather a disciple of the great Aristotle."

"Here, don't do that," Beltan cried.

But already the Greek had run full tilt against the shining haze. His short broadsword was in his hand. His shield was before him in warlike pose. His javelin, slung by a thong over his back, rattled against the heavy armor. A magnificent fighting machine, unsurpassed in the history of the world! Racing irresistibly against an immaterial shimmer, a mere projection from the mind of a puny, shrunken man with overlarge head.

The blade flashed in the air, descended

with powerful, hacking stroke. It hewed against the pale web of thought. The keen steel stopped in midstroke as though it had hit a neutron wall. Sparks flamed outward in a dazzling spray. The weapon wrenched violently from his hand, flew ten paces away. Kleon catapulted backward in a sprawling heap.

Sam swore furiously, tugged at his Colt revolver. Without quite knowing what he did, his finger contracted on the trigger. His friend, comrade of incredible adventures, had been hurt—killed perhaps.

The steel-jacketed bullet crashed from the orifice, sped true to its mark. Sam gaped foolishly. The missile mushroomed against the invisible surface in a flare of blinding light, clunked solidly to the ground in a flattened disk.

Before he could shoot again, Beltan had him by the arm. The Olgarch's face was serious, concerned. "You are as bad as the Greek," he groaned. "A creature of impulses—of disastrous emotions. Our puny weapons are no match for the mighty thought of Ens. He could kill us with the merest flicker of his mind."

Kleon stumbled slowly to his feet. He stared incredulously at his still-tingling hand, picked up his stricken sword. A shadow of dawning awe overspread his haughty features. "By Zeus," he husked, "I had never dreamt my sword could be thus turned."

Sam looked down at his still-smoking Colt with a sheepish grin. "It seems," he observed, "that Ens does not wish to be disturbed."

"There are others on this island," Beltan said suddenly.

"Where?" chorused his friends.

The Olgarch pointed. "A goodly number. See those faint iridescent glows scattered over the ground—so faint they are hardly discernible? Members of the same race as Ens, perhaps, each enclosed in his own sphere of thought."

"The ultimate in privacy," Sam remarked. "I hope they're not all as standoffish as Ens. Let's get started. Now that Kleon brought up the subject, I'm *very* hungry."

THEIR FEET crunched over hard lava and crumbly pumice. They were tired and hungry and in desperate straits. Somewhere over the Pacific, even now, were the hordes of Harg. Each fanatic soldier enclosed in an individual stellene rocket tube, bearing the stellene-tipped rod that flamed blasting disintegration, was searching for his prey, for new cities, new peoples to conquer on this Earth heretofore thought entirely desolate. A Totalitarian State, aflame with the lust for conquest, had poured out its men from their underground city after the escape of the three men from alien times. Under their new leader, Vardu, they were ruthless, vengeful.

"Here we are," said Kleon gloomily, halting before a swirl of interlocked vibrations. "Another one, secreted within his cocoon. How do we get him out?"

They called, they waved their hands, they shouted, they gesticulated. They even danced in frantic effort to pierce the swirling maze. But the shimmer did not change its tints, or open up to reveal who or what lay within.

At length Sam called a halt, exhausted. His lean face etched with angry bitterness. "Nice people, these intellectualized beings of the future," he panted heavily. "The very essence of hospitality. Me, I'd prefer a little less brain power and a little more of warm, human emotion."

"Evolution has its price, it seems," Beltan said calmly. "We of Hispan have found that out. So, too, have the hordes of Harg. A single faculty or group of faculties expands—but only at the expense of others. The latter—laggard in the race, or found to be useless—tend to atrophy."

"I'm still hungry," Kleon interposed.

"Beware the Greeks whose stomachs are empty," murmured Sam. "Let's try another of these birds."

The third and fourth and fifth of the enswathed denizens of the island paid no heed to their cries and entreaties. Even when Kleon, in an access of desperation, daringly flung his javelin at the exasperating shimmer and the weapon jerked back in a huge shower of flaming sparks, there came no response from the interior.

"It's curious," frowned the Olgarch. "No one since Ens has even taken the trouble to invade the privacy of our minds, to pluck out the secret of our presence on their island."

"We obviously are beneath their contempt," Sam snarled. "No fit subjects for their lofty contemplation, damn them!" He walked hastily over to the next dome of iridescence, fists clenched, jaw ridged with hard little muscles. "By God, I'm going to make this fellow open up if I have to——"

He stopped short. "Well, what do you know about that?" he exclaimed.

As he had approached, the interlacement had suddenly burst into a lively glow. Inquiring feelers seemed to thrust outward. Then, as if satisfied, the light faded, the impalpable surge of waves grew thinner and thinner until, suddenly, it was gone.

EXPOSED to their astonished view was another being. He was like Ens, yet somehow dissimilar. By the standards of the three comrades, he was but a puny thing, yet his body was not quite so shrunken, his head not so huge as that of Ens. He balanced himself precariously on his tiny feet, his eyes alert.

"Welcome, men of alien ages," he piped in a thin, shrill voice. "Welcome to the Island of Asto. My name is Kar."

"Praise be to Zeus, the Provider!" ejaculated the Greek. "At last we find a trace of hospitality on this accursed island. My own name, stranger, is——"

"Kleon," completed Kar with the ghost of a smile on his sallow face. "My own vibrations are interlocked into the overhead dome. I know your names, your histories, your rather feeble thoughts. But you are a novelty on Asto, where nothing physical ever happens. I was waiting impatiently for your arrival before my thought-seclusion."

"But we almost missed you," Sam ejaculated. "There are hundreds of your kind, each wrapped up in the selfish garment of his thoughts. We tried in vain to attract the attention of half a dozen.. Suppose we had given up before we came this way?"

"That would have been too bad," squealed Kar. "For, to tell the truth, I am becoming tired of my solitary contemplation. You see," he smiled pallidly, "I am not as far advanced as the others of my race. I have not been able to subjugate the last traces of my lower animal emotions, of which you possess such an overabundance."

"Then why," inquired the Olgarch, "did you not beckon to us, or come over to greet us? Surely you possess the faculty of locomotion, even on those legs."

Kar glanced down at his feeble limbs with certain shame. "They are grossly animal, are they not?" he said with an apologetic air. "Capable even of a crude form of locomotion. I told you that I have lagged behind the status of the others, like Ens, who could not even rise as I do from seated contemplation. But we do not use limbs for locomotion. They belong to primitive times, even as your ships and rocket planes. We could, if we wished, transfer ourselves even to the farthest stars by the mere power of thought. But I would never have intruded on the privacy of Ens, or of any of the others. That is not done on Asto. It is, in fact, inconceivable. Each one of us is entitled to his privacy, to the solitary contemplation of his own excellencies, of his own ratiocinations."

"Individualists," Sam murmured. "Cold intellectualism of the worst kind."

"Naturally," Kar assented. "What else can the intellect be? Thought is essentially a solitary process, not a community affair. Long ago this island was delimited into prescribed areas, exclusive to the individual. We do not trespass on each other's privacy."

"This is all very well," Kleon interposed with a certain asperity. "I, myself, used to love philosophical discussions. I walked with Aristotle and I conversed at length with the Gymnosophists. But just now I confess that they are profitless in the presence of an empty belly."

Sam grinned faintly. "Now that you bring it up again——"

"You mean you are hungry?" demanded the bulbous-headed man with a show of surprise. "A grossly animal desire from which even we are not wholly exempt. Wait a moment."

Puzzled, the three comrades watched.

KAR HAD corrugated the damp skin of his great forehead. It wrinkled into frowning concentration. He stared with pulsing eyes at a round, smooth ball of crystal clearness that seemed suspended over the void of a pit that sank bottomlessly into the dark gray lava. They had not noticed it before.

Even as they followed his glance, the ball clouded under the impact of his will. Slowly it began to spin. Round and round and round, faster and faster, while the cloudiness deepened and became a lambent cherry-red.

As it spun, deep within the cylindrical pit there came a hum, the whir of strange machinery. The hum deepened to a full-throated drone. The ground vibrated.

Then, suddenly, a tiny platform rose swiftly into view. On it, forlorn on the metal expanse, were three small pills.

"Aspirin," thought Sam incredulously.

Kar relaxed, waved his long, slender neck toward them invitingly. "One for each of you," he piped. "Food for your bodies."

Kleon's classic features darkened. Involuntarily his fingers tightened around the hilt of his sword. "That little pellet food?" he flared angrily. "You are pleased to jest with hungry men, friend Kar, and I am in no mood for jesting."

"Synthetic pellets," the Olgarch explained quickly to the hot-headed Greek. "Concentrated essence of food. Hispan has done the same. But this is a different process."

"A very simple one," the man of Asto said indifferently. "Within the pit that delves into the earth is a complex of machinery. That little ball you see is the governor. Its special substance is attuned to the varying vibrations of my thought. I but will the requisite wave lengths, and the ball spins obediently. Beneath, the proper machinery is activated, and in the space of seconds the finished product is thrust up for my use. All my simple physical needs are thus provided for. Each one on this island does the same."

"I can understand the principle," the Olgarch replied with interest. "Granting, of course, your special faculty of projecting thought at a distance. But surely on this barren land you have not the necessary organic elements for food and clothing. Hydrogen, oxygen, sulphur and phosphorus, perhaps; but how about carbon, nitrogen, iron and manganese?"

Kar stared at him. "Even your Hispan is obviously of a retarted culture," he retorted. "Here we do not worry about the elements. Our machines use only the primal stuff of matter—electrons and protons—and weave them into the requisite atoms by compelling them into the proper orbit-states of energy. But eat!"

Gingerly Sam picked up his pill. It seemed small enough within the bluntness of his fingers. He thrust it, never-

theless, into his mouth, swallowed it. So did the others.

Sam Ward gulped, bewildered. He had hardly felt the pellet slide down his throat, yet a sense of fullness, or repletion, had already spread through his system. Strange tastes, subtle, fragrant, luxuriously different, salivated his glands, breathed epicurean delights. He turned in time to see the broad grin of delight on Kleon's face. The Greek smacked his lips resoundingly. "It is magic," he said with a satisfied air, "but it is a good magic."

"We have eaten and drunk, in a way," Beltan said quietly. "Now there are other matters to be considered. The rocket hordes of Harg, for instance."

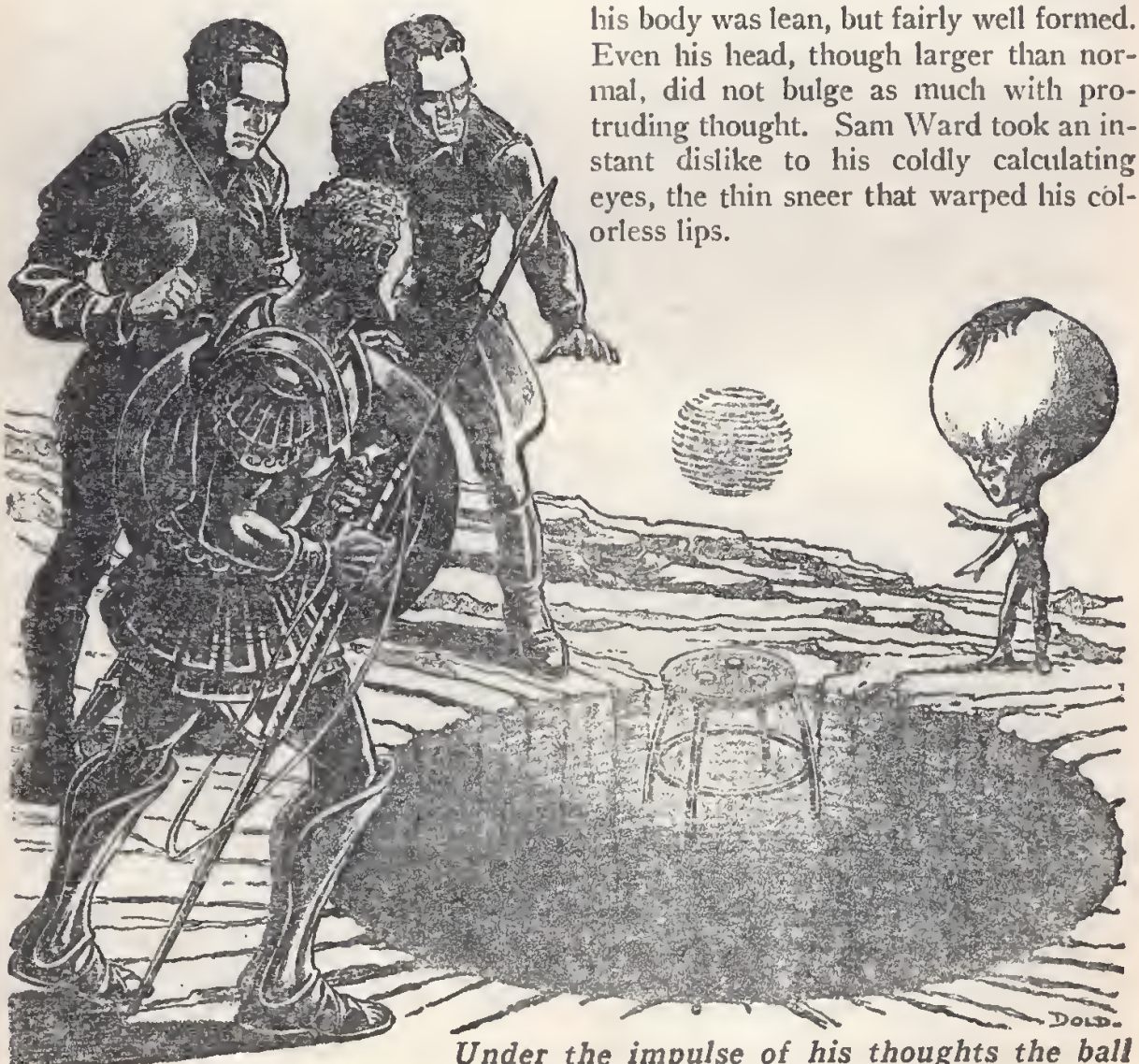
SAM STARTED. He had almost forgotten about them in the immediacies of this Island of Asto. He thrust a quick glance upward. The doming web of thought vibrations was still in place, shifting, swirling with inherent power. The sky was not visible. Surely they were safe. Then he frowned. If the three of them, in a single rocket craft, had managed to detect the island, surely Vardu with his rocketing soldiers would have no difficulty.

"Harg?" queried Kar in some surprise. "What do you mean?"

"Well, you see," Kleon began, and stopped abruptly.

A man had materialized in their midst!

He was taller than either Ens or Kar; his body was lean, but fairly well formed. Even his head, though larger than normal, did not bulge as much with protruding thought. Sam Ward took an instant dislike to his coldly calculating eyes, the thin sneer that warped his colorless lips.



Under the impulse of his thoughts the ball spun more and more swiftly.

One moment the ground next to Kar had been vacant; now he was there, comfortably standing, his will beating like heavy wings against the minds of the three alien comrades.

"I know that I have done violence to the inviolable traditions of Asto in intruding upon your privacy, oh Kar," he declared with a negligent air, "but you and I are the only ones of all our race who retain to some extent the primitive instinct of curiosity. I noted these strange visitants of yours, and desired to know more of their purpose and of these strangers from Harg of whom they speak."

Kar looked astounded. More, he seemed positively aghast. There was a new asperity in his tone that dulled its squeakiness. "Your invasion of my domain is an incredible act, Ras. In all my thousand years of contemplation, in all the former memories of my father, no man of Asto has done the like."

"Then it is time we break loose from a silly tradition," Ras said contemptuously. "I confess I am getting a bit tired with the company of my own mind. I have nothing more to explore therein. It begins to bore me. I require new stimuli, fresh outlooks." He turned his inscrutable eyes on the astonished trio. "Such as the presence of these men of alien times, for example—such as knowledge of these hordes of Harg of whom they speak with such obvious fear."

The Greek had given ground before this sudden apparition. Involuntarily his shield came up; his lips moved in silent appeals to his gods.

But Beltan's proud features displayed no outer perturbation. "I take it, friend Ras," he said, "that you transported your bodily frame along the thrust of your concentrated will?"

The tall Astonian turned with a thin-lipped smile. "Naturally," he assented. "The secret of thought-transportation was discovered three millenia ago by our fathers. Our minds, through long practice and concentration, have become storage batteries of extremely high potential. We thrust out a steady stream of beam-thoughtwaves to the point in space desired. The potential at the receiving end is considerably lower. Our bodies, polarized in the direction of the beam and infused with electro-magnetic vibrations, descend from the higher to the lower potential. The speed is of the order of light."

"Then you could travel anywhere, and as far as you like?" Sam asked quickly.

"Of course."

"But why should we?" squeaked Kar. His perturbation at this unheard-of invasion of his privacy had passed. "Could we contemplate the problems of the universe any better amid other and stranger surroundings? If anything, the outward show would distract our ideas, dissipate our energies."

RAS FAVORED him with a sardonic glance. "I told you, Kar, that I for one have reached the end of my inner cogitations. I can go no further. Without doubt I have not sloughed off the physical as much as the rest of you."

Kar was properly shocked. He wagged his bulbous head. "There is no end to the exploration of one's own mind," he piped. "Perhaps I, too, have lagged a bit behind the others. But look at Ens, look at a hundred others. In ten thousand years they still will not have reached the end."

Ras disregarded him. His penetrating eyes impacted on Sam. Desperately Sam blanked his mind against the prying waves that seemed to suck him dry. "Tell me more of this race of Harg," the Astonian demanded softly.

The twentieth-century man complied unwillingly. In any event, he reflected, he could not withhold secrets from these islanders. He told of their stumbling upon the hydraulic, stellene-enclosed city, of its fascist totalitarianism, its sci-

ence, its incredible army of rocket soldiers. He described how they had managed to escape, with the aid of the Hetera Alanie; how Vardu had wrested control from Hanso and had sworn to subjugate the Earth. How they had ever fled before his pursuing hordes in the stolen rocket ship and found no other civilization but this Island of Asto.

"Except for the neutron city of Hispan," Ras said with a side glance at the Olgarch.

"Which is impregnable to all attack," declared Beltan with proud dignity.

"But you must take warning," asserted Sam. "When we sped out over the Pacific in last desperate flight, Vardu was close on our trail. His hordes will soon arrive. They have numbers, weapons of tremendous destruction. Even your thought-enclosures are insufficient. But if you will get to work, fashion counter-weapons as no doubt you can, you may rid all Earth of this threat to its safety."

"The mesh of all our thoughts is impenetrable to the combined superforces of the universe," piped Kar positively. "It is the fundamental substratum of matter as well as of space. It is eternal, indestructible. Even if the universe should flame in ruining destruction, the projection of our thoughts would nevertheless remain intact."

"I can well believe it," Kleon cried ruefully. He stared at his futile sword and javelin. Since they had been turned aside by an immaterial shimmer his childlike faith in himself had sagged. In spite of his adventures in Hispan, at Harg, and now on Asto, his mind was still too steeped in the habits of the old Greek world to grasp entire the mighty forces that ensuing centuries had unleashed.

"That is true," Ras said absently. He seemed to be absorbed in his own thoughts.

"But at least," insisted Beltan, "even if you are safe, think of the rest of Earth. There may be other cities not nearly as advanced as you, whose defenses may not be proof against the might of Harg."

"They are no concern of ours," Ras answered brusquely. His eyes were speculative; a tiny smile thinned his lips.

"A thoroughly selfish attitude," cried Sam indignantly. But he was talking to thin air. A moment before Ras had stood there, close to Kar. Now, a wind stirred and rustled as air rushed in to fill the void of his form.

Kleon's blue eyes popped. "Aie!" he gasped. "Where did he go?"

"No doubt he went back to the privacy of his own meditations," Kar said indifferently. "He was bored with excess talk. It is a drain on our vitality to speak."

THE OLGARCH shook his tawny head. There was rarely disapproval in his level eyes, but now a shadow had passed over them. "If this Island of Asto represents truly the intellectual advance of the future, then the outlook is dark indeed. Thought that has ingrown, rather than expanded—thought that seeks the inner seeds of specialized decay, that grows narrower as it waxes mighty. It seemingly brings in its train the exaltation of the individual and the total obliteration of the race. I'm beginning to think that evolution has taken the wrong path, that friend Kleon with his emphasis of the physical represents a more natural, wholesome course."

"Know you," Kleon flared angrily, "that I am a philosopher and a man of letters as well as a fighting man. I have witnessed the passage of ten thousand years and have seen nothing to compare with the flame of intellect that played over Athens and Corinth and Thebes and the cities of the Ionian coast."

"He is right," Sam affirmed. "A little more of the old Greek ideal of a sound mind in a sound body—a happy balancing—would have worked wonders for these overemphasized States of the

future. Oligarchy in Hispan, Fascism in Harg—and Anarchic Individualism here in Asto."

"I chose my words badly," Beltan apologized. "That was in fact what I meant." He broke off abruptly, frowned. He turned slowly to Kar, whose eyes were already sinking within their sockets, as if he, too, were wearied with much talk.

"Where is the domain of Ras?"

The Astonian's eyes opened a trifle. His voice was a thin whisper. "To the left of Ens," he answered. "Now go. I am already wearied of your finite intellects. I wish to probe deeper into myself."

"But there are certain matters that must be settled," the Olgarch protested.

It was too late. The sound of his voice beat in vain against a blanketing screen of thought. Kar had faded from sight, was already hidden within the mesh of his vibratory intellect.

"That's that," declared Sam with a wry smile. "Nice people, these Astonians. Even Kar, who seemed the most human of them all."

"I say we leave them to their fate," Kleon declared angrily. "Let us go on to seek other cities."

"You forget," Sam reminded him, "we've run out of rocket fuel. I had wanted Kar to make us some, but he didn't give us a chance." He cupped his hands. "Hey, there, you within! Come out for a moment. We need a little help!"

But there came no answer from the enveloping shimmer.

The three stranded adventurers turned and stared at each other. Their plight was desperate. With Kar's withdrawal, the last chance of aid had vanished. As far as these self-centered intellects of Asto were concerned, they could starve without a helping hand being raised in their behalf. And ever present in their consciousness was the knowledge that the fanatic hordes of Harg were on the way. Each knew that little mercy might be expected from Vardu, their Leader.

"Let us seek Ras again," Beltan decided suddenly.

Sam shrugged. There had been something about that thin-lipped Astonian that had repelled. But anything was better than standing vacantly before a shimmer of impalpable thought.

They trudged through the crunching pumice in silence. The rocket ship loomed in front of them, disconsolate, futile-looking without the precious fuel.

They passed the hazy iridescence of many concealing curtains. Behind each a being roosted, oblivious to all but himself and the exploration of his own mind. Before each one they paused and tried to penetrate the silences, to rouse the creature within. They failed each time.

EVEN BELTAN'S proud calm took on sharp-edged tones at repeated failure. He fingered his electro-blaster as if tempted to try its power against the arrogant withdrawals. But he smiled weariedly and thrust it back into his belt.

Ens was passed without even a hail. Then Sam stopped, looked about with a bewildered air. "That's funny," he remarked. "I could have sworn this was the spot to which Kar alluded as the seated domicile of Ras."

"It is," Beltan responded with a quiet frown. He pointed. "Look! There is a fresh-smoothed surface where a cylindrical pit once existed. Ras has obliterated it—filled it in!"

"But why?" Kleon demanded. "Where could he have gone?"

The Olgarch's eyes were steady. "I was afraid of this," he said. "He seemed restless, bored with his thousand years of contemplation. He has left the Island of Asto."

"Left it?" echoed the others.

"Yes. Our unexpected arrival gave him the idea. That, and the story he derived from our minds and our tongues.

He has gone to meet the oncoming hordes of Harg."

"To fight them alone!" exclaimed Kleon, his eyes kindling. "Aie! I had not expected such noble courage from a puny thing like him." He struck his javelin against his shield with a resounding clash. "I wish he had taken me along."

Sam said softly and with a certain tenderness: "You still possess the child-like faith of your day, my Kleon. You cannot understand the twisted corridors of these minds of the future. Ras has not gone to fight Vardu. He has gone forth to make an alliance with him, to propose that they join forces and thereby become irresistible. A mighty intellect joined to a mighty fanaticism. Nothing on Earth will be able to withstand that combination."

Beltan nodded somberly. "That was also in my mind, Sam," he said.

"But—but—" the Greek sputtered, "that would make him a traitor against his own kind. No man is so base——"

"Are they not?" Sam retorted grimly. "History is strewn with such examples. Your own Greek world had plenty. Besides, on this Island of Individualists there are no binding ties. Supreme selfishness is the approved rule."

Beltan said quietly and with emphasis, "Here they come now. Vardu was closer on our trail than I had thought."

Startled, they stared upward at the sky.

They beheld a sight thrilling, awe-inspiring—yet deathly ominous in its implications.

There was a rift in the weaving dome of thought-projections—the single community effort of the anarchic individuals of Asto. A neat round patch where, earlier, the emanations of Ras had fused the shield to a completed whole.

The blue sky beyond was aflame with hurtling projectiles. A hundred thousand Hargian soldiers, each enclosed in his stellene cylinder, grasping his stellene-tipped disintegration rod, face blazing with the inner fires of fanaticism.

Behind them blasted long streamers of fire, catapulting them straight for the Island of Asto at terrific speeds. The Pacific rocked and roared with the thunder of their coming. In the van, a huge rocket ship slammed along with all jets open.

"Run for it!" Sam yelled.

"Where to?" the Greek ejaculated.

"Back to Kar. If we can only make him understand!"

THEY RACED over the furrowed lava, hearts pounding, ears deafened with the mighty vibrations. Already the hordes were pouring through the gap in the intangible haze.

Straight for the thought-enwrapped Ens they lanced. A thousand rods jerked forward; a thousand blasts of atomic destruction crashed through resistant air.

Horrified, the three fugitives stumbled blindly on, heads twisted backward to view the awesome sight.

An unequal battle! A lone puny being, wrapped only in the projections of his own thought, against a hundred thousand warriors, armed with weapons that crashed the atoms in their courses!

A dome of fiery red blazed with insupportable brilliance. The pumice ground flared and shattered into primal electrons. Billowing gases spattered into coruscating dust. Again and again the bolts crashed forth; again the meshed enlacement of Ens glowed and hissed.

"It's impossible for him to exist within that molten shell," Sam groaned. "They'll break through in another second."

"I'm not so sure," answered Beltan as he ran. "Thought is more primal than matter. Look!"

Kleon gasped, had stopped in mid-stride. Astounded, they stared back at

the holocaust, forgetful of their own danger.

The beleaguered shell of Ens was expanding. Slowly at first, then more and more rapidly. The red tints shifted to a blinding white, then to an almost invisible, furious blue. The roçket-warriors clustered round it like a thousand stinging wasps; the pointed rods flamed with red destruction.

But the immaterial dome rushed outward with increasing speed. Its blazing surface caught the crowding vanguard of the Hargians. There was a series of tremendous detonations, a spray of cometary sparks. A hundred Hargians vanished into nothingness.

The assault redoubled. A thousand more hurtled forward, belching bolts of searing fire. The thought-shell flared anew under the tremendous impacts.

But steadily, remorselessly, the flaming traceries expanded, engulfed more and more of the rocekt-warriors, whiffed them to extinction.

Sam was rooted in his tracks. "Good God!" he yelled. "No wonder the Astonians were not disturbed at our warnings. Why, he's wiping out the entire horde, singlehanded."

The Greek's eyes glowed with the lust of battle. He brandished his javelin joyously. "By Castor and Pollux, I take everything back I ever said. This puts Thermopylae into the shade."

But Beltan said: "It's simple enough. Thought is obviously the substratum of the universe. Its waves—more fundamental than electron trains—are unaffected by material weapons. But its own vibrations, when concentrated, set up a dissonance in the orbits of the atoms and burst them asunder."

"The point is," cried Sam, "that Harg is defeated, and whatever cities of Earth that may exist are saved."

Pain shadowed the Olgarch's eyes. "I am not so certain of that. Here comes the rocket ship."

The silvery craft plunged down into the mêlée with a thunder of jets. An amplifier ripped a fierce command through the turmoil and crash of battle.

"Back, men of Harg!"

WITHIN the shining hull two men stood erect. One was tall and dark of face; a tiny mustache rode his snarling lip.

"Vardu!" screamed Kleon, and lifted his javelin.

Sam caught his hand in time. "You fool," he cried. "You wouldn't last a moment if they knew you're here. Besides, Vardu's not the dangerous one now. It's Ras!"

The renegade Astonian stood at the side of the Hargian Leader. He was slighter, punier, with bulging, ungainly head. An unpleasant smile played over his thin lips.

Swiftly a haze enveloped them both, a screen behind which their features grew vague and shifting. The screen expanded to meet the onrushing shield of Ens. There was impact.

The very Island reeled on its foundations. A blast of hellish fire ran like a flaming sword deep into the earth, up to the very heavens. The overlaying, feebler curtain of vibrations ripped asunder like smoke puffs in a hurricane. The blue Pacific reared in mountain-high breakers. Sound screamed and battered at paralyzed eardrums. The stellene-enclosed men of Harg tossed violently in the gale. Sam was flattened to the ground.

Two mighty intellects opposed each other with weapons such as the world had never seen before! Projected thoughts, meeting in head-on collision like runaway stars, thrusting and heaving at each other with forces huger than those implicit in the bowels of the Sun.

The dazzled trio picked themselves up, crouched aghast at the titanic conflict. For once their reckless daring, their sense of self-confident arrogance deserted them. They felt like tiny in-

sects in the presence of the elemental. Even the fanatics of Harg, trained to unthinking immolation, pressed back against the still-oncoming rush of their fellows. The stage was set for the solitary struggle!

For what seemed eons the conflict ebbed and flowed. The two spheres of thought crashed and flared and crashed again. The universe seemed to be split asunder.

Then, suddenly, it was over!

The blinding light flickered, grew pale. The thought-shells shimmered, thinned. The roar and thunder muttered away. The shells vanished.

Two antagonists, Astonians both, faced each other, naked, defenceless, their mighty thought-screens cancelled and made null and void by the mutually opposing forces.

Ras had a triumphant smile on his evil countenance. Vardu, next to him, looked scared, frightened out of his wits.

Ens, still seated on his cushioned mound, his futile shanks crossed beneath his spindly body, stared calmly upward at the threatening hordes. Ras said something sharply. Vardu jerked erect, crashed out an order through the amplifier.

"Slay!"

A hundred stellene rods uplifted, blasted forth screaming disintegration. Ens, still calmly staring, flashed to extinction.

WITH a huge shout of *Harg! Harg!* the countless hordes flung themselves upon the next Astonian, toward the other end of the island. Again the solid land shook and rumbled with the noise of battle.

"The blind, unutterable fools," panted Sam as he stumbled along. "If they'd only unite their thought screens, they could blast Ras and Vardu and all their men to hell and gone in an instant. This way they'll be butchered one by one."

"They are individualists," groaned the Olgarch. "In the course of thousands of years they have lost the faculty of community effort. Each is a law unto himself."

"They are weaklings, not men," countered Kleon fiercely, "in spite of their intellects. They deserve to be wiped out."

"Except that we go with them," Sam said with grim emphasis. "Our sole hope is to convince Kar before the mopping-up process reaches us. Ah, there he is!"

The domelike evanescence was opaque, quiescent. Beltan raised his voice, shouted above the roar of farther battle. "Kar, oh Kar! Show yourself and hear us. Your own fate, the fate of all your comrades, depends upon your listening."

Slowly the shield grew transparent, fell away. Kar stared out at them with calm, untroubled glance. "Why do you disturb my meditations?" he piped. "You have broken the train of a deep problem involving the ultimate fate of the universe."

"In another few minutes it wouldn't matter anyway," Sam told him bitterly. "Ras has turned traitor, is leading the forces of Harg against his fellows. One by one they are easy prey. But if you can arouse them, get them to unite——"

Kar looked at him with queer surprise. "Unite?" he echoed. "That is a word we do not know. It would mean the end of all our privacy—the end of all secluded thought. The fine balance of our intellects would be destroyed forever."

"So you'd rather die, like rats in a trap!" Kleon cried.

Kar turned his bulging head toward the Greek. "Even death," he declared, "is better than sinking one's individuality in the common will—than losing one's identity."

They argued, they pleaded, they screamed insults and objurgations. But the Astonian was calm, immovable, im-

pervious to all argument. And meanwhile, one by one, each by each, after gigantic conflicts, the farther island was being cleared. The din was terrific, the flashes of lightning blasts insupportable. The tide of war was swinging around, creeping toward them.

"All right, man of the future," Kleon ended angrily. "Die if you wish, without a struggle. I have seen enough of the future. I'm only sorry I did not fall in the fight with Porus. At least that would have been a glorious death, among my comrades and under the very eyes of great Alexander."

Kar meditated, shook his huge head on its spindly stalk. "I shall not die," he decided finally. "There are still certain problems to be solved."

"You mean," demanded Beltan, "that you will rouse your fellows, present a united front to the enemy?"

KAR LOOKED at him with pitying condescension. "I do not mean that, stranger. That would be impossible. But I shall withdraw myself from Asto where I have meditated for more than a thousand years, and pursue my solitary thoughts in peaceful surroundings."

"Good!" exclaimed Sam. "You will take us with you?"

"Not at all," declared the Astonian. "You are intruders upon my privacy. You have disturbed me enough. Goodbye!"

Sam jerked forward, cursing—but he was stumbling over nothingness. A moment ago Kar had stood before them. Now he was gone—vanished with a whoosh of inrushing air.

"By Heracles," muttered Kleon, shaking his javelin savagely, "I wish I had run him through on the spot."

Beltan's aristocratic face was pale, yet unmoved. "We have lost our last chance," he said quietly. He unloosed the electro-blaster from his belt. "Come, my friends, at least we shall go down fighting, as befits brave men."

But Sam's brows were furrowed on the cylindrical pit before him—the pit which held deep within its bowels the machinery whereby Kar had manufactured all the wants of his former existence. The crystal ball still hung suspended over the void.

"I wonder——!" he spoke half to himself. He swung around, peered through the billowing smoke of disintegration, the appalling sheets of flame, against which the shrieking, hurtling rocket hordes of Harg seemed like so many demons. "Good!" he cried, "our craft is still intact." He whirled back on Beltan, eyes burning with a new luster. "Do you think you would know how to handle Kar's machinery?"

The Olgarch looked doubtful. "It is hard to say. From Kar's description I detected certain resemblances to what the Technicians of Hispan have evolved. But, of course, I couldn't manipulate his crystal ball by the power of thought. I'd have to work with the machinery direct. Why do you ask?"

"Our rocket craft, by some freak of good fortune, is still intact," Sam explained rapidly. "Now if we only had some rocket fuel—a few gallons of liquid hydrogen, a tank of liquid oxygen——"

"Say no more," declared the Olgarch decisively. "I understand. How long do you think it will be before the horde sweeps over to this end of the island?"

"About fifteen minutes."

Kleon groaned. "Little time enough."

But already the Olgarch had unbuckled his electro-blaster, handed it to Sam, and had swung himself lithely over the edge of the pit. Anxiously, his two comrades peered down into the smooth-walled cylinder. Beltan was standing on a ledge that ran spirally down, moving sensitive fingers over the shiny surfaces of intricate machines whose very design were wholly foreign to Sam, not to speak of Kleon.

"What do you think?" Sam shouted.

Beltan did not look up. His whole

being was absorbed in a frantic effort to understand, to find a clue toward operation. "I don't know," his voice echoed up. "There are certain elements of familiarity, that is all as yet."

Kleon jerked suddenly erect, whirled, jabbed with his javelin in a single motion. Air screamed around them. Like a plummet, a Hargian soldier, his blond face cruel, hate-distorted, swooped out of the clouds of soot. A rocket jet blasted behind him. His hand held a lethal rod, its narrow muzzle snouted down through the monodirectional stellene envelope.

The javelin drove straight through the tiny opening. With a mighty thrust Kleon twisted. Then he was flung backward, the weapon jerked from his hand, borne down by the fierce momentum of that earthward drive.

But the Hargian's aim had been diverted. The blast of disintegration seared a great gap in the lava soil yards away. Sam levelled the electro-blaster. Blue bolts crashed forth. The soldier within his stellene tube crisped and flamed in death-agony.

"Whew!" Sam wiped his brow. "If it hadn't been for your quick wit, Kleon, our adventures would have been over."

"There will be more." The Greek picked himself up, breathing hard. "The flashes are moving our way now."

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IT HAD BEEN sheer luck that the hordes were still concentrated on the last few individualists at the farther end. And luckier still that billowing clouds of soot and dust made a thick pall over everything. Kleon was right. Where one had stumbled by accident upon them, there would be hundreds and thousands all too soon.

"Hurry, Beltan!" Sam yelled into the depths.

"I'm doing my best," the Olgarch answered. "I've already got an understanding of the funamental principle of these machines, but how to get them started is another matter. Hold them off as long as possible."

"We'll do it," snapped Sam grimly. "Keep going!"

To Kleon he said: "Did you hear that?"

The Greek nodded joyously. His nostrils were wide, eager with the snuff of battle. He slung his javelin behind him, hefted his sword lovingly. His shield protected his breast. "Let them come, friend Sam. We'll show these creatures of the future that there were men in the olden days—men who knew how to fight and how to die."

Sam grinned affectionately. A tag of an old book ran in his mind. Three musketeers, three dauntless men separated by eons of time, yet as one against a hostile world. It was good to be of their company.

His fingers tightened on the electro-blaster. His own gun was useless against the stellene envelopes. Even Kleon's ancient sword was better. Shoulder to shoulder they stood, eyes alert, peering vainly into the hell of sound and flame and blanketing soot that enveloped them.

"Here comes one," shouted Kleon suddenly.

A red rocket trail ripped through the murk, blasted toward them. Sam saw the startled look in the Hargian's eyes as he zoomed unwittingly upon the crouched figures on the edge of the pit. He jerked frantically on his stellene rod. Sam loosed a stream of crackling electric charges. The man died with a jarring thud upon the hard, lava floor.

Even as he fell, Kleon lashed forward with a tremendous stroke. Another blundering soldier had hurtled out of the enshrouding gloom. The fierce thrust swung the hard stellene shell to one side. Its nose buried itself unharmed within the stony ground. But the figure within catapulted forward against the metal. His neck snapped to one side, broken.

"Good work!" Sam approved. "They're coming fast now."

Kleon grinned. This was life; this was exaltation. Death no longer mattered. His sword had held its own against the magical weapons of the future.

The surrounding fog began to belch forth Hargians. The brilliant sears of flame where Ras and his former comrades locked in tremendous struggle drew closer and closer. Soon they would be upon the embattled three in overwhelming mass.

"How's it going, Beltan?" Sam yelled anxiously.

The Olgarch's voice rose muffled, excited. "Give me another five minutes."

Sam set his teeth hard. "Ten, if necessary," he shouted back with false optimism. And as he shouted, he shot down another Hargian. How many charges were left within the mechanism he had no way of telling—but they must be few indeed.

They came fast and thick now. Kleon cut and thrust like some terrible god. By sheer weight of arm and power of shoulder he parried the hurtling—but unstable—rockets, sent them crashing to the ground. Sam's fingers ached with the searing heat of rapid fire. Around them, in a flaming circle, were dead men, each within his shell of stellene.

THEN, with a click, the electroblaster was empty. "That's the end," whispered Sam with a wry smile. "It was a good fight while it lasted."

Far beneath they heard a whoop. "I've got it," cried the Olgarch. "I've found the key. Within a minute——" Never had they heard him so excited.

"A minute," groaned Sam. "He might as well ask for eternity. Here they come."

To one side the hordes were massing, moving with relentless deliberation toward them. The other end of the island was bare of Astonians. Now they were coming to clean up the few who still remained within their shells of thought, too absorbed, too indifferent to flee to save their lives.

"Sam Ward!" Kleon cried out in a great voice. "How about the weapons of Harg? Surely you must know how to manipulate their secrets."

"Kleon, you old son!" Sam yelled joyfully. "Of course!"

He raced to those tubes where the rods had been thrust through the transparent covering in vain attempt to bring them into action. He ripped hard, jerked two free. One for Kleon and one for himself.

There was a tiny knob near the handle. A single pressure, and a beam of force sped to its mark.

Again they were armed!

Beltan's tawny head emerged suddenly from the pit, the muscles of his face tense with strain. His both hands tugged at two glasslike containers. Within their walls colorless liquids tumbled. Even as he stumbled out upon the ground the transparent walls clouded and frosted with snow. Liquid hydrogen —liquid oxygen.

"Run for the plane," Sam yelled. "We'll hold them off."

"Here they come," shouted the Greek.

The Hargians had seen them now. A detachment swung off from the main concentration of the horde, swooped for the three running men like falling meteors.

Screaming bolts of red lightning seared around them, blasted great holes in the smoking terrain. Sam and Kleon flung up their captured rods, squeezed down. The foremost Hargians puffed into clouds of dust, but more whooshed through the air like angry bees.

A huge pit opened suddenly in front of Sam. The sleeve of his shirt vanished. A fiery pain etched his arm.

"Run, Beltan!" he shouted above the blistering turmoil. "We can't hold them off much longer."

THE OLGARCH'S face was white and drawn. His breath came in sobbing gulps. The cans were heavy and the ground rose about him in flying fragments. Ahead lay the inert rocket plane and the slim chance of safety. Behind, only two stout comrades to ward off an army of rocketing soldiers.

How he made it he never knew. How—in a sort of fevered nightmare—his stiffened fingers, burnt to the bone by the fierce cold of the liquids, emptied the containers into the proper tanks. Even stabbing at the controls while Sam and Kleon tumbled in was forever lost in fuddling memory.

As the slim craft trembled in every strut, and took off with full-throated roar, the huge ship of Vardu thundered along. Within its hull the Hargian Leader stood, sallow face furious, shouting indistinguishable words. At his side crouched Ras, his bulging forehead frowning in strained concentration. Around him rose a mist—a shimmering cloud that reached out after the fleeing plane.

"Faster!" screamed Sam. "Once that thought-screen envelops us, we're lost."

Beltan, black, sooty of face, staggered as in a dream, stumbled blindly against the controls. Somehow his wounded fingers found their mark, pressed with dying vigor.

The fleet ship responded like a startled bird. It accelerated with a screeching of tortured plates. The pursuing web of force reached out in avid swirls, missed, fell slowly behind. The heavy cruiser limped badly to the rear, outdistanced. The Island of Asto, with its holocaust of mighty minds, its barren soil a smoking welter, swarmed over by the triumphant hordes of Harg, vanished in the bosom of the Pacific.

Kleon roused himself, grinned through split lips. "What do we do now, oh Sam Ward?"

The American tottered to the bow, stared over the blue depths of a faint edging line on the horizon. "Harg has broken loose," he said grimly. "With Vardu in control, it was a menace to whatever peoples still exist on Earth. Now, reinforced by the tremendous intellect of Ras, it is an overwhelming threat. Yet we must not despair; we must find those other races—give them warning of what is coming."

"Still looking for your mythical city where evolution has gone ahead in accordance with twentieth-century dreams, eh Sam?" whispered the Olgarch with kindly irony.

"Yes!" It was a simple answer, but Sam's pain-struck eyes burned on the far horizon. There must be; there had to be——

Procession of Suns

by R. R. Winterbotham

A cosmic necklace across the throat of space, twenty flaming suns hung across the sky—throttling Man with fear.

FAO saw a machine of metal swoop down from the stratosphere to land in the swirling mists of the isolated Arrallian valley. Fao was the only person who saw the plane, for he alone inhabited the valley. The place was his retreat, almost inaccessible except by plane, a world shut off from the wars and savagery of man-ruled Earth.

The aircraft settled to a bouncing stop and a slight figure emerged from the cabin and stood for a minute or two,

apparently intent on getting his bearings. The aviator was dressed in the coarse fibre uniform of a military flier, but the uniform of which of the dozen or so warring nations on the face of the globe, Fao could not tell. Fao had lived ten years in this forgotten valley, and military maneuvers had changed the maps a great deal in that time.

One thing was certain: the aviator had no business in Fao's valley.

Under cover of the rocks, Fao approached the figure. He brushed his long hair from his eyes, drew an antique model of a neutron gun from his belt, and carefully drew a bead on the stranger.

Fao was young, and he intended to live the rest of his life in this valley. For this reason alone, it was necessary to kill all intruders. Once his presence was discovered, he would be sought out and forced to join one of the many armies, or shot down.

But as Fao's finger squeezed the trigger of his weapon, something checked him; some slight warning caused him to hold his fire and look more closely at the slight, youthful flier whose eyes seemed to be trying to discover a way out of the volcanic valley.

"Lord!" gasped Fao. "A woman!"

He stood upright and approached the aviator, who whirled at the sound of Fao's approach and drew a shiny weapon from her belt.

"Who are you?" she asked, covering Fao with the weapon.

"I wouldn't shoot, if I were you," said Fao. "I could have shot you easily a moment ago, but I didn't."

"Nice of you," said the woman, displaying even rows of white teeth in a smile. Fao also noticed her brown eyes, delicately formed nose and the fact that she was beautiful. "But it wasn't very prudent of you not to shoot. I may have to kill you, for, you see, I'm a soldier, like thousands of other women, and I can't let my plane fall into the hands of the enemy. You are an Arrallian and my country is at war with you."

"The fact that I live in a valley of the Arrallus mountains does not imply that I am an Arrallian," replied Fao. "I am Fao. Simply a man who has decided to be independent of other men. I have allegiance to no government and I dwell here by myself. This valley, surrounded by high cliffs, is not easily reached and I have not heard what country Arrallus is fighting now. I presume it has fought many in the past ten years."

THE WOMAN restored her gun to its holster and pulled the heavy flying helmet from her head, allowing thick brown hair to fall to her shoulders.

"You are right—Arrallus has had many wars and so has Mexia," she said wearily. "Everyone fights. All nations are in terror because the end of the world is near."

"Who are you?"

"I am Danna, colonel in the Mexia flying corps, although I am only eighteen. But how can you live here by yourself? Isn't it lonely?"

"It will not be lonely, now."

She looked at him with a startled expression and once more her hand flew to the holster, but the action was too slow. Fao reached her side and wrenched her hand from the weapon, then he removed the pistol and threw it to one side among the rocks. An expression of dismay crossed her face.

"I could not let you leave to tell others I am here," Fao continued complacently. "As for your personal safety—do not be alarmed for I shall not harm you. But you are my prisoner."

He turned toward the flying machine, unsheathed his own gun and sent a blast of neutrons into the structure. For an instant a small red spot glowed in the center of the plane, then suddenly the entire machine crumbled into a seething, molten mass.

"You forget——" Danna opened her

mouth to speak. Then she quickly closed her lips and cast a glance at her captor whose eyes glowed with the reflection of the red-hot metal.

Danna's first impression of Fao was that he was not an ordinary man, but she had learned, too, in her short career as an army fighter, that she was an extraordinary woman.

From the start of her exile with this bearded, long-haired hermit, she played a sort of game, using first one wile and then another to break through his impenetrable armor of complacency. But however she tried, nothing seemed to pierce his defense. He seemed impervious to human emotions.

But he was not entirely cold; he served Danna like a slave, constructing her shelter, showing her where food could be found or trapped, teaching her the ways to spend her hours. Still, he told her nothing of the work that occupied much of his time in a small stone building, hidden away in a forest at one end of the valley.

Fao's regard for his prisoner was undisguised adoration, but it was of the sort with which a person regards a fine painting or enchanting music. When Danna tried flattery, he received it with aggravating stoniness. But when a real compliment slipped from her lips, as it did from time to time, he seemed to recognize it as such and it left him speechless. Always he perceived her tricks, and always he realized when she was in earnest.

But two people cannot live side by side, away from all others, and remain formally reserved. Nor can two people always present the same viewpoint to each other. From day to day the pattern of human emotions, feelings and outlook is changed; even the amount of food one eats may have a bearing on his general attitude toward life. It was, therefore, impossible for Fao always to wear the mask of untouchability in the presence of Danna.

THE FIRST SIGN of change occurred in the fourth month of Danna's captivity, when Fao shaved his beard, trimmed his hair, and took her up a winding path to witness the sunset from the top of one of the valley's lofty mountains.

"Off there," he said, pointing to the southward, "lies Mexia, your homeland. It is a broad, marshy land, that was once largely covered with a fresh-water lake, known as Lake Erie. The country south of there once was known as Ohio before the glacial period that swept the Earth into a turmoil centuries ago. I have visited the ancient ruins of that civilization—the crumbling ruins of the cities, Cleveland, Toledo and Sandusky, and I have collected bits of seemingly worthless paper from the huge vaults of the ancient libraries.

"To my surprise I found that these ancients were in many ways far more progressive than we of an age one hundred thousand years later.

"From other sources I pieced together the stories of a great migration southward, of bloody wars of extermination that engulfed all humanity and split great nations into striving tribal units such as Arrallus and Mexia. A seismic upheaval split the continents of the world, and the rigors of glacial climate stripped humanity of all culture save a common desire for survival. Savage, civilized warfare wiped out the sciences of antiquity, excepting the science of slaughter. It brought the neutron guns, deadly gas, terrific explosives and hideous controlled diseases.

"I learned these things in my youth, before the latest period of warfare. I was a scientist, and when war broke out I fled to these mountains and made my home in this crater of an extinct volcano. It was here that I found among some old books I had rescued in your land, certain vague references to a science called astronomy—the study of stars."

Danna nodded. "I know," said she. "It was the stars and astronomy that caused the latest upheaval—the stars that promised the end of the world."

"You mean those twenty flaming suns up there?" asked Fao with a smile, pointing to the sky. Although the sun had not set, a long streamer of stars was visible, trailing across the heavens behind the Earth's primary—twenty flashing stars of more than first magnitude.

"Yes," said Danna. "You were not the only man who revived astronomy. Those stars were not in the sky at the beginning of the old civilization, and they are not novae, which flash suddenly from dimness and then wane again. Those are stars advancing upon the Earth and which will eventually tear our system to pieces."

"I am not so sure," smiled Fao.

The visits to the top of the mountains to witness the sunsets became more frequent. Neither spoke of love, yet each of them sensed it. Fao spoke of distant stars, of planets and told of other planets that had moons, like that of the Earth. He told Danna that in bygone years Polaris, the star that dimly gleamed overhead, was directly above the North Pole. Now Vega stood in the north. He told of shifts in constellations, of stars that had disappeared and of new ones that had taken their places.

But strangest of all, both of them felt, was the dazzling chain of twenty stars that seemed to sweep across the heavens each night like a necklace of glittering gems about the throat of space. Fao, with his primitive instruments, had determined that these stars were close, one of them being but one and one-half light-years away. The farthest was not more than thirty light-years distant. Yet all seemed to follow the sun in procession, like a burning fleet of ancient battleships sailing majestically across an inky sea.

NOTHING had ever been recorded in the history of man that approached this sight; no man had ever dreamed of such a thing as suns marching like men-of-war.

"It is terrible and beautiful," sighed Danna. "Someday they will overtake us and wipe out the Earth and the other planets—even the majestic Sun will crumble to dust. It is no wonder that humanity is fighting to ease its panic—no wonder there are wars."

"No," disagreed Fao, "the fact that the universe is so very large makes our own troubles seem small in comparison. What is the loss of a sun—even twenty suns—to the millions of stars in the firmament? I should say that the study of astronomy is a healthy way of relieving a person of his natural conceit and of easing a nation of its problems. One human life is so insignificant in the myriad forces of the universe that it can be entirely neglected."

But the small can look at the large, and together Danna and Fao delved into the musty documents—the secrets of the little room which Fao had concealed at first from Danna. They studied the old star-maps and tried to find the suns that had disappeared from their places in the sky. But the change had been so slow that no man had taken the trouble to make a record of it. A glacial period had passed, and an interglacial era had set in before the change had been noticed.

Danna was the first to point out a clue in the mystery.

"Fao," she said, pointing to a star-map that had been retrieved from a ruined library, "there is one important change in the sky which neither of us has taken into consideration."

"That is——?"

"—the Milky Way! When first you pointed to the heavens and showed me the star-map, I noticed that it was missing—or I thought it was gone. Now, upon studying the skies, I've decided

that it hasn't disappeared, but it has enlarged. The Milky Way forms the background for all the stars! We're in the middle of the Milky Way!"

"No," replied Fao, shaking his head. "We were in the middle of the Milky Way, and if it is gone, it is because we have left it. The Milky Way, which was our own stellar universe, was believed by the ancients to be roughly lens-shaped and about three thousand light-years thick. In its breadth it was about thirty thousand light-years, so that when we, in the middle of it, looked at its cross section, we saw a band formed by the light of millions of stars. In the space of our own universe were nearly all the known stars, all diffuse nebulosities, planetary nebulae, new stars, clusters, variables and other things—but no spiral nebulae. From this lack, the ancients decided that our own stellar universe was similar in form to that of spiral nebulae."

"But there is a difference between theory and observation," insisted Danna. "We have observation on our side. Early in the morning we can see where the Milky Way ends and the blackness of space begins. The Milky Way, which once was only a band of light, now occupies half the sky. Could it be that the universe has expanded?"

"There was such a theory—but I hardly believe it could have expanded at the rate necessary to account for what you have noticed. No, Danna, there must be another explanation."

IT WAS NEARLY a month later that Fao noticed the second peculiar thing about the Milky Way. By that time the watchers had observed a second thin line climb across the heavens just before dawn, and had reckoned it to be the opposite side of the circle that was known as the Milky Way.

The observation at once demanded that the two call the Milky Way a ring of light, which encircled a sparsely filled area in which the sun and other stars floated in space.

"But I don't like that idea," protested Fao. "It is unsatisfactory, and it calls on us to live under conditions that are not present in other stellar universes. I think we should stick to the idea that the Sun floats in the midst of a spiral nebula, which we see as the Milky Way."

All that night they discussed the theory, and when the sun rose on the following day they still were no nearer the solution. They slept through the day, and the next night they looked again at the stars.

They brought primitive instruments—small light amplifiers which produced enlargements on screens that could not be duplicated with three-hundred-inch telescopes. They observed the planets, glorious Venus and Jupiter with his moons, red Mars and ringed Saturn. They spied the Big Dipper—slightly out of shape after one hundred thousand years—pointing toward Polaris, which no longer was the pole star. They recognized the dim Pleiades, Orion and Cassiopea. But all constellations were distorted and different from those of the centuries-old star charts.

The Milky Way, vastly different, seemed to spread over the heavens like a gigantic diamond, threading to a mere line of light where it completed the circle, engulfing constellations and becoming a background for the stars directly overhead.

And the twenty flaming suns that followed Solaris across the sky, bright enough to cast a shadow in the moonless night, far brighter than Sirius, and merging splendor with Jupiter and Venus—they, too, had a part in this mystery!

"There is much to see and much we do not know," said Fao hopelessly. "In fact, we may never reach the solution. Thousands before us failed to guess the secret, so why should we discover it?"

"If we can, it would help stop those wars," said Danna. "The people of the Earth are fighting through fear—the battles are not wars of conquest, but wars of panic over the end of the world. In the million years that man has lived on earth as something more than an ape, there have been wars and rumors of wars; famine and pestilence; great men have lived; races have been born and civilizations have perished. Yet nothing has really ever happened compared to this!"

SUDDENLY Fao rose to his feet. "But it has happened before!" he cried. "It happens daily; why shouldn't it happen to a stellar universe?"

Danna raised her hand as if to quiet him, but Fao spoke rapidly and quickly. At first she refused to believe the things he said, but then as he talked on she saw reason in his ravings and realized that the problem was solved.

"We know the story of atoms," said Fao. "we are familiar with the neucleus composed of protons and neutrons, surrounded by flying electrons. Those things are known as well as the alphabet, and we also know that substances are built from atoms and that the shape of atoms sometimes can be determined from the shape of crystals of a substance. We can carry the analogy of atoms from crystals to worlds, and note how well a sun and its planets carries out the atomic scheme of things.

"From the sun we might travel on to the stellar universe and find that it acts as a gigantic gas cloud, and that many stellar universes might carry out the analogy still farther. At every step we find that the micro-universe behaves as the macro-universe; that planets and stars are protons, neutrons, electrons and quanta of energy, for they are these things in the macro-universe. Why shouldn't they act as these things?

"We know that the smallest speck of dust and the greatest sun are made of the same elements—protons, neutrons and electrons—and that those things can be broken down to energy. Therefore, energy alone is the basic element of the universe and the universe, being energy, should behave as such.

"We know further that heat, light, electricity and other energy obey certain fundamental laws. To a certain extent electricity and light are nearly the same, and we can change one form of energy to the other without a great deal of trouble.

"Of all types of energy, man is most familiar with electricity. His inventions control electricity through systems of coils, magnets, condensers and transformers. Man has even used the Earth as a condenser and magnet. In a large scale model he could use the Earth as one plate of a condenser and the rest of the universe as another—— Man has even calculated the capacitance of the Earth as such a condenser.

"We can go beyond this, and consider a nebula as a huge electrified gas cloud, for it is composed of particles which in their essence are energy, hence can act as electricity. We see the sweeping arms of the spiral fold back over each other, becoming condensers which can be overcharged just as the small condensers man uses in an electric motor. When a condenser is overcharged sparks jump from one plate to another—ions flow across the gap!

"Danna, what we see in those twenty parading suns are ions jumping across a spark gap! The sun is behaving as an ion of a macro-universe. Millions of years ago we left one of the arms of the spiral, and now we are approaching the other. As we near the arm of the nebula it fills the heavens, while the other arm, from which we came, has diminished to a hair-line in the distance of space."

"Is it the end of everything?" asked Danna.

"Hardly," smiled Fao. "I doubt if we on Earth will even notice the change.

Nothing happens to the ions that cross a spark gap—they simply change positions in the system of things."

"Then there is nothing to fear, Fao? Could I get word some way to my people and tell them that there is no reason for panic?"

Fao laughed heartily as though he thought her returning was a good joke. "You cannot return," he said. "The floor of the plain below this mountain is more than a mile away—straight down. There is no escape from here."

She smiled tenderly at his laughter. "It does not matter to me personally, Fao, for I am happy here. But I'm thinking of the millions whose lives would be saved if the panic could be stopped over the Earth."

She rose and left Fao seated on the edge of the cliff.

THE NEXT morning when Fao searched for her, she was gone. Behind her, flapping in the wind, was a note, pinned to a curtain on her window.

DEAREST FAO:

I grieve over leaving you, but you forgot when you destroyed my plane that I carried an emergency landing rocket in my gear that would permit me to drop over the side of the mountain and land unharmed on the floor of the valley below.

You did not know that your hiding place in these mountains had been suspected for several years, and that I had been sent by my people to learn if you were of military importance to the Arrallians. My instructions were to kill you after finding out your secrets, but in this I have disobeyed my superiors.

I have no doubt that your explanation of the procession of suns will alleviate the panic that has thrown the world into chaos, and it might even bring peace in the wars that now are raging. But don't count too much on it, and don't count on my return, for I am still a soldier, and women make as good soldiers as men, sometimes.

My report will list your death, so that you have nothing to fear in the future. I doubt if anyone will ever intrude on your seclusion in years to come, for I shall say that your valley is of no military value.

Therefore, with an aching heart, I must say——

Good-by,
DANNA

Fao read the letter twice, then folded it and placed it in his pocket. He walked slowly across the valley to the little laboratory where he studied his star charts.

"I told her," he mumbled, "that all things grew from one basic thing and therefore all things were the same. But there is life, and who can account for that?"

Slowly he entered the room where he could lose his memories in charts of a universe so large that even a galaxy seems trivial.

"She *will* return," he murmured.

"THREE THOUSAND

by

Thomas Calvert McClary

Sailor was a weird sight, but he caught the first fish—and brought about the first business deal in the new world.

YEARS!"—

In a ruined world, Drega finds the man worthwhile is the man with a fish—or practical knowledge!

SYNOPSIS OF PART I.

War, famine, unrest, threatened Man's world. Millions of people were being crushed in the insensate jaws of an economic system grown too ponderous for control. Wielder of might and power, and action behind the scenes of half the civilized world, was Vincent Drega, hard-headed, hard-fisted, intensely human; a man who was a builder at heart, but who had been saddled with tremendous financial control. Drega had worked with men who worked. He had started as—and still was at heart—a boss-contractor. He knew the individuals who make up mankind—not impersonal Man. Mistakes, to him, were an inherent part of humanity. He did not seek perfection. He took the world as it was.

Simon Gamble, the greatest scientist Earth had produced, was intensely human, too. But he knew Man, not men. He was an idealist, a perfectionist. The ills and troubles of Man were a canker to him, avoidable and stupid blunders. With the cold detachment of pure science, he regarded Man's troubles as waste.

Gamble discovered the secrets of atomic power, a method which would make gold as cheap as iron, and make possible wheat at a cent a bushel. Gamble pointed to millions of starved humanity, demanded of Drega, that the new power be made public. Drega refused. Cheap gold, power, wheat would shatter the economic structure of the world, ruin civilization, he protested. The economic system itself, he thundered, was the greatest resource Man had, because it made all other resources possible. Balked and condemned by the very public he would have helped, Gamble turned to bitter privacy in his immense laboratories.

On March 15th, ten years to the day after Gamble's angry fight with Drega, all animal life on Earth was suddenly suspended. Suspended so completely that, to the minds and bodies of Man, no time whatever elapsed.

But time on Earth went on! Rains, storms, sun, frosts and vibrations of three thousand years tore down the world. Man awoke to find the world a mass of tumbled wreckage. Civilization lay buried beneath nature primeval.

Lucky Flagherty, news reporter, awoke to continue his thoughts just where they had left off. But his mind was stiff and jerky. About him was a strange scene. His city editor sat amidst a pile of dirt, looking like a naked and dirty caricature of his former self. Clothes, desks, machinery, buildings, were rotted and crumbled away forever. No tool, no steel, survived. The vibrations of a suddenly reawakened New York set the building to tumbling.

Catastrophe had happened. But what?

Lulu Belle joined Lucky in helping others who had survived, from the crumbling ruins. Then Flagherty set off across a strange forest-covered and dangerously crumbling and pitted New York toward Drega's building, for he suspected Drega might know something of what had happened.

Drega, with other financial figures, was sitting on ruins. Oddly, the Drega Tower had vanished, but the old solid

masonry building Drega himself had built in early days, before he was more than a master builder, was still standing. More inexplicable, Drega and his group wore clothing. They were the only humans left with clothes. Just before that fatal hour on March 15th, they had donned new suits made of spun-glass fibres, and these had survived.

Yet Drega could not guess the answer to the riddle. While others stood around bewildered, he shrugged aside the question of what had happened. What did that matter now? There was work to be done—a new world to build!

Together, they returned to the site of the old Journal where publisher Prescott and others had gathered. On the way they were joined by Tim, foreman of a telephone trouble-shooting gang. Tim held in his hand a prize of infinite value in the reawakened world—a pair of berryllium-bronze pliers, a tool still in working condition! It was the only tool at that moment.

At the Prescott camp, the publisher envied the suits of Drega's groups. His own clothes had vanished, save for a scrap of fine linen shirt. Prescott had been very proud of the quality of his linen. That shred of linen was similar to that which had remained sound for three thousand years when wrapped around an Egyptian mummy.

"Three thousand years!" Drega started.

The men look at one another with wonder. Can this be the explanation?

Gamble had been the world's greatest authority on suspended animation—Gamble who hated the economic system which was now shattered forever——

VII.

LUCKY shook himself and climbed to his feet. He still felt dirty and he climbed over the ridge to the river bank. A douse of cold water suddenly cut between his shoulders and he turned to find Lulu Belle splashing in the cove. Masculine, he glowered at her idea of humor.

"Well, don't stand there like a Greek god," she giggled. "We're not married yet!"

Lucky colored and waded into the cove. It was colder, on his emaciated body, than blue blazes.

"There's no soap but there's sand," she said. "I can see you're going to have a siege of conjecturing what's happened."

"Maybe you can tell me?" Lucky demanded.

Lulu Belle said with complete self-absorption, "I'm hungry. You might find me something to eat. You can drink this water if you like."

"But it's salt. The bay's right below."

"When they made woman out of man's rib they took all his sense away. The tide's almost out and the surface is nice clean river water from above."

They spoke very slowly, throat muscles not too flexible. Bodies were not yet functioning with smooth precision. But nature had slowed down all senses. Slow speech was distinguishable to slow hearing and slow mental reaction. Normally, they would not have been able to understand one another.

Lucky set about scraping off strips of dead flesh and hunks of obdurate dirt. He felt more vigorous and normal. He felt as if his body breathed again.

Oliver rolled over the ridge. He grinned. "I'm seeing funnier things than last time."

Lucky snapped, "There's no d. t.'s about this!"

"Nuts, brother." Oliver pointed to the sailor they had rescued from the ground.

Lucky stared. A bright red flower grew out of the top of the sailor's head. The man's covering of fungus-mossy growth had taken on grandeur under the gentle rain. The coat was a half-

inch long, a beautiful brownish green.

"That stuff can't grow on him!" Lucky said.

Oliver pursed his lips. "No-o-o-o, but it is! Its roots are imbedded in him like hair. But that flower simply took root in his hair."

"I hate to be material about life," Lulu Belle confided, "but if anybody's going to take a drink, they better do it before the tide makes it all salt." She looked quite funny with her pert expression. Her hair, brittle and dead, had broken off at the scalp. She was hairy as an egg.

Oliver went back to warn the others. The sailor was eying Lulu Belle with interest. Lucky glowered, unsuccessfully, and gave her his coat. Somehow, she could rig up a skirt. But Lulu Belle calmly took his pants instead. "After all," she stated, "that coat would never fit me. I really look quite well in pants."

She danced away, leaving Lucky vaguely wondering what good his coat was going to do him.

THEN OLIVER announced he had found a horse. A dead silence fell over the crowd; a peculiar glint came into many eyes. The horse was cropping down the ridge; he was gaunt and would not have made meals for more than four. But it was food, and brought throbbing demands from every stomach.

"I think we'll save the horse," Drega announced in an authoritative voice. "That may be the only 'horse power' left in the world."

Muttering swelled into open defiance. Drega's chin squared. The trouble shooters, the only organized men present, looked doubtful. Tim, the foreman, muttered, "I don't know."

"Well, I do!" A heavy man pushed through the crowd. At one time he had been a beer deliverer. He headed a group of surly men of like stature.

The trouble shooters had looked on the verge of defying Drega. But they bristled at the newcomers. Tim looked at Drega. Drega said, "Get the horse. Put this man out of camp if he makes trouble."

The trouble shooters raced toward the horse, unruly spirits in chase. There is no discipline for hunger. At the top of the rise, the trouble shooters surrounded the dull-eyed animal. Holding a piece of rock, the beer-thrower came up, followed by ten times their number.

The leader stopped, breasting his heavy body close to Tim's. "Gimme that horse or I'll conk you like an egg!"

Tim's hand leaped out. Lucky thought, "There isn't enough strength in bodies yet, nor enough coördination, to knock out a brute like that!"

But Tim did not try to knock him out. He grabbed his nose with the bronze pliers, their one tool. With a merciless wrench he brought the brute to his knees. The crowd stood back uncertain, muttering. A second time Lucky felt the crisis. One of the beer tossers was preparing to slam Tim's wrist so that the pliers would be knocked loose.

Drega came up holding the corroded bronze plate from the Custom's building. He whanged down on the heads of the two beer tossers. The gorilla men pitched onto their faces. Tim and Drega grinned at each other.

But the thought of food had crystallized. The crowd did not open to let the horse through. In ugly silence the seconds passed. Again the muttering began. Lucky, Drega, Tim knew what it meant. This time there would be no leaders. The crowd would rush forward in one of those unexplainable bursts of mob impulse.

The muttering reached a timed mumble like the tramp of feet. Lucky thought, "They'll tear Drega to pieces as well as the horse!"

A nautical voice piped up, "What's got barnacles under them lubbers?"

The crowd turned, for the voice had

cut the mumble with peculiar deep-sea clarity. The sailor stood there, his flower nodding ridiculously atop his head. In his hand he held a three-pound flounder. The crowd was intrigued by the fuzzy-coated sailor and his flower, but its mind was still on the horse.

Then they looked at the plump fish. The tension broke. The crowd turned back to camp. Who wanted to kill a horse when there was other food around? Besides, there wasn't enough flesh on his shanks to make one good chop!

VIII.

THERE WAS a right of ownership about that fish which had not been attached to the horse. The horse had simply been there. But somehow the sailor had caught the fish. There were five hundred people on that ridge, and one fish. But it was his.

Lulu Belle came up. "Oh-h-h-h!" she cooed. "What a lovely one." It was the first sex tremulo, but Lulu Belle gazed rapturously at the fish. "I could cook him for you."

The sailor hitched pants which were absent and gave her a cocky look. "Enough for us, I guess." He looked over the crowd, and nodded his flower with regal condescension. "There's more trapped in pools if you get them before the tide comes in."

The crowd raced off in little knots. The sailor went to find fire. Lulu Belle began cleaning the fish with a piece of the cigar-case glass. It had to be handled very carefully to keep from breaking. It was crystallized.

Drega was sitting atop his remaining two suits cogitating. He said hungrily with a sense of humor, "A thing like a fish requires thought."

He looked at the corroded bronze plate. The sailor was returning with an arm load of sticks. Drega went to meet him. The sailor looked at the cleaned fish, dropped the wood and nodded at the bronze plate. "It's a deal," he announced. "I never did like fish cooked over an open fire."

The crowd had bolted south because that was the direction the sailor had come from. And that was toward the bay. The sailor laughed. "Damn fools, the tide's washed half the pools down there already!"

He turned directly north. He came back with four more fish. Tim's men came up with wood and dry sod shaken free of dirt.

Drega said, "This is the first business deal, but I don't see how you wangle in, Lucky. I'm the middle man." He looked at the fish and kindling and the bronze plate which he had been knocking clear of corrosion.

One of the trouble shooters was trying to light a bunch of grass with a piece of glass, but the crystallized glass did not concentrate the sun's rays well. It was not lens-shaped. Tim was looking at his bronze pliers morosely—they were specially alloyed to be nonsparking.

Lucky's hunger was gnawing, but it was tied up to memory, and he remembered a strong distaste for raw fish. He thought about the heavy glass cases in the old Aquarium. There was a chance some large pieces were still intact.

HE CAME to Bowling Green with a sense of horrible disappointment. Over the rolling mounds there was no familiar sight of the round old building. He was thinking he must be standing about where it had been when he stepped through a hole and came up splashing. Something cold and eerie nuzzled against him.

Lucky removed himself from the vicinity in a burst of instinct to get away from the *thing*. By the time his fright was over, his eyes were focusing in the dim light. A familiar, hollow roar followed by three burps gave him his

bearings. In front of him, three seals leaned hungrily on their flippers.

Apparently the old fortress had been buried to roof height. The walls were intact. The hard dirt and sod which had formed over the arched roof had either held it together or sustained its own weight. Seepage had passed through the bottom. A mound of dirt led up to the small aperture as if it had drifted down for a considerable time.

A spot of vari-colored light caught Lucky's eye. It was creepy in the dim, chill place, with the bark of seals echoing. He investigated the light hurriedly, and found a round gold-fish bowl which caught light rays from above. It was inverted, with contents gone, but it was strong and intact. Lucky carried it like a treasure and climbed the dirt mound to the hole he had tumbled through. He wondered about seal meat, but more than anything else he wanted to hurry back to camp.

One thing he knew. If that bowl were filled with water, some point of it would refract sufficient sun rays to light a blaze.

The little group he had left were sitting around their fish disconsolately. Attempts at eating raw fish had not been very successful. Lucky drove a swift bargain for the use of his bowl. It seemed like a highly successful bargain to all.

Covering the bronze plate with a layer of sand to avoid poison, they sat down in anticipation of an avid feed. But they found they could only eat two fish between the crowd. They had not counted on the human system's inability to cope with large amounts of food after so much time.

Drega was contemplating the beer slingers coming out of their coma. There was man power, almost horse power in human form. If he could subdue those men he could use them.

He said, "Loan me one fish."

The sailor looked shrewd. "There won't be so many next time. What do I get?"

Drega said, "I'll return three fish."

The sailor laughed derisively.

Drega glanced at Tim. "Well, Tim's men will keep you supplied with fuel for a week. I'll make my deal with him."

The sailor rumbled thoughtfully, then: "O. K., lawyer."

DREGA'S deal with Tim was a promise to pay the equivalent of thirty dollars at some time in the future. "I don't know what's left for money," Tim grinned. "But I know if there's anything, you'll get it sooner or later!"

Drega went over to the beer slingers. "Behave yourselves and you get fed. Otherwise you get cooked—and I *mean over a fire!*"

The leader felt the bump on his head. He shrugged. "All we want is to eat regular as other people. We'll work for you."

DREGA GAVE them fish. He was very pleased with events. "Commerce," he announced, "is the beginning of building." To Drega, building was life.

Prescott appeared, fifteen large fish spit on a pole. The sailor gave him a look of respect. Prescott beamed, "Pool fishing was my boyhood sport. But something happened. A storm must have driven those fish in here. They aren't shore line fish." Sailor knew that, but he had not consciously thought about it.

Drega said, "That means an immediate food shortage. We better get what we can, smoke 'em and salt 'em. Do you think you could take charge of a pool brigade?"

Prescott showed youthful zest, then frowned. "I know how to make pools, but I'm not sure *I could make them.* There's a difference. I'd probably need a sailor's help."

The sailor stopped examining his

queer fur. "What's in it for me? I'm a union man!"

"Seventy-five dollars a week," Drega said. "There's no money left. But the gold the money stood for is left and a good deal of that gold is in my vaults."

Sailor looked suspicious. Lulu Belle looked at Drega thoughtfully, then rubbed against Sailor's shoulder. "Gosh, Sailor, you'd have more gold than almost anybody here!"

"Well, that's different." Sailor got to his feet and stood shuffling uneasily. "Who's my captain?"

Drega gestured to Prescott. He said under his breath, "I hope gold holds its value long enough!"

The promise of gold had a magical effect. People stopped incessant questions and began to ask what they could do. Drega divided them into groups according to physical build and experience. What he was looking for first were people with varied experience of using their brains and hands in the outdoors—sailors, fishermen, woodsmen. He was amazed by the lack of such people. Only three men with woods experience!

Meyer of the *Journal* finished cleaning a fish and threw down a piece of brittle glass. It broke with a faint tinkle.

Sailor looked up and scowled. "I was wrecked once and lived for ten months on a bottle, three nails, a piece of fish line and a knife. That's more than you got in this whole city, judging by the looks. And still, another month I'd have been dead."

Drega gave the crowd time to absorb this, then began clipping out orders. He eyed the four financiers Lucky had found with him. They were gathered in a forlorn knot moaning about investments.

"I can't see they're much use right now," Drega said.

The judge scratched his head. "What's gold really worth?"

"Maybe eighty cents a pound," Drega whispered. "But what is eighty cents' worth if gold's only worth eighty cents a pound? There's a nice problem for you."

"Not for me!" the judge said. "It—ummm—was not covered in the Constitution." He glanced at the financiers. "Money grabbers," he commented. "No use to a society like this."

Drega gave orders to strip the men of their clothing. Tim carried this out without ceremony. The financiers were simply dumped out of them.

EACH OF THE trouble shooters was put in charge of exploration gangs. Remaining ruins and buildings were to be investigated thoroughly. Food sources must be trailed down. Other people were living northward, and before long the river would become polluted. It was vital to find out if there were available supplies of fresh water, and if not, how and where the clan could best move.

It was important to know how many people were left on the lower end of the island, for each new head meant another mouth to feed. Drega looked at new arrivals and saw how much better off his own people were. These other people were still covered with dirt and patches of filthy hair. Most of them were half dead from thirst. None of them had eaten.

Drega's clan paid him growing respect. There were other men of brains in that throng, but none thought to challenge Drega's right to rule. It was the student of the clan who remarked, "Drega's greatest right to rule is that he simply took over without question."

Lucky said, "But on a basis of knowledge, Drega should be your lieutenant."

The student shook his head. "No. I am still pondering what happened. Drega is a builder. Now he's building system. For the past two hours, I am probably the only person on this ridge who has

thought of that unanswered riddle." He gestured toward Drega who was calling Lucky.

"You," said Drega with a twinkle, "being a reporter are good for almost nothing else. You're going out with Tim's survey and report what you see."

"Won't they see it too?" Lucky wondered.

"Only in sections," Drega said. "You'll see the story."

IX.

FOURTEEN days passed and no word of his explorers had come to Drega. But in a way it was well. The camp grew ordered. Weaker individuals had time to get bodies functioning.

Lean-tos and bricked-in caves had been built along the ridge. A very poor grade of cement was made from sand, residue, and raw, crumbled limestone. There was plenty of high-quality limestone where the oyster houses and marble buildings had stood.

But there was a difficulty. The authority who had once written a book on kilns and calcination supervised the building of a kiln. It looked swell. But somehow it didn't work.

The fish pools had been stretched for two miles, with lengthy necks reaching into the river. At high tide the necks were bottled up. Birch and some sugar maple had been found. A poor grade of clay yielded a few pots which did not leak too badly. Birch and maple tea were the camp drink, both made by steaming twigs. There was no way to boil as yet. The inferior clay pots couldn't stand it. A little coal had been discovered buried beneath hard packed mud. It was dug out with sticks and broken laboriously with heavy stones.

Drega's clan had grown to two thousand, but increasing deaths from colds and infection threatened to reduce the number. The meager diet of fish and roots and dandelion greens was not sufficient to build up starved bodies. There had been an attempt to eat green berries which proved almost fatal. Some oysters and clams had been discovered. For the first time, a bird had been caught with enough meat on its bones to eat.

No dogs had come to this camp, but five cats were protected by Drega's order. An onslaught of rats had threatened the camp's very existence, and not until the arrival of the cats had this menace been curbed.

At high tide, sea water was scooped into flat trenches where it evaporated leaving a thin coating of salt. It was a laborious task, but life depended upon it. Salt was not only a vital food, but their only preservative and antiseptic. A bed of particularly oozy clay had been set aside for the treatment of open cuts and infections.

More bronze had been found, and one very large deposit of oxidized silver lay open to the sun.

Among the clan were crack metal workers. But nobody knew how to work the metal without furnaces and tools and pots. It was numbing to find the number of simple processes which reached back to good quality lime and a lime kiln. Until they had those, they could not even build reasonably good molds. And the Authority on lime kilns talked of blowers and motors and steel cranes. He'd never built a kiln of less than 10 ton capacity.

Several dogs had been killed northward in the woods, their hides scraped with clam shell, soaked in salt water, smoked lightly and treated with oak. A light harness had been built for the horse. Four thongs had been allocated to Lulu Belle's cooking division on which to hang fish for smoking.

ALL SHELL and fish bones were carefully cherished. Crude needles had been fashioned out of some, for use as soon as there was something to sew.

Newspaper people had proved very adept at small weaving, pottery making, stringing shrubs and roots into short lengths of rope. Edible herbs had been found in small quantity, and a bronze, and two plastic pestles had been found. A large block of marble limestone had been scooped out with sand and hard rock and supplied a mortar.

The most important functions in camp concerned food. A series of brick ovens had proved failures, due to poor cement more than anything else. But a dugout chimney with a shelf, supplied baked items. Roasting was possible on a stick, steaming could be accomplished in clay pots. Drega had withdrawn the use of the bronze plate as a hot grill when it began to give way to heat.

All of this had taken an immense amount of work for weak people without tools. Some wooden tools such as clubs, fish spears, poles and two shovels had been fashioned out of fire-hardened wood. But this required much time and a great waste of fuel. Much of the wood at hand was green and would burn only on very hot fires.

For further progress, three things were vitally needed; lifting power, transportation and common sense. Drega had sent his most practical men out on Tim's survey. The few others had their time occupied with details of everyday life.

Drega was thinking about these things when a cry went up from an outpost. An amazing sight broke out of the forest—Marillo and Turpine astride an elephant! Held in the elephant's trunk was a large bronze door. Behind them came a second elephant, limping, also bearing a bronze door. All men were weak and sick, Marillo with his arm in a sling of skin, Turpine bunged up all over.

Turpine grinned and handed down two large pots, their tops covered with crust. They handed down an assortment of objects, invaluable to that clan. Three bronze knives, a bronze scythe and four hard, porcelain pots. A bronze spear, two extremely hard plastic molds for cooking pans, two empty pots of some clay substance and two wrought iron wheels. On the second elephant were piled skins, one filled with gold trinkets and plate, a second with rock-hard beeswax, a third holding a dried-up gob of tar, and others stuffed with fresh meat.

"And!" Marillo grinned handing down fifteen bronze fishhooks and a length of real fishline!

"All from the museum," Turpine explained. "Just to make sure nobody else got in, we shoved a few tons of stone back over the entrance."

Drega asked for a report.

THEIR FIRST adventure had come as they left the woods immediately north. Llewellyn, a miner, used to working amidst gas and slides, had stopped and counted heads. They were a man short. Randolph, their civil engineer, was missing. They had found him fallen into a deep hole beneath a tree. His leg was broken.

"We couldn't reach him," Marillo said grimly. "He was down ninety feet, and the sides were too steep to climb. There was nothing to make a rope of. We could see him in the light of flares we let down on thin vines. We had to sleep there that night listening to his groans and not able to do a thing about it."

At a conference next day, they had decided to push on. It was a hard decision for men like those.

North of the woods, the city was in complete ruins. There were signs of buildings, but most buildings had long since tumbled upon themselves, and grassy and wooded hills had formed over their skeletons.

Atop a very high hill, Tim had laughed sharply without humor. "I think this is Tudor City." After a mo-

ment he added, "I had a brother lived here."

They wondered if down in those depths of earth and debris people might still be living. It was not impossible. "Seeds" had wandered into camp to tell of being on the sixteenth story of a skyscraper at three-thirty on March fifteenth. The next thing he knew he was climbing out of a hole midway up a hill.

No words could explain the utter desolation of what had been 42nd Street. It was levelled and piled into sullen, featureless hills. There were shrubs and trees in spots, but most of the country was dead with the deadness of raw earth when topsoil is sheered away. There had been explosions underground. A few thin columns of smoke wove upward from deposits of burning material.

A woman's voice had shrieked at them from a pile that must have been the Brinton Tower. Lucky had found her, a former society beauty, hideous with privations and trapped behind a large block of granite.

"I want to tell you exactly what happened," Marillo said with a hard face, "because it shows what we're up against. The woman was scared we'd leave without getting her out. She didn't get the drift of things yet. She offered us a million dollars to get her out!"

The men could hear her sobbing inside. Her hand came through the hole and held out a diamond the size of a half dollar.

Micheal, the minerologist, had gasped, "The Rockland diamond!"

Story, a tool dresser, muttered, "That would make a thousand diamond drills!"

Einstein, the junk man, stood goggle-eyed repeating, "Oi!" at intervals.

Llewellyn had been inspecting the hill and suddenly announced it wasn't safe to attempt the woman's rescue. "There's about forty tons sitting right above the keystone," he told them. "And all that's holding it there is a little limestone and balance. If you move that granite block to get the lady out, you're going to cut out the footing you're working on."

MICHEAL had disagreed. Llewellyn had tried heatedly to explain, but he couldn't. It was something a miner simply *knew* without knowing how he knew. He had cursed and refused to be one of the rescue party.

They had located some uprooted and burned-down logs, and set to work to swivel the big granite keystone. Lucky Flagherty had squatted on another block beside the hole holding the woman's hand. Three times while they heaved, Llewellyn had started to join them, then gone back swearing bloody murder. But he couldn't listen to his own advice. He came and stood near by.

Another foot on the pry log would give a big enough opening. Not a suspicious tremble or warning of danger had been felt. But suddenly Llewellyn shouted, *"She's going out!"*

In the fraction of that second, the big stone spun like a top. The pry men were catapulted onto their faces. Lucky jerked the woman through the hole. Forty tons resting atop the keystone crashed through some thin flooring beneath. It carried the footing out from under eighteen men. They dropped without a cry into the gaping hole beneath.

The woman had flown clear of Lucky's sudden jerk, but Llewellyn had caught her. She hung by one foot over the black hole. Llewellyn's stone was slipping. He tossed the woman to Tim and jumped clear as it crashed beneath.

Something very hard had happened inside Tim in that brief instant. He said grimly, "Four prime men and eighteen good ones gone—for what? A woman!"

There would be no more rescue work attempted.

Llewellyn had mumbled for hours after, "If I'd thought there was a chance,

but I knew, see? *I knew!"*

They listened to his advice after that.

They had discovered a large body of men, the leader a friend of Tim's, trapped in the tunnels of the old Grand Central Station district. They had not been able to get them out for fear of bringing down treacherous ruins above. With a few tools, they could have released the people.

Wherever there had been great buildings were hills punctured with natural limestone caves. In a spot which must have been the old Commodore kitchen, Enstein's junkman's eye had detected a glitter. They had found an aluminum pan coated with emerald crystals. It was also Einstein who discovered a large copper frying pan, one of the heavy kind, large enough to cook a hundred eggs. It had been heavily coated with grease and was in almost perfect condition.

In this part of town they had seen a wild, savage horde of men pursue five helpless men and women and rip them limb from limb—and *eat the flesh raw!*

"Good God!" Drega said.

"Wait," Marillo answered and his lips trembled. "You people down here were eating. Our food ran out and except for birch tea made in a pyrex dish Tim found, we had nothing for many days. We had to pause five days by the old library to wash our feet and legs and let them heal."

The terrible food demands of bodies which had lived upon themselves for three thousand years attacked the men. Tim turned south to locate the old warehouses, but most of the party went northward toward the park. Lucky had made friends with a gigantic sheep dog. It suddenly ran ahead of them and stood stiff and growling. It was fortunate it warned them. A band three times their size swooped around a hill brandishing clubs.

BUT TIM HAD found a sheet of lead earlier, and they had worked the molten metal into cracks and crevices in their own clubs. They were better armed. Yet they would have lost the battle had not Turpine, the circus roustabout, started them running up a hill as if defeated.

The enemy followed, with savage hunger and murder in their roars. But as they passed a rock, Turpine tripped them with a stick, sprawling them into a deep pit where they split open on sharp rocks.

Exhausted from the fight, they had slept amidst the dead that night. Lucky's dog fed upon an enemy body. Nobody stopped him. He did not touch any of their own dead. During the night there was much stealthy movement. But not once did the dog bark. The next morning, six enemy bodies had disappeared.

"And the dog didn't bark?" Drega asked.

Marillo's face was like iron. "No." He looked straight into Drega's eyes and the two men understood one another. No reference was ever made to that again.

"We had lost half of our remaining party," Marillo went on, "and pushed on for the Park. We saw a dozen bands numbering around ten thousand. They were fighting each other for the right to kill the loose animals, but as soon as a man would go down, other men would leap upon him with insane hunger. None of the bands could kill the animals. They were unarmed. The elephants alone must have slaughtered a thousand men and women when they went on a blood rampage.

"There were four elephants and Turpine recognized one. He'd been its keeper sometime. He finally calmed it down. By luck it was the leader."

He told about charging the lions and tigers, the elephants stamping them dead. The bears had not been so easy, and they had lost Stokes when he tumbled down among them. They thought of possible old weapons and went to

the museum to investigate. One elephant got bogged down in a swamp and they had to desert it.

The old museum was an immense mound, but there were openings beneath great blocks of stone and it had been no trick for the elephants to pull the stones free. For two days they had searched for an entrance, but found only dirt and rubble. On the third day they pulled aside a gigantic slab and found a vaulted room almost undisturbed by time. It had been one of the Egyptian rooms.

"We had a number of spears and swords but we went back to kill the other animals," Turpine said. "The hyenas, jackals, bears and wolves were still around. I'll bet there are a couple of camels they won't kill for a long time either. We used most of the weapons killing what we got. Some of them broke, and some we dropped. We didn't dare to go after them because of the bands of people."

"We've had some bad skirmishes here," said Drega. "That's why we don't go far."

"It's a regular battlefield of cannibals uptown. Everybody kills and eats anything they can get."

AFTER skinning enough animals to hold the other carcasses, they had stolen across town through thick brush in the dead of night. They headed down the river bank, charging crowds mercilessly. A band had followed, and they had had to turn and fight. They lost nine of their remaining party. Lucky and Carter had taken a chance and headed uptown to the old university section before that.

"We lost another elephant, the one with most of the meat, yesterday. She dropped through a cavern. We spent the day trying to figure a way to get her out. At least to get the meat out. But she'd busted a leg and was kicking. It wasn't safe to go down. We can go back after the meat and her hide and flesh."

That night Drega's band ate meat stew for the first time in three thousand years. The meat was tough and probably impure. But the animals had had two weeks to feed up and were not as stringy as they had been.

Late that night Llewellyn staggered in, bloody and half dead. He had fought his way clear of the last skirmish, but the men aboard the elephants were already trampling through the crowd and he couldn't catch them.

Next day, the camp went back to where the elephant had fallen through. The elephant was still alive. It was a problem how to kill an elephant.

Drega said, "Find the heaviest block of stone you can."

Without the elephants, finding such a block might have involved considerable search. But Turpine simply rode the lead cow around lifting up rubble. He found a tremendous, square block and had the two elephants roll it across the space. It was about sixty feet to the bottom of the pit. When the block struck, the elephant died without a trumpet.

It took five days for men working with bronze tools and burning brands to get the flesh of the beast started off. There was no way to cut off feet, and the ponderous head delayed things further. The crew were worn out and pessimistic. There were demands of why they should slave at Drega's bidding.

Drega snapped, "So that you can eat!"

He ordered vine and skin ropes brought, and himself got into the pit to supervise. It was a simple trick for the elephants on the surface to strip the flesh from their sister's bones.

The flesh was succulent and healthy. The pachyderms had spent two weeks gorging on luscious vegetation in the park. The skin alone was worth a fortune under new values. From those

bones, in time, came not only soup, but some of the new civilization's most valuable tools.

WHEN THEY returned to camp they found Tim back, sleeping with complete exhaustion. His feet were swollen dangerously, but he had hauled, somehow, a length of cable and two coils of lead wire he had found immersed in pitch.

With him was one remaining man and the woman they had rescued. Six men had been lost getting into the ruins of that warehouse. Yet these two had not lost the aluminum and copper pan, the lead, the bronze bust, and three blueberry plants they had found! As if proud of such grim determination, the plants lived to flourish.

The next day Lucky, Carter and the dog arrived. They were worn and spent and great sores covered their bodies. But each carried a large woven root hamper filled with small round cylinders of rust.

"Old cans?" Drega asked. "Amazing!" He recalled a tin-plating process which Simon Gamble had worked out.

"Food!" said Lucky. "It may be poison, but we've lived on it for ten days! Canned beans!"

X.

EXCEPT for small punctures, the copper pan was perfect beneath a crusty coat. The punctures were imperfectly mended with bits of lead, after the coating and ancient, hardened grease—itself almost as hard as the copper—had been scoured loose. It was the only utensil in which they could melt the lean animal fat from Turpine's kills.

The bands to the north were growing more daring, and utmost precautions had to be taken against attack. Nobody could imagine what the northerners were existing on, but they grew in numbers daily.

Lucky reported a large clan of college students and teachers living near the university, parts of which were in comparatively good condition, but deeply buried in places by many feet of accumulated dirt. The buildings which had resisted time were those of old-fashioned masonry.

There were groves of woods and herb swamps near the university. The clan there was living well on a vegetarian diet. They had some tools, and more utensils than Drega's clan, which they had combed out of the university ruins.

From the university north and south and east, mankind had degenerated into savagery of the lowest order. The Bronx River had widened, and the city lifted considerably at that point. It was now a river of vicious currents impossible to traverse. Groups had tried, with crudely constructed cable rafts, to get across the East and North rivers. The clumsy crafts had been ripped like boxwood in midstream. There were a long line of whirlpools where old bridges had crossed the East River. There was a tremendous suck-hole where the upper tunnel had existed under the North River.

Drega was considering possible moves for his clan. "What about Central Park? Our strength is sufficient to conquer the territory."

It was Sailor who advised against it. "You've got most of the animals, and there'd be no fish in any quantity that far up the river. You'd have to keep a fish camp down here."

Drega said, "It would divide our forces. Tim, what's in this part of the city?"

"Everything that's left," Tim said, "including more people. Thousands are trapped underground. What they're living on, I don't know. But they've all got fire from explosions, and most of them seem to have water and something to burn."

HE HAD traveled rapidly after leaving the others. For a long stretch he had seen little evidence of anything useful other than one section of granite blocks. About opposite their own camp, he had discovered a goodly sized, sweetwater river gushing from the ground. There was plenty of good grass over there, and a grove of straight timber. Many trees had been torn up by their roots and lay drying.

The city in between was undermined with caves and passages of two types. One, the remains of old cellars and subways. The other, natural formations which had arched over streets when buildings tumbled, or natural growth of rock from the debris of old buildings. It was highly dangerous country, with firm-looking turf growing over deep holes.

"There are plenty of warehouses," Tim said. "All ruins and most of them looking like hills. But I think there's good material in them. They'll have to be mined—just like drifting a tunnel through loose rubble. Two hills covered with old trees fell in while we watched.

"The telephone warehouse is the best bet. There was a lot of tar and pitch and oil and wax in there. The next block was a power station with four large transformers. There must be plenty of metal and wire protected. Those transformers are sunk in oil and covered by thickly enamelled armatures. The armatures are shot, but the transformers should be sound metal if we can get them out of the oil."

"Why can't we?" asked Drega.

Tim gave a pessimistic blow. "That oil's hard as rock. We'd need picks. We need iron to work with. And there's no iron to use in the city. Unless we can find some way to smelt rust and get ore that's grown through old stone. But even before we get it, we've got to have lifting power to clear the way."

"We've got the elephants," Lucky pointed out.

Turpine had not joined in the conversation, still regarding his position in life as that of a roustabout. In the flood of suggestions from artisans, technicians, business men, he might have been overlooked. It was Drega who spotted his desire to speak.

Turpine said, "I wouldn't want to take the elephants back even the way we came. What you're talking about sounds like worse country than that."

Drega nodded. "We've got to have immediate supplies to assure daily existence. Our pools are running shy. We need cooking utensils. We must have tools. In the meantime—the clans up north are getting bolder and more savage. And we need to break through and rescue Tim's friends."

"I thought rescue was out," Prescott interposed.

Drega said, "It is. But those men are technicians and know what's left below ground in this part of town. Carter, how about transportation?"

"I agree with Turpine. We can't afford to lose another elephant. We need a safe road across the island."

"To build a road we have to be safe from attack." Drega was silent with deep thought. He nodded to himself. The clan waited to hear their fate decided.

"We'll build a wall straight across," Drega decided. "Steep on the north side. We'll use the wall for a road. It'll be tough work. We will be fighting against time. We need fish nets urgently. We can make them with pitch and vine and wire, but we need something to boil fish in."

ALWAYS, for the next three months, immediate problems came back to the lack of iron and lime.

A small expedition including Marillo, Tim and Llewellyn made a northward dash under cover of night to rescue Steve, Tim's trapped friend. Twice they nearly stumbled into savage camps.

Once they had to beat off a pack of dogs.

It was the horse and cable—Drega's foresight—which made their work possible. Drega, ever thinking in terms of construction, had his camp fashion wedges and poles, short beams and scoop shovels by burning and fire-hardening available wood. It was unsafe to trust stone for support work. It had a way of crumbling even if it looked sound.

No answer came from Steve, but the men drove ahead under Llewellyn's direction. If any thought he lacked liver, they no longer thought so. They saw him working in his element—sure, careful, willing to risk falling tons so long as there was a chance in fifty of surviving. Three times he missed being crushed by inches.

The widening of the hole was a tremendous task. Nineteen times they dug away loose shale and rubble and growing stone. Nineteen times they had the hole almost large enough to wriggle through.

And nineteen times some infinitesimal vibration knocked loose a rock and the roof pounded down to fill the hole.

The twentieth time they were successful. For eighty feet they wriggled through a natural tunnel barely large enough to pass. Every inch brought a rain of roof and walls about them, and they realized the great difficulty which had thwarted Steve's men, trying to tunnel out from the inside.

They paused at the tunnel end to breathe their torch. They were in an immense cavern, great streaks of rust shooting across walls and ceiling and growing in strangely shaped clusters and stalactites. The cavern was filled with colored formations, most of them like dull, raw ores.

The floor of the cavern was lined with ridges and projections. But corners were softened as if considerable amounts of water had drained through the roof, filling in crevices with fine sand and wearing down sharp surfaces.

LLEWELLYN led the way with instinctive knowledge of dangerous slides and pitfalls under foot. He kept stopping to examine walls and ceiling, his technical interest aroused in the artificially created caverns and formations.

"Anything worth while?" Tim asked.

"Plenty," Llewellyn nodded. "Iron and coal drifts, and some small veins that look like aluminum and dura metals. Must have crushed into the rubble and crawled."

"Crawled?" asked Marillo.

"Sure. Metal likes its own company. There's plenty of copper in spots. And here's some stuff that looks like hardened pitch."

Tim scraped the surface with his bronze knife. "Tar," he grunted. "Considerable quantity of it."

Marillo said, "All we got to do with a lot of this rubble is toss it into a vat and break it down." He paused and scratched his head. "Only where we going to get the vat?"

"Hot dog!" Lewellyn yelled. He held his flare up to a mottled spot, tinged with green and brown. "Lead! A solid nugget as big as a boxcar!"

"We're in the old switch tunnels," Tim decided. "My gang wired 'em. There's probably just about an orecar of lead there." He was picking a long, thin streak in the surface of one wall. "Plenty of heavy cable left in here."

Llewellyn suddenly hissed, "Shut up!" He stood listening intently. They heard the barest rumble from a great distance. Llewellyn glanced quickly at the walls and roof and darted toward the opposite wall. The floor began to shake. It felt as if it crawled beneath their feet. Llewellyn warned, "Stand back here."

They were under a particularly jagged section of the roof, the type any of the others would have avoided. They

waited an interminable ten minutes. Suddenly the wall beside which they had stood gorged out. For a minute it spewed dust and small rock, then stopped.

"Okay," Llewellyn grinned. He gestured toward a granite corner projecting from the ceiling. "That's probably holding all Park Avenue up."

The tunnel broadened so that they could not distinguish its edges. Rats became more profuse, and in the distance they saw fires burning. They approached cautiously, hiding their own

The explorers were back! Back from the cannibal-infested wilderness of Upper Manhattan!

torches and feeling their way ahead. They were studying a group of naked men and women around a fire when stout hands caught them from behind. Without ceremony they were thumped on the head and dragged.

Tim came to looking up into Steve's thin, but grinning face. "So you came back and got through!" Steve was trying to laugh off the emotion in his voice. "Well, you old tunnel rat, I thought maybe seeing you was a dream."

Tim suddenly sniffed and said, "Food! Real food!"

XI.

"WE'VE GOT plenty of food," Steve said. "Only trouble, it's about half poison."

Tim ate a dinner he never forgot. Jerked beef—tough, but good. Eggs! Corn meal mush. Honey. A kind of bean cake. And hot chocolate sweetened with maple sugar.

"How come?" Tim asked unbelievingly. "Are there stores of this stuff left?"

"Only maple sugar. This supply was a freak. I knew there was a trainload of specially cased food round here. It was for some polar expedition to take and bury for test purposes."

"But even then——" Tim began.

"Well, it was all carefully dried and packed in vacuum. This was copper and lead covered, and over that was a large sheet of heavier lead. And that was covered with a blanket of tar."

Steve went on grimly. "We'd given up hope of getting out of here. We had a fire—some of this solid material burns—and plenty of water. But we'd gotten down to eating rats. Then things got worse."

"Each other?" Tim asked softly.

Steve nodded, his face strained. "Our number had grown to about four thousand. A lot of them were God knows what. They didn't even know how they got here. Some of them were pretty tough, and every few hours somebody—began to disappear. We didn't know who to knock off for law and order, because damned near everyone of us was at the point where we were thinking of each other as food. Just about then we located this train. Or what we located was the food that had been in the train. It was buried solid in walls and floor."

He sucked on a piece of almost-black substance as hard as rock. Maple sugar.

"We couldn't locate enough to keep four thousand people alive more than a week. But we had a—lucky break." Steve laughed harshly—softly. "The first meat we found was rock, but after it was soaked and boiled it looked good. Only it wasn't. About three thousand people died in three days."

"That was luck," Tim agreed with hard irony.

"We just dumped them down a bottomless pit and moved our supplies to another tunnel."

"How about boiling?"

"All fixed for us. There were fires burning down here somehow. Every once in a while one of them breaks loose underneath of us. We found a place where some water was boiling in a hollow. There was a short tunnel under it, all afire."

"I don't understand the egg, though," Tim said. "Like Chinese buried eggs?"

"Powder," Steve smiled. "Egg powder. I guess it would keep forever. We're almost out of it."

FOR A DAY Tim's gang rested. Then the clan, numbering now around eight hundred, followed Llewellyn back out. They had found a big deposit of mixed coal and oil and tar which had been crushed together long ago. They had mined a considerable quantity loose with fire-blasting. Each person took a chunk of this to carry back to Drega's. They carried the rest of their food supply, and some stone containers they had

fashioned to keep themselves occupied.

Later, the quantity of fuel was to save Drega's civilization. It burned into clinkers and produced a high heat. It was the only fuel Drega's people were to know with which they could melt bronze and run it through the clinkers into channels and molds beneath.

Drega had thrown his entire camp into the duties of food and wood gathering, wood burning to make tools, and building the wall. "We might flounder around trying to do this and that and get caught by winter. Let's go at this problem as we can, without worrying about the things we're not doing."

Once already they had had to fight off a large horde from the north, and their casualties had been heavy. The elephants had saved the day.

More valuable than man power, the elephants were not allowed to tread over a foot of ground until the March Detail had tested it before them. This detail was composed of four hundred heavy men, already trained to march with a heavy goosestep in perfect rhythm.

Drums had been fashioned out of hollow logs and skins from the seals Lucky had discovered. Each morning they marched heavily back and forth over the territory the elephants would cover that day. Eight times the ground had given way beneath their tread. Thirty of their ranks had died. A hundred and more were on the sick list.

It was a heavy price. But daily the elephants heaved great blocks of stone and logs into place; the solid barrier rampart was pushed ahead. Behind the elephants, men and women worked to exhaustion filling in and piling smaller rocks. Wooden scoops and shovels were used for dirt work.

At the outset Drega had stated, "We need good cement," and called a former cement manufacturer into conference. But with no supplies at hand, the man was defeated.

"I thought you were the biggest cement man in the world," Prescott growled.

"I am—at least I was," the man said bewildered. "But we made our product by the thousand ton. We imported raw minerals from twenty States. There's not even lime here! The kilns won't work."

"No lime?" roared Drega. What were all these former experts good for? "Well, I can't make a kiln work either, but I can damned well get lime of some sort!"

He had a large clay pot with a hole in one side baked. A crude bellows with a flap intake was made from a sealskin. This was made fast to the hole and a fire built in the bottom of the pot. Large stones were placed in the fire to give a kind of grating, and limestone laid across the rocks. In forty-eight hours, he was getting chunk lime.

Drega ordered the lime pulverized after that. It was done at tremendous cost by men and women using rocks in smashing pits. It was mixed with sand and carried dry on pole trays covered with clay.

If streams, backwaters, springs or potholes were handy, it was wetted laboriously from containers made of clay and brush, or by ditch. Birch bark was too precious to be used for heavy work. If no water was available, it was left dry and the clan prayed for a very light rainfall.

SO THE SUMMER passed, men and women wearing themselves to the bone to maintain the necessary daily food supply; fighting off the fierce clans from the north; building that wall and road so that it would be finished by winter; and making crude tools from wood.

There was little time for further exploration or metal working. Only one gang could be spared to bring cable across the island, and the cable was urgently needed for harness and lifting and fish nets. Only three women could be

spared to melt and peel the tar covering the cable. It was a dangerous and laborious task, the only melting pit a natural rock formation which resisted heat fairly well and beneath which huge fires were built.

The great find of those months was when the elephants tugged a huge block aside and exposed an old elevator cable almost perfect with a heavy coating of grease. But it was dry and stiff and required three weeks to fire it back to life.

Oddly, it was the need for money which gave birth to a feeble metallurgical industry. Sailor began to demand his wages. "It ain't that I don't trust you," he said to Drega, "but you got so many people on your payroll I don't see how you can remember all you owe me. I want something says you owe me so much."

Drega smiled appreciatively. There were crack metallurgists among the clan. Many jewel and metal workers had been in that district. But experiments to work metal had not proven successful. Lead they had melted much earlier—at a terrific cost of fuel and loss of metal.

But money was even more important than tools. Money was morale—the thing which kept the grumbling, surly and bad-humored tribe fighting their way through. And tempers were getting sharper as food grew more limited. The only bright outlook was the hope of early berries and summer roots.

Drega called a conference of pitman and metal workers. They had just discovered the intense heat of the fuel brought by Steve's clan. The cement men were called in. They had learned where certain beds of better lime and sand existed. The outcome was an open-fire pit, crossed midway down by blocks of granite. Beneath the blocks, narrow tunnels opened into the pit. The tunnels opened at their other extremities giving some draft. A large bellows was made from the elephant hide. At the very bottom of the pit a channel was made of clay. This channel led to molds of hardened sand carefully packed by hand, then wetted and dried with fresh water for several days.

The channel and the molds nearly drove the metal workers to distraction. Even the copper man shook his head hopelessly at the channel and the forms.

"What's wrong with them?" Drega wanted to know.

"Well, for one thing, when the molten lead hits that lime, its going to raise hell."

"Then we can use plain sand at the pit."

"We can't find any. No molder's sand. That's better than the sand around here. But when the metal gets out to those forms, the sand's still no good. It's full of dirt and minerals, and its going to work in with the metal."

They tried the experiment anyway. The fuel was piled atop the granite stones. Hunks and sheets of lead were laid atop. The fuel was fired, the bellows worked. The lead melted and dropped, working through the hard cinders. In the pit the lime sputtered and bubbled and filled the metal with gas. The clay channel cracked. In the molds, the impure sand worked as the metal workers had predicted.

Had there been an old-fashioned blacksmith in the clan, he could have saved the situation. All these men were experts, artisans knowing only one branch of their trade, and used to working with the finest industrial materials and tools.

But the lead cooled, and Drega had tokens to give out for pay.

XII.

THE TOKENS were pitted. Many of them were cracked and filled with foreign matter. But they were *money!* For a few weeks tension eased. People

had something negotiable with which to barter and gamble.

Too, money was a whip to hold over the heads of shirkers and the lazy. A scale of wages was now worked out on a much closer basis than before. The matter of a few cents difference in actual lead money made a sharper impression on wage earners than a matter of dollars in promises before.

The great wall across the island was finished on the first cold day. But it was a weather freak, and there followed two weeks of wonderful Indian Summer during which the clan rested. There were berries and herbs in quantity, and a semblance of poisonous alcohol was concocted by fermentation.

The tough grasses of the lower island had grown long and the women set about braiding and weaving skirts and brassieres. Their hair had grown during the months, and the hard work had given lithe lines to their bodies. With a rest, they were a handsome lot, some of the best-looking secretaries from the former Wall Street district. For the first time, men paid them serious attention again.

It was Turpine who brought sharply to focus the additional work to be done. "I've got to have a solid, warm cave for my elephants for winter," he informed Drega, "and a lot of hay."

Drega looked over their cutting utensils, the bronze knives and scythe and a few sharp stones. They had not been able to do anything with the bronze as yet. The bronze was now melted in the clay-pot lime kiln. A small pot was placed inside, with a lead-off for the molten metal. Clay molds were tried, and worked reasonably well. Blunt instruments were then sharpened by honing.

Drega called the clan out to cut hay for the elephants, and to build winter hovels along the inner edge of the wall, both for protection from the enemy and the winter winds which would sweep the ridge.

The clan did not respond with enthusiasm. There was a great weariness. For the first time, they were enjoying leisure and the weather. A few caches of canned goods had been discovered. About one can in twenty was safe to eat. They could tell when they smashed one on a rock. If it exploded at them it was poison. Otherwise, their systems seemed to manage.

Drega called out his faithfuls. Largely, they were workers from the building and maintenance trades, but there was a scattering of artisans and technicians who worked with their hands. Drega had a fundamental respect for people who could make things. This group policed the camp, driving people to work at first by coaxing, and shortly by physical dominance, for the people grew surly and hard to handle.

"So you've become a dictator again?" Prescott said jokingly to Drega.

Drega sighed wearily. "It's no pleasure." He went off personally to help in the construction of the elephant quarters, for that building must contain three chimneys and a broad roof with no cracks.

THE CLAN irked under Drega's drive. When the winter housing was finished, still he drove them on to exploration, to clear the old warehouse across the island, and to salt and smoke fish. They began to turn against him.

It was in a September chill that Drega called them together and said, "I cannot hold this from you any longer. We have no food for winter. We have been going into our preserved stores. We are almost out of food now. In five days we have caught only three hundred and sixty fish and crabs in nets and pools combined. The situation is serious. We must find what is in those warehouses—or starve."

"There are still the elephants!" somebody in the crowd growled.

Mass bitterness at their condition turned against the elephants. With a sudden roar, the crowd swept toward the elephant house. Leading his small bodyguard Drega raced along the wall to head them off. He won through to the house by yards. A bitter club fight ensued. Nine people fell to the metal-tipped cudgels of Drega's men.

Day by day the bitterness against Drega grew deeper in the rank and file. There was muttering around fires at night. Men who should have been working, began to fashion themselves fighting weapons of hardened wood and stone and what metal they could steal from Drega's stores.

It was at this time that Drega told Lucky, "I've worked out a real lime kiln! That idiot who used to write about them forgot the chimney slope and his pit was shallow."

"Does that save us?" Lucky asked.

Drega said, "If we can find a way to work iron it would keep them busy through the winter. We'd pull by, because with lime we could make the houses warmer and fires hotter. And with iron, even the crudest implements, we could get into those warehouse hills."

"I thought Man made iron very early," said Lucky. "Why haven't we been smelting ore?"

Drega gave him a sardonic look. "Because we have no blast furnace! We've got the foremost metallurgists in the country and three crack furnace men. But they don't know how to work ore without a blast furnace and dolemite! Lord deliver me from civilization." He took a piece of dried fish off a crude silver dish and crushed it savagely between strong teeth.

Tim came up, two of his men holding a surly clansman between them. Once, he had been a leading importer. "Broaching stores," Tim reported, succinctly.

"What kind?"

Tim wet his lips. "About sixty pounds of dried fish."

DREGA got up and walked around morosely while the council was called. The discussion was short. There could be no alternative with winter this close. It was death—or its equivalent. The man was dropped over the wall, left to the mercy of the prowling cannibal clans.

But the sentence was not approved by the clan. Many fomenting spirits had eaten of those stolen stores. Others had been planning on the same thing. For many days now, the rations had become shorter and shorter, and their stomachs were empty.

Toward the end of October the clan revolted against Drega's enforced command to work. The week had been one of broken heads, of flogged bodies, of heavy financial fines, of fines in the way of withheld meals. It was the money penalties on which their bitterness settled. Oddly, they planned to kill the man who stood behind that money. Without Drega, it was worthless.

In the dark of midnight, a large body crept upon his hovel. They passed Lucky's and he was awakened by his dog's growling. From the muttering and the stealth of the band, he knew what was afoot.

It was possible to reach Drega's from his place over the brow of the ridge, out of sight of the plotters. Madly Lucky raced to give warning. The mob had stopped to reassure itself of its hatred, for taking Drega would not be easy. His house was placed to strategically command, and the houses of his trusted men surrounded him.

Lucky rushed in Drega's back door and panted the warning. Drega leaped from his bed of branches slamming a heavy silver mallet upon a small bronze ring. In the dark of the night, its clear

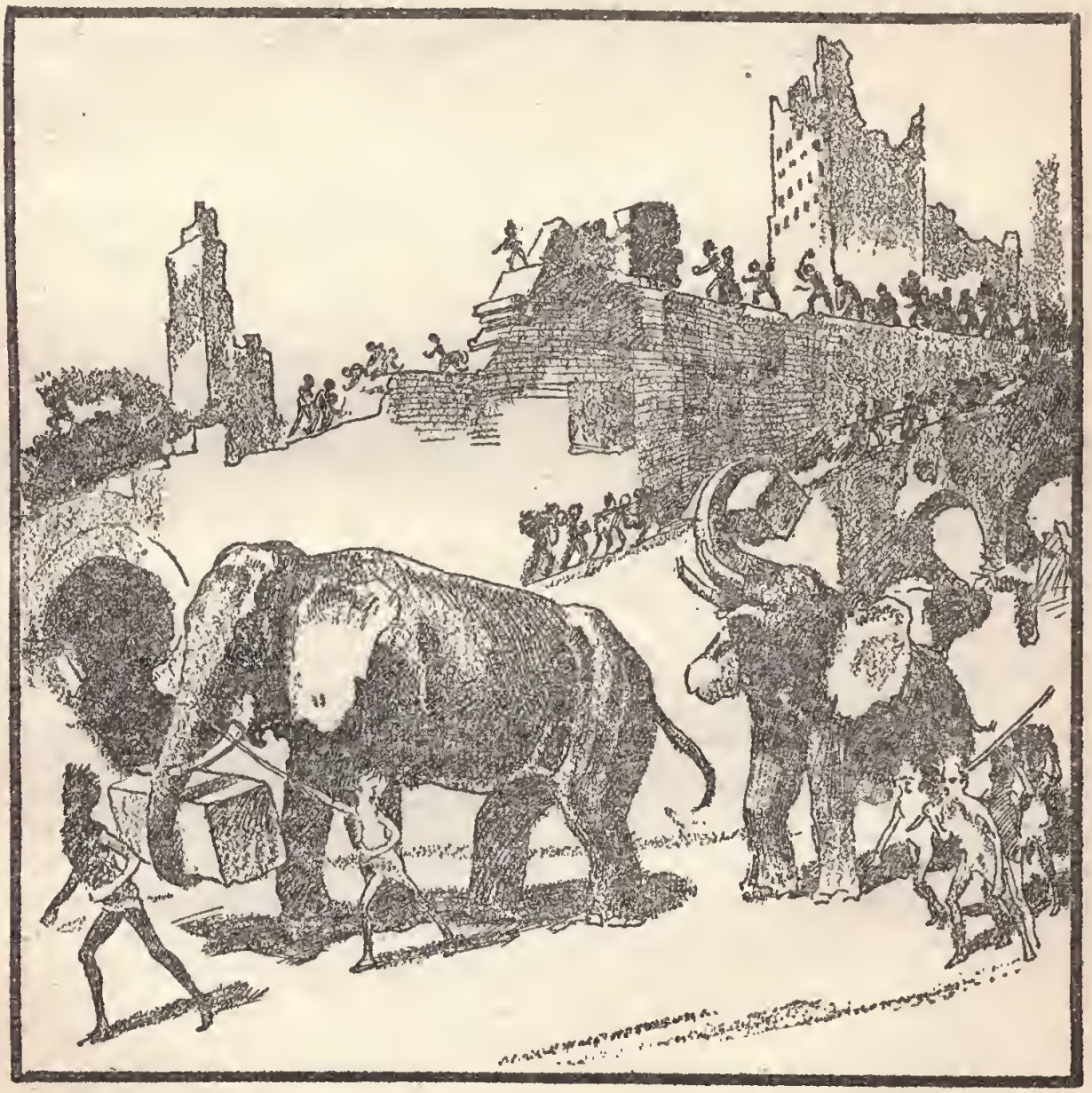
voice rang out, tolling danger to the clan.

Drega's bodyguard rushed from their sleep. But they were outnumbered and forced up the wall. It was a terrible and lengthy riot that night, with many who might have assisted Drega uncertain what to do behind the ranks of the insurrectionists.

During the frenzy of battle some one broke into the one well-made house, except the elephant stable—the food supply house. News spread through the mob. Defeated by the organized army of loyal men, it broke, but tumbled through the supply house grabbing food.

THERE WAS no way for the smaller body of men to investigate in the dark of the night. Until dawn, they huddled around Drega's, expecting a fresh attack every minute, their eyes glued on the fires springing up at the end of camp.

At dawn they went through the wrecked supply house. Not a bit of



In a world whence cranes and trucks were gone, there were things more precious than men. The elephants could lift and haul. And the March Detail stomped before them.

food was left. The clan had gorged as only starved people, worked to the bone an entire summer, could gorge. They lay in heavy slumber around the charred embers of their fires. They awakened as if they had been drunk, hysteria gone, their wits dull and many not knowing why they had attacked Drega the night before. They were not sorry. They simply did not understand their own actions.

That day the fish pools petered out, and the nets brought almost no catch. Possibly the fish had been fished out, or simply gotten wary of that shoreline. In days, the clan was famished and ugly again. But they would not risk another attack on Drega. They came up in the light of day demanding to know what he would do with them that winter. The story had spread that he had vast stores of food beneath his house.

"There is nothing I can do," Drega said simply. "We have not even sufficient food for an expedition out beyond the wall."

This was true, but partly he spoke for effect. Drega believed in his destiny. Somehow he would find a way to take care of his obstreperous clan. But he wanted them to get a good lesson, for the winter would be severe. He did not mind the muttering and hatred of the moment. They would get over that—when they got hungry enough. Well he knew the way of mobs.

And at that moment there was a throbbing in the air. They looked riverward. A large motor boat turned in toward shore!

XIII.

WHITE-HAIRED and forceful, a dynamic figure leaped ashore. Without hesitation, he walked up to Drega, his boots holding the clan fascinated.

Drega smiled cynically. "So it was you, Gamble? I thought so. Your great hobby was always suspended animation. But why so long?"

Gamble colored slightly. "We had our own place to order first—food to grow."

He smoked a cigarette. The pungent smoke drew the clan into one mind encompassed by memory of—yesterday.

"It took you eight months," Drega noted. "That's a long time in your world, Gamble. It isn't possible you intended suspended animation for, say, a hundred years—and something went out of whack?"

Gamble said, "That's neither here nor there!" He flicked a glance over the naked horde, his mind classifying them in various conditions of health and disease and malnourishment. "You haven't done badly," he admitted grudgingly. "We'll send down clothing and get things back in order."

"Thanks," Drega said. His lips were curled in a peculiar smile. Gamble's assistants were tossing small boxes ashore—sweet chocolate, cigarettes, malted milk, things a starved people craved more than real food.

"I suppose you're ready to admit the error of the old economic system now?" Gamble asked. "You've had time enough without your gold. Or did you find some?"

"No, we didn't look for it," Drega said. "But what particular error of the many you accused the old system of?"

Gamble snorted. "Money—corporations — ownership — war — inefficiency —compromise."

"I don't think they were errors." Drega's tone hardened. "We may not look like much, Gamble, but little pieces of lead money built this wall! And this wall is the difference between us and savage cannibals."

Gamble's eyes hardened perceptibly. "You haven't changed, Drega. I thought this might be a lesson. You

still want power, to run things, to own people."

Drega said softly, "And you?"

"I want to give them science." Gamble roared. "Science and your kind of money can't get along in the same world."

"Then there's no room for us in your world, Gamble."

Gamble's lips curled. He had caught the slight hesitation on the word *us*. He turned to the people. They gave him a joyous cheer through mouths full of chocolate and the choking induced by first cigarettes.

PASSIONATELY, he gave them a picture of the world science could create for them—corn high as their wall in five days from planting. Clothing in such quantity they could throw it into refabrication when it grew shoddy. Cars and private baths for every member of the family, luxuries for all and poverty for none. It was a beautiful picture. It left them silent and stunned.

"It will take a little time," Gamble said. "But not long. There is only one condition. You all work and *there is no money*. At least money of the kind you know. In return, you get everything you can wish for. There will be no need for money."

A cheer rose and fell dead into stunned silence. There could be no doubt Gamble spoke at least some truth. Look at his shining boots and the presents he had brought! Even bolts of silk and woolens!

"Mr. Drega," Gamble went on, "does not agree with my views. He will probably wish to withdraw from any part of them."

If Gamble had expected Drega to capitulate, he was disappointed. Drega was white but firm. He said to his people, "A world cannot exist without money! There must be trade."

His clan was silent.

Gamble said, "You only trade for what you do not have. But you will have everything. You will have a hot dinner cooked as you used to know it to-night."

A mighty cheer went up and echoed! The people went into a frenzy of dancing, yelling and crying.

Drega yelled through the din at Gamble, "You'll want the minerals on this island. Will you take me to Jersey?"

Gamble said with some disappointment, "You fool! You could be useful, too." He lit a fresh cigarette and nodded. "Of course. And whatever you want to take. If you change your mind, you can come back—under scientific economics."

The leaders of Drega's clan were standing around silently, lost in their own thoughts. Sailor scratched and twisted, and finally mumbled, "You owe me a lot of money, Drega, and I couldn't collect if I stayed here. I'll be going with you."

Einstein was undecided, then spread his hands, "Vat, no trade? But where am I? Mr. Drega, I stay by you. I am not very hungry this winter anyway."

Llewellyn studied Gamble a long time. Then he swaggered over behind Drega. "I was born sweating in a mine, and I been fighting for them sort of hours too long to want to get 'em now."

Marillo and Carter both blew their noses and moved behind their chief. The judge scratched his head three times. "That dinner sounds good," he mumbled. He held his arm up and glanced at the frayed cloth of the suit Drega had given him. "But there wouldn't be any constitutional law under you, Gamble." He moved behind Drega.

The former confidence man flipped a lead coin a few minutes, then snapped his fingers, pitched the coin into the river and came over. "I was born a sucker," he grinned.

TIM WAS talking in a low voice to the bodyguard. One of them laughed at him. Tim smashed him down, yelled, "All right!" Black with rage he went over to his boss. About one-third the bodyguard followed him.

Turpine was picking his nose and wiping his eyes with the back of his wrist. "Nuts!" he snapped savagely. "Lizzie wouldn't get along without you, Mr. Drega."

Drega swallowed. "Lizzie's an elephant. But she belongs to the clan," he explained to Gamble.

Gamble laughed. "There's a catalytic crane aboard that ship that could pull a dozen elephants! Take the beast. Take everything you want, Drega. I'll toss in food and clothing for the winter and tools."

Drega stiffened.

Gamble's eyes twinkled. He almost felt friendly. "You used to believe it was worth a price to buy a man off!"

Drega began to laugh. "So it is! I'll make it stiff. I want complete equipment to set up a town."

Gamble nodded and called his men to give Drega a hand.

The elephants and Drega's men were aboard. Drega was marching down to the boat. A beautiful woman with a blazing diamond around her neck walked over to him. "And I?" she asked softly.

Drega said, "Marian, it will be——"

She shrugged shoulders which hard work had returned the beauty to. She stepped aboard the boat.

"You're an idiot, Drega!" Prescott said. He was mad at Drega for forcing him to the decision to stay. "This is progress!"

Drega grinned. He pointed toward Jersey. "Over there we'll have money."

Lulu Belle nudged Lucky. "Maybe they'll have two- dollar weddings."

Lucky looked grimly ill at ease. He had risked his life a dozen times for Drega. He liked him.

But Lucky was a newspaper man at heart. The story was with Gamble for now. Drega was rebuilding a shattered world. Gamble was making a new one.

The clan had suddenly fallen silent. A few looked hesitant. Thirteen artisans and technicians suddenly ran aboard the boat.

"A good number," Drega grunted. "Any more?"

There was shuffling, but nobody moved. Silently the clan watched the boat pull into the swift currents of the river. Currents which had broken rafts, but which barely swung the powerful ship.

Prescott growled. "I hope you don't forget that dinner, Gamble. We ought to have it down here as a farewell."

"Oh, it won't be a farewell," Gamble said. "But I almost forgot about it. I'll radio the ship to pick up food and cookers before it comes back."

"Radio?" Prescott asked.

"The scientific way," Gamble said.

ALREADY his mind was lost in a tremendous, efficient, scientific future for these people. Abstractedly he drew a device the size of a watch from his pocket. Two short wisps of wire trailed it. He hooked one onto his belt. It was his own invention, and infinitely superior to the type of radio used in the yesterday of three thousand years before.

"Where's a water pipe?" he asked, still abstracted. "I need a running water pipe for this radio."

Prescott swore for one of the few times in his life. He pointed at the swiftly disappearing boat. "Out there! Water pipe! Oh, hell and damnation!" Then he looked at Gamble hesitantly, speculatively. He began to wonder.

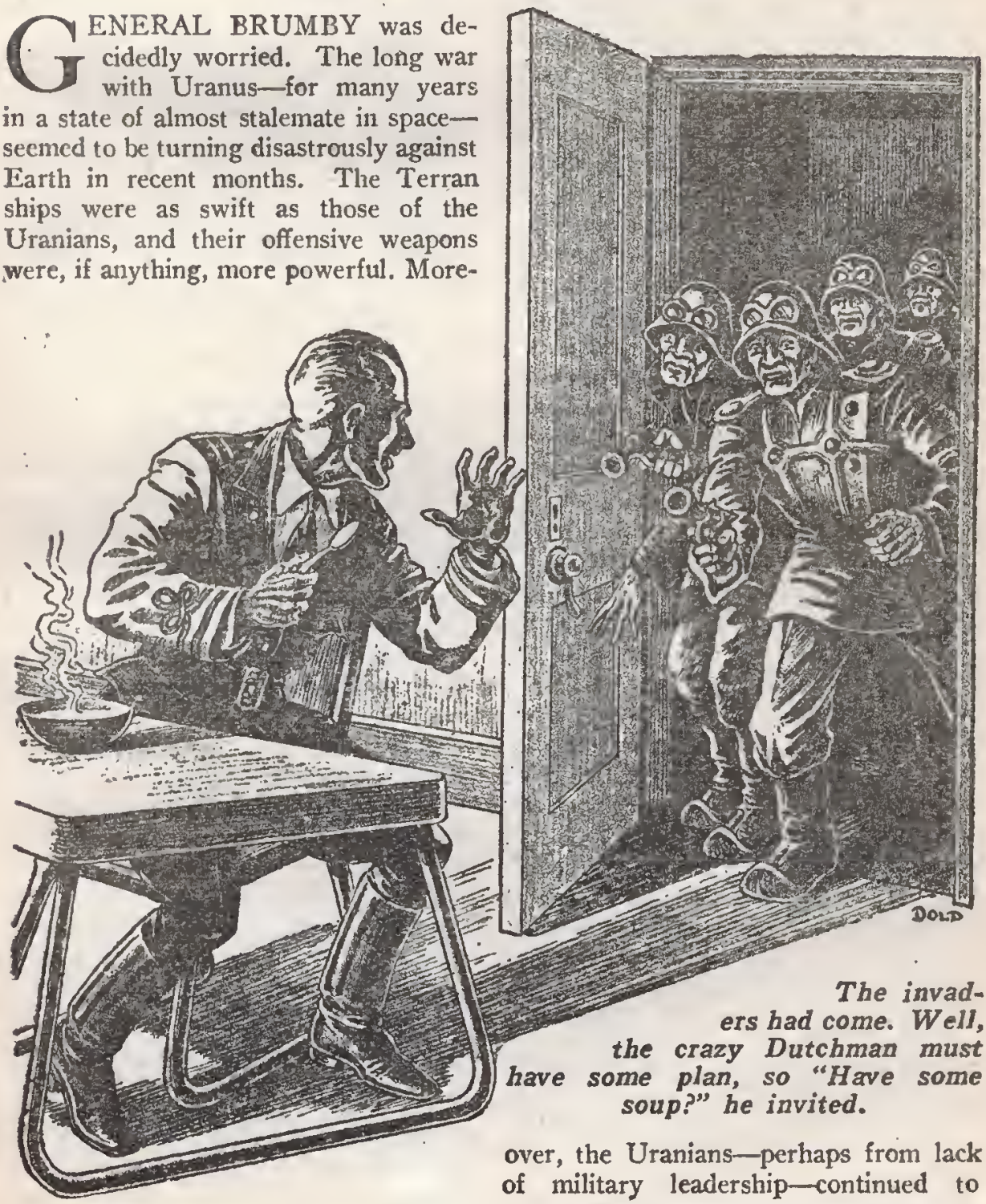
TO BE CONCLUDED.

STATIC

By Kent Casey

Sergeant John West and the gently mad Dr. von Theil succeed in making the Uranians quite mad.

GENERAL BRUMBY was decidedly worried. The long war with Uranus—for many years in a state of almost stalemate in space—seemed to be turning disastrously against Earth in recent months. The Terran ships were as swift as those of the Uranians, and their offensive weapons were, if anything, more powerful. Moreover, the Uranians—perhaps from lack of military leadership—continued to



The invaders had come. Well, the crazy Dutchman must have some plan, so "Have some soup?" he invited.

fight a war of single ships, frequently outnumbered as much as ten to one when discovered by Earth scouts. Earth should have been winning.

But Earth was definitely not winning of late, for the Uranian scientists had recently developed something new in the way of armor. Single Uranian cruisers, even small and lightly armed ones, now made no attempt to escape when discovered by a Terran fleet. They would boldly allow themselves to be completely surrounded, letting the hostile bombs and disintegrator-rays batter against their seemingly impenetrable screens, firing steadily until the Earth ships—their neutron armor damaged to the danger point—were forced to withdraw for repairs. One Terran batttleship of unusual speed had tried to ram the defenses of a Uranian—and had crumpled against the mysterious screen like a light-bulb thrown against a stone wall.

It was only a question of time before the Uranian high command realized its advantage, massed their ships for a raid on Earth itself and ended the war in a blast of destruction. General Brumby, now in full command of the Space Patrol, had commandeered every available scientist, and they were frantically working to find out the secret of the new screens. Or at least to find a weapon which could disintegrate them. Meanwhile, the disheartening message had just come in that the largest and best equipped Earth fleet yet sent out was returning to Base badly battered and still unsuccessful. Only one Uranian ship had been even damaged, when a small, one-man Earth scout had maneuvered—at suicidal risk—to head into the slip stream of the Uranian's main rocket and fired a bomb through that narrow opening. In the process, the scout's screen and hull had been severely handled, putting her out of control. She was rescued by a tractor-ray from the flagship and was being towed in.

The General dolefully thumbed over the day's laboratory reports. Failure, failure, and more failure. "It's not an improved neutron-screen—they've proved that. It's not an application of Von Theil's exploder, either, for it doesn't explode anything that hits it. It just fends off as if a Morrell-ray was a toothpick! And Captain Hawkins reported that his bombs were repelled. Actually bounced and still didn't explode!"

LATE THAT NIGHT the fleet limped home, ship after ship showing in her awkward landing evolutions how badly she had been mauled. The disabled scout was gently lowered by the flagship's tractor, for as yet there had been no sign that her single occupant had survived his gallant attempt to destroy the enemy battleship. "If he's alive he'll get a medal, all right!" was the comment of every returning officer.

"It was the bravest thing I ever saw, and deserved better success," the flag officer told General Brumby.

First-aid parties were rapidly transferring wounded men to hospital, but it was some time before the fate of the silent man in the wrecked scout could be determined. His ports were locked fast, and he made no move to show that he was alive. Finally, a door was forced open and the unconscious man carried out.

"He's alive," the Medical Corps man answered the General's question. "Can't tell how badly burned he is yet, but he's had a bad concussion. Fine big man, isn't he?"

"Why!" exclaimed the General, "it's Sergeant West! He was my orderly last year. Too good a man to lose, so take the best care you can of him."

When the various divisions and squadron commanders assembled in the General's spacious office, their report tallied exactly. They had much outnumbered and outmaneuvered the enemy. The Uranian offense had not been more severe than usual; and while no ships

had been lost, they had all had their screens gradually battered to shreds without, apparently, inflicting the slightest damage on those of the Uranians.

"Neutron screens can't take it for more than five or six hours without renewal. But those sons-o'-guns seem to stand all we can give them indefinitely!"

"The new detectors gave no hint as to the composition of the screen?" the General asked.

"Not a hint, sir," answered the flag-officer. "There is only one thing we know. When a projectile touches that screen, there is a momentary, but incredible, flash of almost stunning intensity and the projectile is thrown back. It isn't an explosion at all. There is only that infinitesimal instant of light so brilliant as to be crippling, and instantaneous repulsion."

"I see," said the General grimly. He rose and began pacing up and down the room, chin sunk on his chest. Suddenly he straightened and addressed the haggard officers. "Gentlemen, I beg your pardon for keeping you so long when you are as exhausted as you are. Apparently the enemy has not followed you in—but I think it advisable to have your ships run into the underground hangars before daybreak. The fleet will not go out again until we have something better to try than we had to-day. Meanwhile, I advise a stiff toddy and a night's rest. It is up to the laboratories now. You have all done your possible best. Good night."

LEFT ALONE, the General quickly summoned his technical aide. "It isn't much for them to go on," he said, "but tell Wyman and Appleby what the fleet reported. Intense light and repulsion on contact, but nothing at all showing on the detectors. Make all those absent-minded professors realize that until they find out something better than they have, the fleet is interned and the Earth open to bombardment. A desperate fight against odds is one thing—but to waste ships and men knowing that you cannot inflict any damage at all is damned idiocy!"

The televisor bell hummed softly, and the General switched in his screen. As light glowed through it, there appeared a smiling, bespectacled face wreathed in snow-white sideburns. "Hello, Dr. von Theil!" he cried. "Where have you been? Did you get my message?"

"Sure!" beamed the doctor. "I got it, but I can do you no good all cooped up with your scientific young men in the government laboratory. I don't work like that. So I don't come. I go to my own laboratory and I do some thinking."

"I hope you have thought to some purpose," said the General glumly. "Unless we can solve that new screen the Uranians are using we're licked. Have you any ideas about it?"

"Maybe yes, maybe no. But I got another idea. I think, if you can do something I ask, maybe I can find out what they are using."

"I'll give you anything the Service has and make the Council trot out more if you can do that, Doctor. What is it that you want?"

"Oh, not much. I want a little ship, and I want the same pilot you gave me last year when I tried my Dirac 'pebble-buster'. Too bad you can't use that because you have to keep your screens up yourself and it needs empty space to work. If all the other ships will stay home, and Sergeant West and I go for a little trip, I think maybe I can make the Uranians show us something about it. But I got to have Sergeant West. Anybody else wouldn't do what I tell him. Even he wouldn't maybe."

"West is hospitalized, Dr. von Theil. I don't know how badly he's hurt. He took a severe beating in the battle this afternoon. By the way, he'll be Lieutenant West if he gets well. He's earned it!"

"He's hurt? Oh, too bad! Suppose I come see how bad he's hurt. We couldn't go for several days anyhow. And General, West has got a tooth missing, hasn't he? A left upper bicuspid? That is important!"

"Seems to me he has," answered the General, "but what has West's lost tooth got to do with it?"

"Oh, lots. You wouldn't believe how much!" the little doctor chuckled. "I will be there in the morning and if West is well enough to see me, I will get a wax impression of where he lost that tooth. Then maybe he can go with me in a few days."

"But—" the bewildered General said—— But the screen dimmed and the little doctor was gone. "Didn't even tell me where he is," said the General. "Well, he'll be here tomorrow. I'd know he was crazy if I hadn't seen him at work."

WHEN John West opened his eyes the following morning and stared groggily around him, his first thought was to get up. Somehow, he found he could not do it. His legs were oddly numb, and his eyes seemed to be out of focus. Not only did distances look wrong—he missed the water glass on the bedside table by inches—but no woman could possibly appear to normal eyes quite as homely as the large and muscular nurse who leaped with a toothy grin to help him. With one brawny arm she raised West's shoulders and held the glass to his lips.

"Fine!" said the nurse in a bubbling voice. "We're going to be all right now!"

"All right, huh?" He thought, "All right, with a million needles jabbing from the hips down and a head like an arc light? Yeah, looks like I'm in my usual luck again, all stove up and out of action. It would take me to draw a gargoyle like that for a nurse!" He shook his head slightly in an effort to clear it, and nearly yelled with the pain in one shoulder. He sank back weakly on the pillow. "Where am I and what happened?" he asked.

The nurse's round face again split in that horrific grin. "You're in Fleet Base Hospital," she said, "and am I lucky to get your case! All the girls are jealous because my patient is the hero of the war. My, you must be brave! Even the General keeps asking about you!"

West opened one malevolent eye and merely stared. The General asking for him, huh? "Must be he's got another lousy job for me," West decided, "and has put this thing in charge so I won't dawdle over getting well."

"Kind of the General," he grunted. "I never noticed that he ever gave much of a damn when I was his orderly."

"Oh," gurgled the nurse, "you're very wrong! He's *very* anxious. Why, just look what he sent this morning!" Reaching into a clothespress she brought out John's uniform tunic. The chevrons had been ripped off during the night, two gold bars adorned the shoulders and the cuffs had been decorated with swirls of green braid. "And look!" again cried the nurse, pointing to a gay ribbon sewn on the left breast. "The Order of the Eagle! The General sent that himself!"

Order of the Eagle! I must have done something more lunatic than usual. Don't remember a thing after getting into the blast and turning my Morrell-ray loose. Ouch! My back! So I won the Idiot's badge, did I?

"And," the nurse went on, "I think he's coming to see you. He sent word to let him know just as *soon* as you could talk to anybody."

Hm-m-m. Old Brumby isn't given to idle chatter with sergeants. Now I know it's another job. Well, talking to the General is no worse than listening to this big lummox. "O. K., sister.

Tell him I don't usually receive except on odd Tuesdays, but he can come when he likes."

THE NURSE waddled away to find a telephone, and greatly to West's relief, stayed away for some time. She wanted to let all the Hospital see her escorting the great General Brumby through the corridor, so she lingered near the door.

To her intense disappointment, the General, accompanied by an undistinguished little man who trotted at his heels like a Sealyham terrier, passed her without a nod and disappeared into the medical officer's office. When he emerged, the Hospital chief was with him, and she did not dare to attach herself to the party.

"His burns are slight," the chief was saying, "but he is badly bruised and shocked. However, with his build and constitution, he should be up in about a week and good as new in another," and the three men disappeared down the corridor toward West's room.

West did his aching best to give the appearance of standing at attention while flat on his back as the two officers entered the room abreast, but all rigidity left him as he spied Von Theil's beaming face behind them. With difficulty he refrained from shouting "Why, Doc, you old son of a gun!" but he managed it, waiting for the General to speak.

"I wanted to find out how you are getting along, Lieutenant," said the General. "Colonel Davis, here, says you will be up and ready for action soon. I think you know Dr. von Theil?"

"Yes, sir," answered John. "We're pretty well acquainted."

"He wants to ask you about a missing tooth," said General Brumby with a fleeting smile. "I think I will leave him with you, for he doesn't wish to tell me what he wants you to do. Good luck to you and quick recovery, Lieutenant!"

Left alone, West and Von Theil could at first only beam at each other and shake hands. "What's this about a front tooth, Doc?" John asked.

"Not a front tooth, big man. A bicuspid. Open your mouth. Fine! Right close to the lead of the fifth facial nerve! That's good. Now everything will be all right and when you are well, you and I will have another party."

The little man opened a tin box which he took from his pocket and rammed a lump of wax into West's mouth. "Bite on that so I can make it fit," he said.

WHEN THE WAX was out of his mouth, John laughed. "I don't know what you're up to, Doc," he said, "and I don't know that I care. I'm sure glad to see you. If you're planning another trip, I'm your man as soon as I can get out of here. What you got now, another exploder? I hope so—we need something tough to crack those new Urie screens."

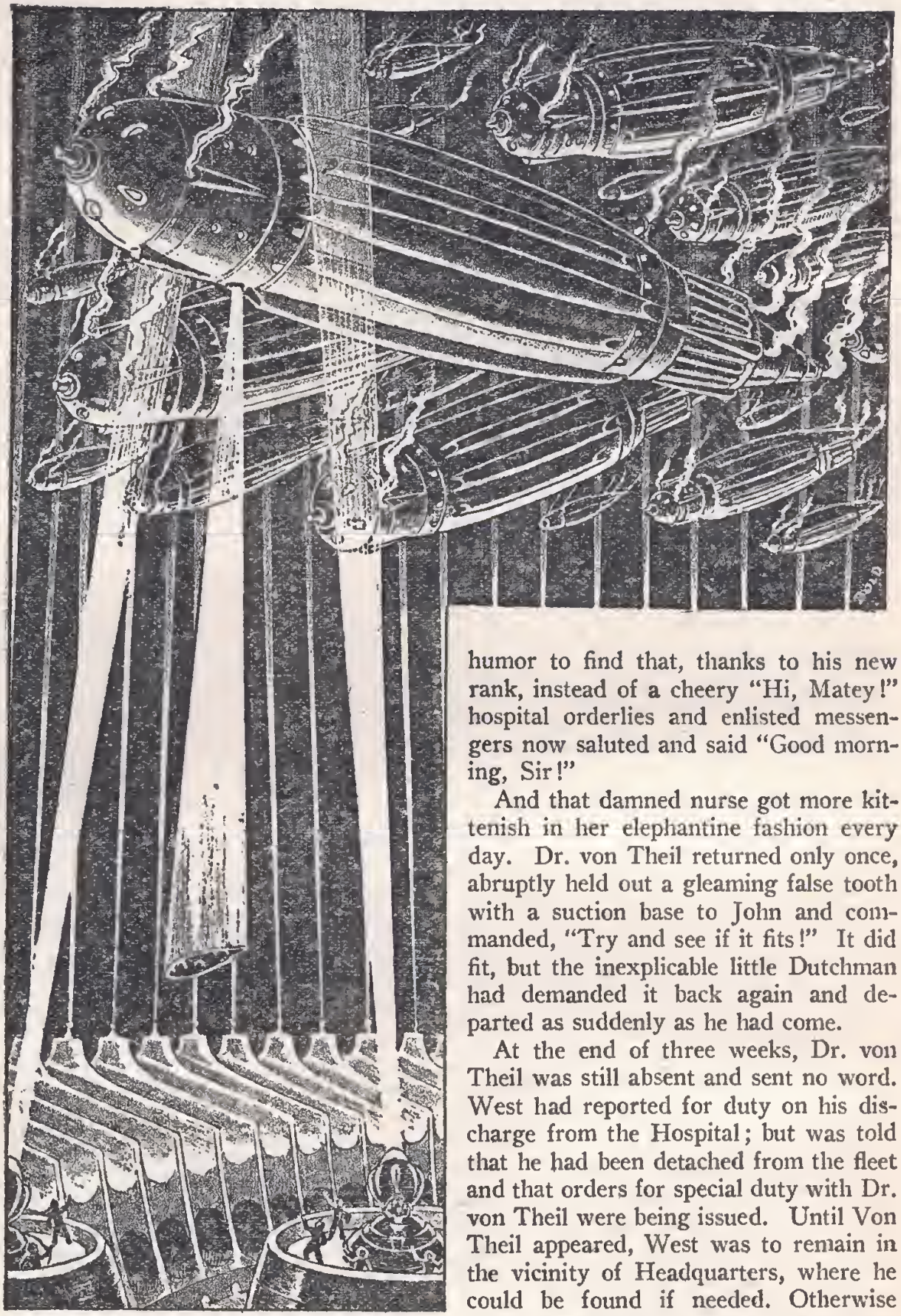
"Wouldn't it do just as well to have screens like that yourself and maybe find out how to soften them?" asked the doctor.

"Sure-ly," said John. "But how are you going to find out about 'em? The Uries won't tell."

"No-o, maybe not," and the little doctor patted his fingertips meditatively as he leaned back in his chair. "Maybe they won't tell, and maybe we can't learn ourserves. But perhaps you and I can persuade them to show us. Especially since you lost that tooth. But I must not keep you talking too much today. I'll come another time. Shall I send your nurse in when I go?"

"Lord, no! Tell her I've gone to Alaska for the weekend. Come in soon, Doc. It's good to see your whiskers!"

The physician had not overestimated John's rugged constitution. The numbness and the aches rapidly cleared, and, in fact, John was a very impatient man before they allowed him to get out of bed and wander around the Hospital grounds. It did not add to his good



Late that night—awkward landing maneuvers betraying the beating it had taken—the fleet limped home.

humor to find that, thanks to his new rank, instead of a cheery "Hi, Matey!" hospital orderlies and enlisted messengers now saluted and said "Good morning, Sir!"

And that damned nurse got more kittenish in her elephantine fashion every day. Dr. von Theil returned only once, abruptly held out a gleaming false tooth with a suction base to John and commanded, "Try and see if it fits!" It did fit, but the inexplicable little Dutchman had demanded it back again and departed as suddenly as he had come.

At the end of three weeks, Dr. von Theil was still absent and sent no word. West had reported for duty on his discharge from the Hospital; but was told that he had been detached from the fleet and that orders for special duty with Dr. von Theil were being issued. Until Von Theil appeared, West was to remain in the vicinity of Headquarters, where he could be found if needed. Otherwise he was to do nothing but rest and wait.

Rest! I did enough of that in Hospital. What is there to do around here?

Diffidently, after discovering that his new gold bars merely embarrassed the enlisted men if he hung about the orderly-room, John tried the Officers' Club. That was even worse. Young shavetails—hadn't even got a space-tan yet—insisted on being chummy, and fingered his new decoration. Older officers overdid the business of making the new officer "feel at home". When he could escape conversation, the big padded chairs in the library were comfortable, and the papers and magazines helped pass the time. But as the days went by, West grew more and more impatient.

HE WAS half asleep over a newspaper one day when Von Theil suddenly appeared before him. "Hello, big man!" was the professor's greeting. "Get your hat and let's go."

John West leaped to his feet. "O. K., Doc! Where are we going?"

"Oh, out there," said the little man cryptically. "You got your toothbrush and things? We might as well start."

"They're in my room upstairs. Half a shake and I'm with you, Doc."

There was no need for John to pack. A change of shirt, underwear, socks—spare tobacco and toilet gear—were already tied into the blanket-roll hanging in his closet. It was over his shoulder in one motion, and the queerly assorted pair were on their way to the hangars. Hung around his neck Von Theil had what looked like a small camera-case. But he was otherwise unencumbered. "Where's your baggage, Doc?" West grinned.

"Oh, you know I don't travel with foolishness. I got a toothbrush in my pocket. I think maybe we be back tonight. And if we don't, we won't have time for baggage. Maybe we can get some food or drinks from the Uranians."

"The Uranians? Say, Doc, what kind of a party is this?"

"A nice party, I hope. I don't like rough parties. Don't you go spoiling this one by trying to fight. Foolish! They got muscles fifteen times as strong as yours."

"What shenanigan is the little runt up to this time?" West wondered, looking skeptically at the jaunty little runt. "First he talks about my tooth and then about the Uranians and says I mustn't fight. This sounds like it's apt to be good!"

A tiny ship, ready to go, lay on the ramp. West looked her over rapidly for signs of new equipment. There was none. "No new gadget to try out, Doc?" he asked.

"No. I think we will have a new gadget to bring back, but it won't be mine. Go easy when you start. Don't break my neck doing it."

West laughed as he settled into the pilot's chair. "O. K. I'll lift her slow and easy. Where to now, Mister?"

"Oh, just out a little way and stop so we can talk. I don't want to talk around here. Somebody might be listening and they maybe wouldn't let us go." Von Theil chuckled.

GRINNING broadly through his mystification, John eased the little ship clear of the ground and accelerated slowly. In a few minutes he shut off his power as he slowly twisted the verniers of his micro-repellers.

"There we are, Doc. We're playing we're the Moon's moon, just revolving around her. Nobody'll bother us here. Now spill the news."

The little man leaned back and began to tap his fingers together as he talked slowly. "I *think* I know what the Uranians got, but I am not sure. I think maybe that screen is cosmic rays."

"Cosmic rays?" West grunted. "Would they make a good screen? Instead of repelling, I should think they'd

go right through a bomb without bothering it. And the light-flash? What about that?"

"That's why I think it is cosmic rays," answered the doctor nodding sagely. "You see, maybe you know, everything we know about is a manifestation of some kind of wave. And the waves go like octaves in a piano keyboard. You know how if you make a wire wiggle maybe for instance 512 times a second, it sings 'Do!' You wiggle it twice as fast, 1024, it still says 'Do,' but an octave higher. Now, other kinds of waves—magnetism and radio and so forth—work the same way. Double their frequency and you got another octave. Red, for instance, is 'Do' in the octave of visible light. Now light waves are the same type as cosmic waves; so if you keep on doubling red, by and by you get a 'Do' in cosmic waves."

"So what? I still don't see."

"We-ell, I think," said Von Theil slowly, "that they got not much radioactive rocks in Uranus. That is what I am hoping. Anyhow, I think they collect cosmic rays——"

"With a Harkness tube?" John asked.

"With something like a Harkness tube. But I think maybe—since I know Uranus is not very good at some kinds of science—it is probably more like the Schweidnitz tubes they used to have on earth about the end of the twentieth century. It was a development of the old Geiger 'counter' modified so instead of just registering the rays as they happened to come in, it *pulled* them in. Collected them. It wasn't very efficient, and it was much too big to use in most places. Anyhow, I think they maybe collect the rays and have made something to radiate them in a dense globular mass like you do neutrons for your shields. Now, what is your Morrell-ray?"

"Alpha particles," said John.

"Pfui!" snorted the little man. "That's the bursting charge. But what is the carrier, the ray itself?"

"Oh," John answered. "I don't know. I don't think anybody but Morrell ever did. We can make the gadget, but we don't know the principle."

"I BET I DO," Von Theil replied. "I bet it is like my ray. Only its electromagnetic radiations aren't so active. And your space-bombs—they're just dense vortex-whirls of low-grade energy that release the alpha rays that do the business on impact. While my ray, when it hits matter, creates electron-positron pairs where there is no room for them, the Morrell-ray just carries alpha particles to where they can start smashing atoms. When the Morrell or the bombs hit that dense-packed belt of cosmic rays, the bursting charge of alpha particles is bounced back. But the ray—and part of the bomb-envelope of energy—isn't. It is, you might say, smeared on the face of the screen. The alpha particles bounce off the cosmic rays, and some cosmic rays bounce back from the alpha particles. By the laws of conservation of momentum and energy, the kinetic energy that the alpha particles acquire has got to be lost by the cosmic rays. So. The lower energy of radiation quantum means lower frequency—'Do' in a much lower octave. It's analogous to the Compton Effect. When a light quantum and a free electron bump and bounce. That's what makes the flash. It's just incidental, see?"

"I'll take your word for it, Doc. What can we do about it?"

"You do what I tell you and the Uranians will show us. If they are bright, they will just show us how they make the cosmic rays bunch together like you do neutrons. If they aren't so bright, like I think they aren't, we can make better screens than they do and can soften theirs up till you can pierce them."

"Listens swell to me, Doc. What do I do?"

"Well, first you put in this tooth and get used to it. No matter what happens, don't you let it get out of place. That's why you mustn't fight. You keep it tight in your mouth, and when you eat don't bite hard on that side. Maybe, when the party starts, it will get a little hot. If it does, take some water and hold it in your mouth, but don't lose the tooth!"

West shouted with laughter as he obeyed. "Doc, you're a comet-tail's orbit! You can do more cuckoo stunts than a cageful of monkeys. What is this thing, a mascot?"

But Von Theil did not laugh. "You bet it's a mascot," he said grimly. "You keep that in your mouth tight like I say or everything will be no use. Now, the General says you don't use that secret cache of stores on Mars any more —the one you took me to last year."

"No," John said. "Of course, the hangar is still there, and there's a tankful of fuel and some provisions in the living quarters. The other supplies have been taken out. They were afraid the Uries were getting wise to it."

"Hm-m-m. Is there a place where you can hide this little ship? Not the hangar, for I don't want the—Uries, you call 'em?—to find the ship. I may need it to build up some more power in this gadget if the party lasts too long," and he slapped the small leather case hung over his shoulder.

"Yes," West answered. "There's a deep gully I could slide her into that's covered with trees so it doesn't show from the air. It's about a quarter mile from the station."

"Fine!" said the doctor. "Let's go there quick."

TWO HOURS later the tiny ship lay in the gloom of a narrow crevice in a Martian cliff, and John turned to his passenger. "O. K., Doc. What do we do next?"

"We don't. You do," the little man answered. "And you are going to get mad when I tell you."

"I'm used to being the goat, Doc. I won't manhandle you this time, even if you tell me to call up the Uranians and ask 'em to tea."

"Good! That's just what I want you to do."

"What the—what do you mean?"

"Why, you send out a message, any old message that don't make sense, but that they can pick up and recognize as an Earth message and trace. Send it on plain radio so they can't miss and will think you are dumb. Then you go over to the quarters of the old station and cook something to eat, like you lived there. I think maybe you will have the Uranians drop in for tea. I hope so. Don't you fight them. You be glad to see them. You tell 'em you been alone here for, oh, maybe a year and are going nuts. Then, when they get you outside there and give you the ship, you bring it back here and get me."

"When they——. Say, I won't have to pretend I'm going nuts if you keep on talking like that," West snorted.

But Von Theil interrupted brusquely. "Please, Mister, send that message quick, because the General says he thinks some of the enemy are around here and maybe we can get home tonight. No matter what you say. Just send something dumb they can hear."

"O. K. Will this be nutty enough?" Throwing power into the speaker, West intoned into the microphone, "A great she-bear came down the street and thrust his head in the Barber Shop. What? No soap?"

"Fine," chuckled the Doctor. "Once more. They will believe you when you act nutty."

Choking back his laughter, John obeyed, and space again carried the

deep-voiced message "What? No soap?" into every receiving set for millions of miles.

"Now scram and get your tea ready," said the little man. "Me, I stay here so they don't know about me or the ship. Remember, don't you lose that tooth, and come back here as soon as they let you."

OVER in the living quarters of the abandoned station, John did not have long to wait. He had cooked a large potful of canned soup and was singing lustily when the door slammed open and he turned to find himself staring into the bell-mouth of a force-gun in the hand of a Uranian officer. Other Uranians were crowded in the corridor.

John grinned foolishly and raised his hands. "Hello!" he cried. "Glad to see you. I've been here alone so long I'm about batty. Have some soup?"

The Uranian searched John for weapons and found none. A rusty, long disused rocket-pistol that was hanging on the wall was quickly confiscated by one of the Uranians who now crowded the room. They stood in a circle around John, staring grimly at his idiotically smiling face.

"What are you doing here?" growled the officer in the universal pidgin which was the language of trade between the planets.

"I'm just the caretaker," John said. "They were going to make a storehouse of this, but I guess they forgot. I've been waiting most a year, but nothing has come yet."

"Caretaker? You're lying. You're an officer. They don't use officers for caretakers in your service, do they?"

"That's because I'm a Morrell-ray expert," John lied glibly. "They were going to store Morrell spares here. They wanted somebody could keep 'em repaired. But they forgot. Have some soup? It's good."

A Uranian standing back of John grinned and tapped his forehead significantly. A little smile crossed the officer's grim visage. "A Morrell-ray expert, huh? Well, you come along with us and you won't be lonesome. We'll take you home and maybe the Admiral would like to hear all about how you make Morrell-rays."

West managed to turn a surge of anger into a vapid laugh. Even if he was playing nutty, it stung to think that they took him for a man who would spill military secrets to the enemy. "It's nice not to be lonesome," he said. "Does your Admiral play pinochle? Have some soup."

"Take him aboard," said the officer. "You, Lamorak and Godok, search this place. No, no need to tie him up. He's peaceable."

"He's crazy as a bedbug if you ask me," giggled one of the Uranians, taking West's arm. "Come on, fella. You and me are going to play games."

It was hard to preserve the smiling vacancy of his face when John was not too gently half-led, half-shoved on board the Uranian ship. Three others that had also intercepted his "No soap" message were hanging aloft, waiting for some indication that their help was needed. It was very hard to keep the interest out of his face as he remembered that he was the first Earth man to see the inside of an enemy ship, the first to have a chance to discover some of their scientific secrets.

To keep up his role, John began to sing again, a silly song of old, old times that his nurse had taught him years ago.

"When it's night time in Italy it's Wednesday over here," he crooned, then smiled into the face of the officer of the watch. "Hello, Commodore! Have some soup?"

"Put him in the sickbay and set a sentry over him," the officer who had captured John directed. "He's off his

head, but he says he's a Morrell-ray man. If he is, Gron will get the secret out of him. Take off."

WEST'S THOUGHTS were turbulent enough, as the Uranian ship soared up into space, and began to blink by visual signals to the other ships what had been found. Doc must have wanted me to get captured. He's got something up his sleeve. It can't be that he's just going to blast these Uries. I'm to do something, but what? "Bring the ship back to Mars when the Uries give her to me," he said. Oh well—Doc's no fool.

Absent-mindedly he reached for a carafe of water that hung on the bulkhead. He was oddly thirsty, and—by Jove, Doc warned me to keep water in my mouth if this tooth got hot. And is it getting hot! Ouch!

A rattle of accouterments and a queer grunt made him turn toward the door. The sentry was sitting flat on the deck, his mouth hanging open and his eyes crossed. "Make-heavy—planetoid—bargain-bang!" remarked the sentry sagely.

As John stared, the sentry slumped over and rolled on his back. Odd, blubbering sounds whispered through his thick lips. "Why, something's turned this guy into a complete idiot! Should I go tell 'em he needs a doctor?"

But just then, the Uranian doctor, crawling on all fours and swinging his head from side to side like a bear, entered the sickbay. He was chanting under his breath, over and over, "Forty million piston rings, forty million piston rings!"

Staring, West bent over the two, but they paid absolutely no attention to him. The crawling doctor, after barging into the prostrate sentry, stopped uncertainly for a moment and then began to crawl backwards with stertorous sounds.

"Huh! What a bughouse! Ouch, this tooth *is* hot! Oh, oh! What's happened to the pilot? Another turn like that and he'll be straining the ship's frames."

Cautiously, West left the sickbay and stealthily crept along the deck. Several Uranians turned vacant eyes on him, but did nothing. Even the officer of the watch was sprawled at length and seemed to be trying to count his fingers. Entirely unhindered, John entered the charthouse. The pilot snored noisily, in the corner, and the steersman had fallen forward, hooking the helm hard over. Without a controlling hand, the ship was swinging in crazy circles.

John jumped for the wheel, lowering the unconscious quartermaster to the deck and straightening the ship up on an even keel.

"By golly, this is Doc's work! 'When they give you the ship,' he said. Boy, I'll say they've given her to me. They're out for the count, the whole daffy lot of them. 'Come back to Mars,' he said. Well, if those other three ships don't beam me down for trying, that's just what I'll do. Hot diggety! What *has* the little runt got in that camera case?"

THE VISOR mechanism gave a warning hum, and John snapped the switch. Dr. von Theil beamed from the screen. "Hello, John!" he called. "Those other ships are nuts, too. Maybe put a tractor on 'em and pull 'em here. We'll take all four of them home with us. But don't lose that tooth!"

"You bet I won't even if it is hot as Tophet," John answered. "What have you done, Doc?"

"Easy," answered Von Theil. "Even back in the twentieth century, Dr. Crile found out thoughts were electrical like anything else—work like radio. Well, I just sent out a lot of static. Those Uranians aren't hurt. They just can't finish a thought when they start it. They just don't remember how to walk. That tooth is a static eliminator, so it didn't hit you."

"What are you going to do with 'em?" John asked.

"Leave 'em here on Mars. There's enough for them to eat until the General sends to get them. We will take the ships home and find out about those screens. What does the gadget look like?"

"Accumulators all along the sides of the ship, and some housed-in mechanism I can't see. But mainly there's a whacking big tube with two horns on it right down the center of the ship. Must be forty feet long," John said.

"Hm-m-m!" chuckled the doctor. "I thought so—Schweidnitz tubes. Only one?"

"Yeah, just one."

"I know they were not so bright! I will tell the General not to throw alpha rays at those Uranians at first but begin with gamma-ray charges. Then by and by their screen will be full of soft holes."

"Why, Doc? I don't get you."

"Because Schweidnitz tubes got the same fault as the Geiger counters they were made from. Two Geiger tubes in series will keep out anything but cosmic rays. But only one by itself lets in gamma rays—any old radium emanations. They got no radioactive rocks on Uranus, so they haven't been bothered. But get radium, or even uranium nitrate near that tube, and the screen will be only part cosmic rays. The rest will be no better than neutrons."

Half an hour later, West eased the captured ship to the ground and gently towed down the other three. Puffing and chuckling, Von Theil helped him roll and drag the disarmed, vacant-minded crews to land, take the air, and clamp heavy tow-tractors on the three empty enemy ships as well as on the little despatch-boat that had brought them.

When well clear of the ground, Von Theil reached into his little leather case and John heard the snapping of a switch. "I guess we let 'em up now," he said. "I left the speaker turned on in the hangar, but I smashed the transmitter so they can't yell for help. You want to tell 'em something?" He grinned at the big spaceman.

John peered through his binoculars at the now active and gesticulating crowd of enemies marooned on land. He leaned over the microphone.

"Have some soup, bullies!" he invited gently. "You'll find it on the kitchen table!"

NOT THE, BUT A

The time-travel plot has been much used in science-fiction, probably because it allows of a type of interest-rousing situation that is fundamentally appealing. Only by some time-traveling device—suspended animation should be so considered from this standpoint—can a character of modern times, talents and knowledge be directly opposed to the environment and people of other ages.

Fundamentally, a good story should rouse in the reader the thought "What would I do?" The transportation of a modern to that other environment is, dramatically, a sound idea.

But the science of that type of tale lagged sadly. Evidently, the earliest supposition was that if the machine went forward in Time it went to ***the*** future. It took science-fiction nearly a quarter of a century to change that "the" to an "a"—to realize that time-travel would lead a man to ***a*** future, perhaps, but not ***the*** future.

That realization was the first New Concept—the first ***mutation***—of the time-travel plot. Fundamentally that change was as small as that; the realization that "a" not "the" should be used.

A tiny thing? A mere grammarian's distinction? Yet on it—because it was actually a vastly important change—a whole new literature of time-travel and time-concept is founded. Mutations seem small and utterly insignificant at the start; perhaps a thing so small as to miss notice. But that shift from ***the*** to ***a*** brought forth such stories as "Sidewise in Time," "The Worlds of If," a dozen other. It changed the whole concept of time-travel.

Jack Williamson has opened up another field for time-travel plots. ***The Legion of Time*** is itself a memorable story. It has a new plot. But more than that—it has a new concept—a ***mutant*** plot.

If the future can follow either of many paths—and that, I feel, must be so, if our modern science is reasonably sound—then there is a new possibility. In the year 5938, for instance, either of two civilizations ***might*** exist. A time-traveler going down the paths to Tomorrow might reach either one or the other.

But, as Williamson points out, ***those two cannot be real to each other.*** If either ***can*** exist, and if they have the power, the knowledge to see through Time—then they may struggle for existence! But they cannot attack each other!

Williamson has developed in a powerful story, a completely new idea; two possible civilizations, unable to attack each other, struggling for existence through a present man who can bring either into being.

That idea is so broad, and so basically important, that it can give rise to a hundred plots, all differing from ***Legion of Time,*** yet all stemming from that concept.

Just as it, in turn, and just as all modern time-travel stories, stem from that little, unimportant grammarian's change——

Not "the", but "a"——

The Editor.

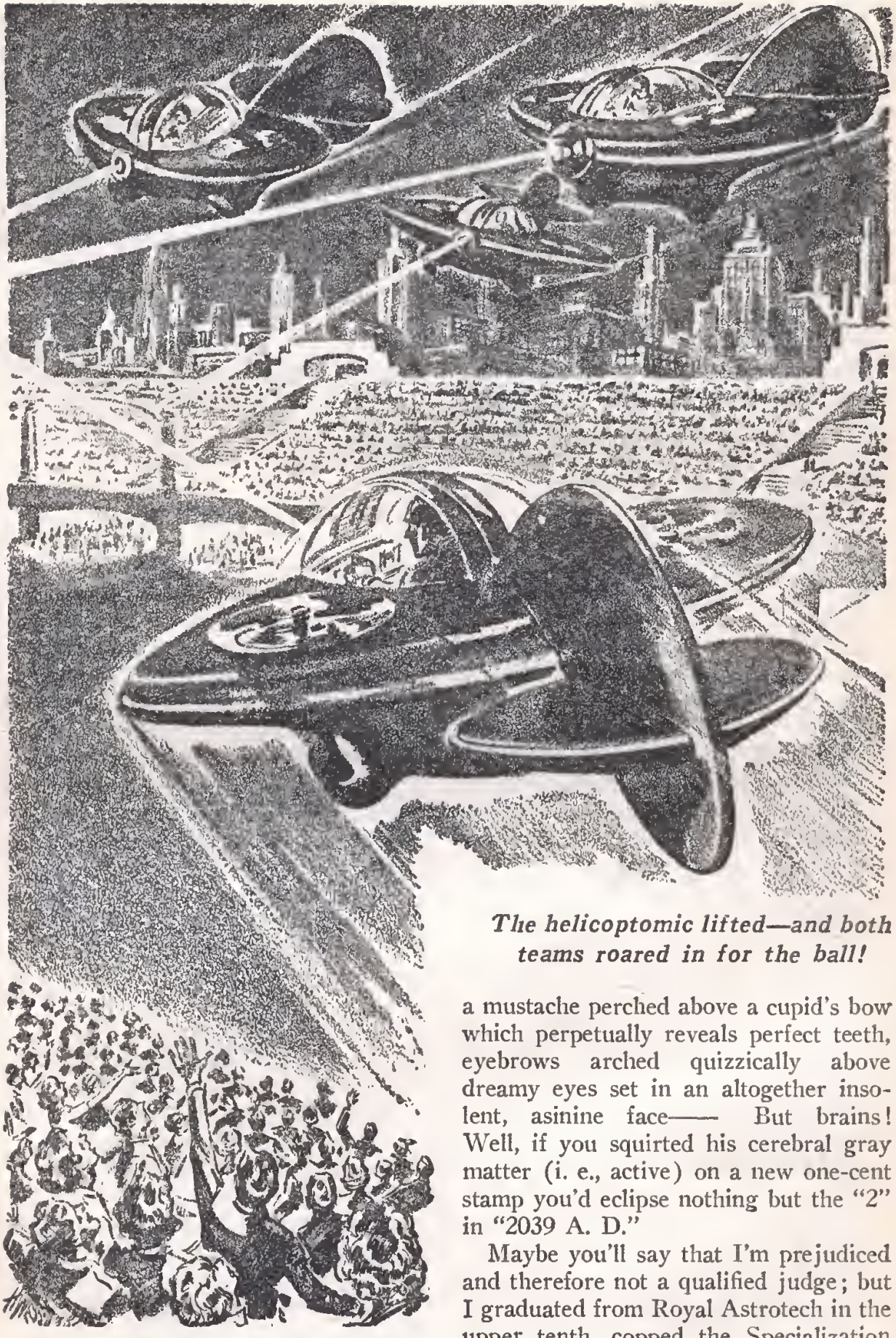
RA FOR THE RAJAH

By John Victor Peterson

A new type of story—a tale of rivalry at a college of the future—told in a unique and appropriate style.

MANY of the so-called intelligentsia will laud a Martian as a gentleman and a scholar. Personally, I catalogue him as a distinctly anti-Hoyle dimwit of the *genus homo sap*—which is neither robotypist's error nor ultra-modern abbreviation for *sapiens*—and—— Well, the typer won't handle that.

Take that fop of a Rajah from Syrtis Major, for instance—a Beau Brummell from the feminine viewpoint. Wisp of



The helicoptomic lifted—and both teams roared in for the ball!

a mustache perched above a cupid's bow which perpetually reveals perfect teeth, eyebrows arched quizzically above dreamy eyes set in an altogether insolent, asinine face—— But brains! Well, if you squirted his cerebral gray matter (i. e., active) on a new one-cent stamp you'd eclipse nothing but the "2" in "2039 A. D."

Maybe you'll say that I'm prejudiced and therefore not a qualified judge; but I graduated from Royal Astrotech in the upper tenth, copped the Specialization Prize in Atomic Engineering, rubbed

elbows daily with offspring of the Red Planet, and hence should know what I'm talking about.

None of those alien-witted studes and stooges from Mars even hit in the upper half—except the Rajah, perhaps. But after all, his paternal ancestor was the big mogul in Syrtis Major, with a bankroll that would have insured his pride-and-joy matriculation at Bryn Mawr!

Deduct therefrom that the kid never legitimately passed an exam. Old Gratzmeyer, Kerrin or Massey would squint at the papers, peruse the attached check, and conscientiously elongate a point and follow up with a pair of perfect circles. Which really isn't such a bad percentage, considering!

I was Freshman President by virtue of what was termed brilliance in prep school polo when the exclusive Coloe Palus prep Godsped the Rajah across to Royal.

His knee bent in homage, a Sophomore Martian introduced us: "Frosh prexy Ward Jetland, this is his Royal Highness Ianay Fonay, eldest son of Lanay Fonay, Over-Rajah of Syrtis Ma——"

"I-am-a-phoney!" I punned softly and chuckled. Consciousness was concurrent with the discovery that my aching mouth tasted of Martian knuckles and the realization that even a Martian can be insulted.

Tradition went smash! For a common frosh can't sock the prexy, even if he is a Rajah's heir-apparent. It's worse than mutiny on a space-trajectory; it's worse than a privately tutored youngster prancing innocently into the Blaster's Dive on Ganymede and asking for milk!

Naturally, I promptly recovered my pugilistic prestige, and for three years afterward we had secret rendezvous behind the polo hangars and nurtured black eyes, skinned knuckles, acid burns and whatnot. We rounded the final pylon sound-limbed and going strong. Then radium, atomic energy, rockets, thrust-dispersion, polo, and—last and most important—Rosalie Ames, came cometing into our bittersweet lives and things really got serious!

THE RAJAH and I were majoring in Atomic Engineering and since we both regularly copped hundreds on theses et al., Professor Massey consigned us to Laboratory 23B on special research *in re* curbing initial high-exhaust velocity on atomic motors in order to disperse thrust.

Perhaps you've tried to work with a guy like the Rajah? Smooth, self-confident, conceited, and arrogant as only a Martian can be? Your hands are fists most of the time; you just can't help it! If it hadn't been for our mutual interest in the problem, plus the danger of expulsion, things would have gone smash. But as it was, the personal factor and stimulant weren't long coming.

Said p. f. was Rosalie. The stimulant: we fell in love with her. I don't mean she was a prospective bigamist—that wouldn't start to describe the girl!

Rosalie is heiress to glabrous little "Tiger" Ames who runs the Interplanetary Stock Exchange. Her picture has been in the televisor news dozens of times. Remember the time she was supposedly gaga over a Balkan prince? He turned out to be a fortune hunter from Alcatraz, miracle of plastic surgeons, whom the G-men finally cornered because he smoked Martian gooley-weed in an off-moment and mumbled out his life's history amid his pipe-dreams. Beautiful, right? No, not the "prince"; I mean Rosalie!

Her gawky cousin, Widdlemere Ames, III, conducted her into 23B one afternoon while Ianay and I were rendering molybdenum radioactive in a Lawrence cyclotron (artificial radium being a possible solution to our problem).

She swept in like a queen, surveyed

the Rajah and me haughtily and then swooped to our level with an even, white smile that made my heart surge like a hypoed jet-blast and keep going faster than a Perseid. I ogled at the Rajah; he ogled at me.

"Canal frogs peeping on a June night!" he sighed, which, if you've been to Mars, is a beautiful thing, "a vision!"

Of course, he said it just loud enough to hear——

She dimpled prettily and I decided that those telepix didn't do the darling justice; then Widdlemere introduced us.

Simultaneously something short-circuited in the unattended cyclotron—atoms disrupted in a hot, white, snapping flash—the durite vacuum tank cracked in twain.

"Damnation!" I yelped. *"Voila:* my next month's allowance gone with the proverbial wind!"

"I will pay all," sighed the Rajah ecstatically. "It is as nothing compared with meeting the famous and beauteous Rosalie——"

Shakespeare really had nothing on Fonay!

Silently cussing his mouth and his money, I cleaned up the unsalvable parts and chucked them into a vacuum waste chute while he proceeded to give Rosalie a soul-torn treatise on Martian moons and the crimson sea bottoms on a star-drenched night.

FINISHING my humble task, I studied her profile as she listened to that garrulous dimwit's lisps. It made me think of all that was beautiful and perfect and angelic in life! I was in love with her—just like that!

She turned her golden head, and at first surveyed me calmly; then her perfect lips parted breathlessly, an unforgettable warmth swam into her eyes and an intangible curtain seemed to envelop the two of us and shut out the Rajah's flowing voice. A soul-stirring moment —if that wasn't genuine love in her eyes, then surely the newborn ardor in mine was reflected in her limpid blue optics like an unobscured full moon gracing the new 400-inch mirror at Mt. Yerkes.

Suddenly someone was repeating angrily: "Hey, what is this?"

Rosalie blinked her beautiful way into consciousness.

"Attraction of souls, my dear Ianay —chemical affinity or something, as it were—or was it?" she said, smiling sweetly at his flustered face. Something which might have been common sense told me that Rosalie had the rare gift of making every man a slave to her wondrous eyes, but my hopeful heart said "No!"

Hardly had Widdlemere III spirited her away to meet the Dean of Women in order to matriculate for a special gyrotomic training course than I cornered the would-be poet.

"Listen, Rajah Phoney," I growled, "all hands clear. The deck's mine and you're just a third-grade blaster. She gave me the orbs first, so just arc for Callisto and keep your unlovely proboscis clear of the heart-shiverin' until I slap an I-do around the pretty's finger——"

"Listen, Vacuity Jetland," he snapped back, "the dame's mine. But if you must fight over everything, I'll make you a bargain. Seeing that you're Captain of the Royal American Varsity and I'm Cap of the Martian Varsity—well, when the annual Commencement Game comes off, the winner takes the spoils. In other words, the beauteous Rosalie is to be escorted to the Reception by the winning Captain, and the age-old custom of the engagement announcement will be preserved, all parties willing. Okel-dokel?"

Even as Martians go, he looked crooked.

"Everything's on the up and up—no hypoed jets or anything; regulation polo

rockets and conformation to the rules ——"

"Why, my dear Jet, do you think I'd stoop to trickery?"

"Fella, you're so low you couldn't stoop without steppin' on yourself. Besides, 'trickery' is a Martian's middle name!"

Martians are also quick-tempered cusses; he came at me with both fists slugging. I crossed him, caught his jaw at its perigee in respect to me, and dumped him pants-down in a whole rack of acid-filled test tubes which took the fight out of him and the seat out of his pants.

When the period bell rang, he departed from 23B in a pink-laced curtain and I marched solemnly before and called out: "Friends, women, country-boys: the Rajah's taken to skirts!"

Which, though rather unfair, brought a good laugh and which was a very small example of the sublime deviltry which the Rajah and I had been concocting for nearly four years!

Ianay had a brace of lectures that afternoon so I returned to 23B alone, hauled out a drafting kit, a model atomic motor, certain proven formulæ, and scratched the brain into action.

ACCELERATION has always been the big problem in astronautics since Steinfahl built the first durite atomic-propulsion jet, and jockeyed his way up to 300,000 feet before said jet melted and a 'chute took him back down. He'd followed an upward-curving track for a mile, building up flying speed.

Rocketeering, you know, is a lot more than just blasting the jets and lancing straight up and out into cosmic space. Have you ever seen a man-carrying skycraft that didn't take a run? The old aeroplane, autogyro, helicopter—which didn't simply *blast* into the air, but accelerated slowly upward—liquid-powered rocket or gyrotomic? Spaceships must also take a run, unless you want the human cargo inside to suffer a miniature egg-scrambling at every take-off.

Steinfahl, of course, used the predestined method of checking recoil and thrust-pressure in later rockets: the old twin hull idea. But that necessitated a freely suspended inner chamber, plus intricate hydraulic shock absorbers connected to the outer hull. It was highly inconvenient both for control and vision. Without it, however, you either swept off in a nice run, or else blasted from inertia to a few hundred m. p. h. in nothing flat with no protection at all!

It's easy to say, "Ease off!" It's easy enough to disperse your blast with common rocket fuel; just try to disperse an atomic blast! From the point of disruption in an ordinary atomic, you have short, Bellargite-lined exhaust nozzles which figure a sweet $100 per inch. Try to divert an atomic blast to disperse its thrust, and your Bellargite is just so many scattered atoms. Atomics are hot stuff!

All this fuss about thrust-dispersion was due to a $250,000 offer from the Interplanetary Explorers' Club for various reasons. Naturally, you can't always expect to find ideal, sloping spaceports spread out on alien worlds. Neither can you expect to find conveniently placed catapults.

In the event of hurried take-offs without adequate runways—and they are many, especially in that biological madhouse of giantism that is Venus and the weird, shunned place of death Martians call *Zabirnza*—a dispersed blast will gradually build up acceleration, taking the fly-or-die quantity out of the problem.

Which, when boiled down, meant controlling that very uncontrollable initial high-exhaust velocity; which meant—what?

That's what I tried to figure out. I knocked off at dusk, and after a good,

old-fashioned supper, started strolling across the campus to shake some of the atom dust out of my hair.

The moon was a big, yellow May-thing rising out of the blue-black Norwegian spruces across the lake, the sky starshot and beautiful—a setting in which that silvery voice rang out so very naturally: "Oh, hello there!" That's all!

A voice which strangely I had half-expected and which when it came—— I can't explain that moment—I sha'n't try. Even that harebrained Fonay couldn't describe Rosalie's thrilling voice!

White and beautiful in a shimmering, clinging gown, she posed there motionless beside a moon-lit, concrete balustrade, moon-shadows mystic in the hollows of her cheeks, her soft eyes caressing my face as I drew near. I took her in my arms and kissed her—I'd have been a fool not to.

Then: "Hold it!" There wasn't any flash, just a click and the fiend of a cameraman with a hyper-sensitive candid dashed away like the decathlon champion who leaned against a hot atomic-jet.

"Hey, you!" I cried.

But Rosalie interrupted: "Cut!"

"What do you think this is—Tele-Stage?"

"Yes," she murmured softly, "and we are in a love scene——" And she closed those glorious eyes and her tender lips came up to mine——

IANAY—to say nothing of a certain stooge named Jetland—went *non compos mentis* when the *Royalist* came off the press next day. That picture-by-moonlight topped the front page with the caption:

"Heiress in love with AV Capt. Jetland.

"He-man Ward Jetland admits that he and Rosalie Ames of the Ames Millions got a dart-in-the-heart and may announce their engagement at Commencement. This exclusive foto was posed for——"

Posed! Imagine! Engagement! Sweet, suffering Saturn!

Cockeyed novæ, was I mad! X plus Y didn't equal X-tas-Y just because some newshawk glimpsed a kiss in the moonlight! Besides, I had admitted nothing—said nothing!

I didn't see Ianay or Rosalie during that momentous day—only Professors Massey and Gratzmeyer and the strangely taciturn and immediately-black-eyed Editor Ted Slirr of the *Royalist*. But when evening came, I saw the Rajah go berserk. He and his Martian stooges were playing Chandler Tech and ably knocked the previously undefeated team out of the Pennant Race.

If you're one of those rareties who haven't attended a rocket-polo "carnage", let me tell you it's a colorful affair. In the first place, it's played at night against a backdrop of stars. Thousand-foot towers a mile apart constitute the ends of the playing field, surmounting which are huge, neon-outlined rings flaunting the colors of the respective teams.

Five small gyrotomics, their wings and fuselages etched in guarded neon-tubes, constitute a team. The ball is a five-foot, positively charged, helium-filled sphere which is thrust back and forth by plus-charged force beams in the 'tomic's noses.

Picture that weaving, wavering criss-cross of varicolored lights, intricately kaleidoscopic-illumined ships flashing hither and yon—finely etched, winged bullets against infinity.

Chandler's purple-neoned ships never had a chance. Everywhere her Forward and Wings and Goalies turned they found red-blurring ships shoving that silvery sphere through the black-

ness on the end of blue-glowing magnetic force-beams, penetrating that traditionally invulnerable defense like so many aerial torpedoes. At length the slaughter was over—32—1. I sought out Ianay to congratulate him on his superb playing.

Down from the stands I came and found an admiring, jubilant throng hoisting that asinine Martian and Rosalie unto their shoulders where they duly clinched at a fotog's request.

I started shoving angrily through the mob, but Black-Eyes Slirr was suddenly grabbing at me, shouting: "Listen, mugg, she said you're a piker and so let the girl have something besides your silly pan to lamp!"

I never saw two guys like him and the Rajah—always asking for it! (N. B. Request duly granted.)

Trailing along behind the crowd, I caught up at length with the precious pair where they had been deposited on the lake's verge and left to spoon.

"Listen, Rosalie——"

"Oh, it's you, Vacuity!" the Rajah bristled.

"So what?" I sneered. "Hello, honey!"

"Publicity hound!" snarled the vision. "Cad, scum, Infusoria!"

"Now, listen, honey——"

Just then Ianay swung without warning. I came to on the cold, damp ground; the rat must have left me lying there.

NEXT DAY in 23B, I fractured the Rajah's jaw with a terrific haymaker when I couldn't stand his goofy, sick-calf look any longer. He went to sick bay and Rosalie's hovering charm; I lost all my privileges, all of my allowance, plus some of the irate paternal bankroll to offset expulsion, and gained the infamous repute of being a Jealous Lover!

The next four weeks were hell. No opportunity to seek out Rosalie and try to explain, no chance to find out who had bribed Slirr to print that erroneous news. Ianay was out around with his jaw in a sling. I didn't see him, Professor Massey having assigned us to private labs. And all the time the fellows told me that Ianay had taken it upon himself to privately tutor Rosalie in her gyrotomic-flying. Which hurt more than anything else!

Massey mercenarily let me out for polo. I was in a white fury—the Varsity cleaned up Army, Navy, M. I. T., and Chicago in short order. Ianay Fonay was moonstruck—the Martians were smothered under in four straight games.

The Sunday before the Varsity-Varsity game and Commencement, I went on parole and Ianay went over to Denver to see the Martian Consul about something or other. I was listlessly rechecking formulæ in my room when the televisorphone buzzed.

Snapping on the audios and videos, I snapped: "Jetland!" and softened as the vision that is Rosalie swam dizzyingly onto the fluorescent grid.

"Hello, darling—listen. Meet me tonight on the campus—near the balustrade at nine. Oh, please, honey. O. K.?"

"Where have you been all our life?"

"Too far away from you, Jet. But not tonight nor any night hereafter if that horrible Martian will stay away from——"

She looked genuinely frightened. "Horrible?" I queried.

"I'll explain later. Smile bright, love! That's better—— Good-by now!"

"Au revoir!" I said puzzledly, mechanically welled the T V P, and wondered what in the world it was all about. Let me tell you, the Black Hole in Cygnus ne'er puzzled man as woman

has puzzled him——

I walked along the moon-drenched lake path at nine and Rosalie, again in flowing white, came running from the shadows to meet me, a sob in her throat, fervent kisses on her lips.

"Jet, oh I do love you so——"

"You haven't showed it lately!"

"How could I?" she said softly. "That newspaper thing—— You were so brazen about it all! Oh, that made me boil! I didn't mind the picture, but what you said!"

"I didn't, sweet! I think the Rajah was back——"

"The Rajah!" she whispered. "When he's around, I think I love him; when he isn't, I hate him. He isn't human—he's evil!"

"He's a Martian," I reminded her.

SHE CLUNG to me like a frightened child, so I abruptly changed the subject and started telling her how I was developing a surge-blast by controlling sub-atomic rays. It sounded swell—that it wouldn't really work made no difference—and I thought talk of any sort would ease her mind so I talked.

Scarcely had I finished than she murmured: "Jet, I'm frightened. Kiss me, please——"

I did; suddenly a form loomed out of the shadows. A rough hand caught my shoulder and flung me savagely down upon the concrete walk.

"What the devil does this mean?" I roared in rage and pain.

"Shut up, Vacuity!" The Rajah, sure enough! I started up; the moonlight glinted on a shiny something in his hand.

"Behave, bad boy!" he said nastily. "Remember the game tomorrow night. We'd hate to play a man who's physically unfit. Come on, sweetheart; let's go——"

They moved off. I got to my feet and listened to their slow footsteps dying away, heard her voice echoing back through the night: "He uses a surge-blast and sub-atomics, Ianay dearest ——"

That took the heart right out of me.

Night passed and waned into day. Sleep was impossible. I went over to 23B and cut in the cyclotron, sent some deuterons into a miniature maelstrom within the huge vacuum tank as the magnetic- and alternating-current electric field went into action, and shot them against a mass of beryllium to blast out the inanimate neutrons which I immediately collected in a Bellargite container and fed to the atom-blaster.

Then I made the big discovery—accidentally! Great scientists do things that way—Roentgen and I! In my jealousy and disillusionment I scarcely noticed what I was doing and blasted, of all things, durite.

Durite's funny stuff. It's a strange alloy of iron and divers other metals, its exact composition a trade secret of the Duhamel Institute. Up to a certain pressure nothing will penetrate or affect it—then *zang!* it's disrupted, churning in the blasting of its artificial molecular arrangement like a sunspot with St. Vitus. I saw that through the micro-iconoscope in a new light. Here was dispersion indeed—not a flashing, unidirectional blast of nuclei fragments, but instantaneous, disseminated disruption.

Ergo! Inspiration! Exactly one hour afterward my logical solution of the problem was in the vacuum mail chute on its way to the Explorers' Club.

My head felt like an active blast chamber so I meandered over to the cafeteria and devoured black coffee and aspirin. Then I went to the hangars.

The Wings and Goalies and substitutes were noisily tuning up the gyrotomics, fueling them and checking the ray batteries.

SUDDENLY came the sound of boisterous crowds entering the stadia on the course's flanks and the referee's helicoptomic swept off, its amplification system blaring out the line-up etc.

Things moved swiftly then. Mechanics wheeled the ships out on the runway from our hangar and that of the Martians. Both teams had last minute tactical chats. Then we took the blue-gleaming AV ships off and up behind the blue-neoned goal, holding them motionless on white-spinning gyrovanes. The red Martian ships hovered behind the opposing goal.

The helicoptomic hung in the interspace, the silver sphere clinging to its nose grapples. Then, siren screaming, it zoomed, abandoning the ball.

Cutting in the stern atomics, I lanced through the goal at the sphere, Wings following close behind, Ianay an on-coming, red-etched bullet. He cut his blue ray in first, sent the sphere flashing beneath me and in a swift burst of speed had it past our goalies and the score was 1—0.

"Damn!" I said. Ianay really did have his moments.

Diving over the Rajah in the second mêlée, I rode the sphere right through his goal and it was one all.

I gave the boys a micro-wave pep talk. Then we went at those red devils with trick relays, counter-juggling, torque-blasting, and all the tricks. As though inspired, those inconsistent Martians with a record of one-victory-out-of-ten-games shot the sphere back as regularly as we fed it to them; then suddenly we penetrated with a Jason relay—three times before the half ended.

I spiralled down as pleased as a marooned hermit.

Rosalie was waiting near the hangar, her blue eyes excited, her white-clad arms half-extended toward me.

"Always for the winner, aren't you?" I snapped. "Name, money, or fame—that's you every time!"

There were little tears in her eyes. "But I told you the truth——" she protested.

"You pulled that gag once before! Scram, glory-chaser!"

"Do you mean that, Jet?"

"Yes!" I said—and meant no!

"I'm sorry—— Oh, hon, be reasonable!"

"Scram!" I repeated. But I couldn't look at her.

"I don't suppose you could understand——" And she was gone, slipping through the crowd toward Ianay's ship. I felt pretty small and cheap then. But didn't someone say the first rule with a fickle woman is indifference?

So she wanted hero stuff, eh? I'd be a real hero then!

When the second half started, I lanced for the sphere and started shoving it toward the red goal. Suddenly my wing tip skittered up; I lost the sphere and almost smashed into Wing I. You don't hit upcurrents like that over level ground. Some force had smashed against that wing!

But a force ray is purely magnetic; it can't affect anything which isn't charged. There was something decidedly rotten at Royal, and ten-to-one the Rajah was up to his neck in it—as usual!

Ianay slipped magically through us again and again and tied the score. Then I got an option on the sphere and was feinting when my ship went topsy-turvy and the Rajah whirled beneath for a goal.

LEVELLING OFF, I noticed for the first time that my compass was askew——"

"Time-out!" I radioed to the referee and landed swiftly. A cursory glance through the inspection flap verified my suspicions; the wing tip held a tiny metal helix, plus-charged, I knew! A

blind rage was in my heart as I zoomed a substitute's ship up to altitude.

"Let's go, Wings," I called over the short wave.

We had a minute to play when Wing II fed me the sphere that tied the score. We'd go into overtime, I exulted as we levelled.

The referee must have been squinting at the stop watch as the last play went into being. I dove at the sphere; we still might cinch the victory in time.

Zowie! The sphere was a blue-tortured silver streak but feet from the nose of a crimson-blasting projectile that hissed through our defense like a disrupter blast, flashing through our goal to emerge behind it just as the final siren screamed. The Rajah had hung far back, I guessed, and made an acceleration charge to victory——

Which was that! We landed, completely discouraged. The undefeated All-Americans beaten at length by a crew of second-rate Martians!

White fury seared my brain. Fonay had cheated—I had a personal score to settle with him for that!

I sought him vainly throughout the crowd. Professor Massey came hurrying to meet me, his wrinkled face wreathed in smiles, his hands extended.

"Ward, my boy!" he exclaimed. "Congratulations; you've won the Explorers' Prize!"

"Have you seen that crazy Fonay?" I snapped at him. He regarded me strangely.

"Don't you understand, Ward? You've won——"

"—the Explorers' Prize!" I finished. Then my anger abated somewhat. "Sorry, Prof—you know I'm thankful and all that. It's just that——"

"Perhaps this will explain." He handed me an open envelope and I removed a note and read:

"'RA means so very much to me. Jetland will understand. Signed, Rajah I. Fonay. Encl. check.'"

The check was made out to Royal Astrotech and totaled $41,000, current market price for a gram of radium. I understood, all right. That had been no acceleration charge—the Rajah had infused a gram of radium into his atomic motor! Radium, being unstable, disrupts more violently, attaining terrific exhaust velocity—hence, greater immediate speed——

Handing the papers back, I turned silently away.

Ted Slirr grabbed at my sleeve.

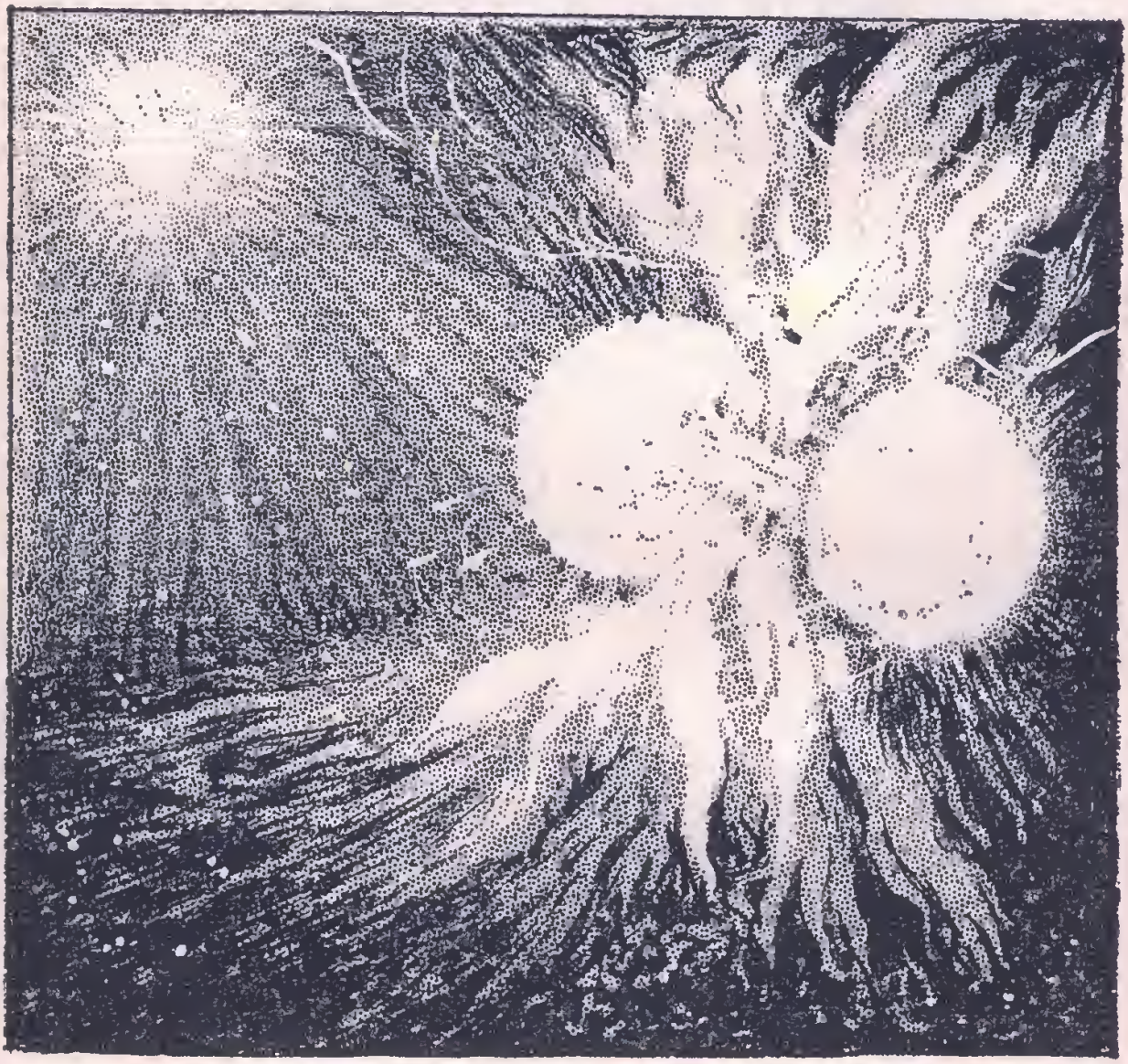
"Oh, Jetland, Ianay told me to say good-by. He left for Mars on the weekly rocket just five mins ago with his fiancée, Miss Rosalie Ames——"

"What?" I roared. He cringed back but I didn't sock him.

Everything clicked together then. "RA" meant "radium." But not half so much as it meant—"Rosalie Ames."

CATASTROPHE!

By Edward E. Smith, Ph.D.



The creation of the Solar System in the Cosmic Catastrophe of stellar collision! Dr. Smith's first science article.

ARTICLES of this nature may be grouped roughly into two classes, which have aptly been compared to the bathing suits worn by our sisters. There is the old-fashioned kind, which went 'round and 'round the subject without touching it; and there is the more modern variety, which clings very closely indeed to the subject, but does not cover it.

I tried to make this a Type Two article, but two things operated powerfully to throw it into Type One. There is the fact—at least, it seems to me to

be a fact—that any tenable hypothesis of the origin of the Solar System is inextricably bound up with, and must be an integral and logical part of, the vastly greater hypothesis of the shaping of the entire Universe as we now suppose it to be. And we know almost nothing about that latter.

Here at the outset, let me caution you that this subject cannot be approached without some mental preparation. Settle down in your easiest chair. Load up your most companionable pipe. Forget anything and everything that may be worrying you. Relax. Make your mind a blank. Clear it completely of the last traces of everyday thought. Ready? Then consider with me the inside of a vacuum tube.

This tube has been exhausted, let us say, to one-millionth of an atmosphere of pressure. This is a fairly "hard" vacuum, containing as it does only (roughly) 1.2×10^{-6} grams per liter of substance. We will now apply to our tube either a Gaede diffusion pump or a Langmuir condensation pump, backed by a Cenco Megavac or Hyvac pump. When this evacuating system—the most powerful and efficient yet designed—has attained equilibrium, the pressure inside the tube will be somewhat less than one one-thousandth of its previous value. This is the hardest vacuum at present attainable, but it still contains approximately 1.2×10^{-9} grams per liter of matter.

Now, by the sheer power of our imaginations, we will take hold of that highly evacuated tube and, without permitting the entrance of a single additional atom of substance, we will expand it to a million million million times its original volume. Or, to make the feat a trifle more understandable, we will expand a one-quart tube into a sphere something over sixty-seven miles in diameter. This new vacuum, while it is a billion billion times as vacuous as any we can attain on Earth, is still far from being a perfect one. It still contains about 1.2×10^{-27} grams per liter of material.

Now imagine with me an infinity of space. While it is probable that space is, in a mathematical sense, finite, it is nevertheless true that to all intents and purposes, as far as human senses go, it is infinite. Look, in your mind's eye, at the faintest, most distant star visible. By the magic of thought perch yourself upon this star and look outward again, extending the original right line of vision as far as you can see. Repeat the process over and over, until your mind begins to reel. You will still be within space as we know it—still within the Cosmos.

Obliterate, in fancy, from all this vast volume of our infinite space all material substance. It now contains no stars, no nebulæ, no suns or solar systems, no meteorites, comets, or other wandering fragments, no cosmic dust—no single atom or particle, however minute, of any material substance whatsoever.

Now, with an ultra-powerful effort of the imagination, we will fill this infinity of emptiness with material of precisely the same density as that within our superhumanly enlarged vacuum tube. We will then have an infinity of space, containing a uniform concentration of matter of approximately 1.2×10^{-27} grams per liter. And, inconceivably tenuous although it is, we will also have the primal stuff from which, most cosmogonists agree, all our universes came into being.

THE WORK of all early investigators was highly erroneous because of the paucity of the then existing knowledge. We know now that any adequate explanation must conform to at least seven natural laws. I say "at least seven" because it may very well be that several as yet undiscovered natural laws may have to be evaluated before any *really* adequate explanation can be

given! The seven that we now know, however, are:

The three laws of motion.

The law of gravitation.

The three conservations—those of matter and energy, of momentum, and of angular momentum.

Newton set forth the first four, and it was during his lifetime that the three conservations (then regarded as four, since matter and energy were supposed to be conserved separately) began to be apparent.

However, Newton himself apparently had no idea of the law of conservation of angular momentum. He realized that an infinity of extremely tenuous material could not be stable; and, as early as 1692, he wrote:

". . . some of it would convene into one mass, and some into another . . . and thus might the sun and fixed stars be formed."

In order to account for nebular or galactic rotation, it is necessary to go back to the very beginning and make certain assumptions concerning the state of motion of the original nebulous mass.

Kant recognized the necessity of angular momentum, but made the indefensible assumption that such a distribution of matter would acquire that property with the mere passage of time. Laplace, avoiding Kant's error, postulated that the original nebulous mass should already be in rotation. This assumption, however, is scarcely sounder than Kant's. If the original space is taken to be so inconceivably vast that even the universal and inexorable force of gravitation could operate, throughout it, only to concentrate its material content into local aggregations, how could it possibly be in rotation as a whole?

It remained for Jeans to make what seems to be the most logical assumption —namely, that in the primeval medium there existed local currents—actual flows of matter instead of purely random molecular or atomic motion. These currents, he showed, could account for all the angular momentum required.

Whether we like it or not, we will have to assume some such motion in the primeval vacuum that was infinite space. But after all, is that so hard to do? We cannot understand how that matter came into being, nor is it any part of our present task to speculate upon that phenomenon. So, if you ask me why it should have had currents flowing within and throughout its volume, I will simply ask you back—why was it there in the first place?

Mathematical analysis confirmed Newton's belief, showing that the primeval nebulosity would in fact concentrate into centers of condensation approximately 520,000 parsecs apart. These condensations would each contain about 3.6×10^{42} grams of mass—a value in close enough agreement with the actual masses of the galaxies.

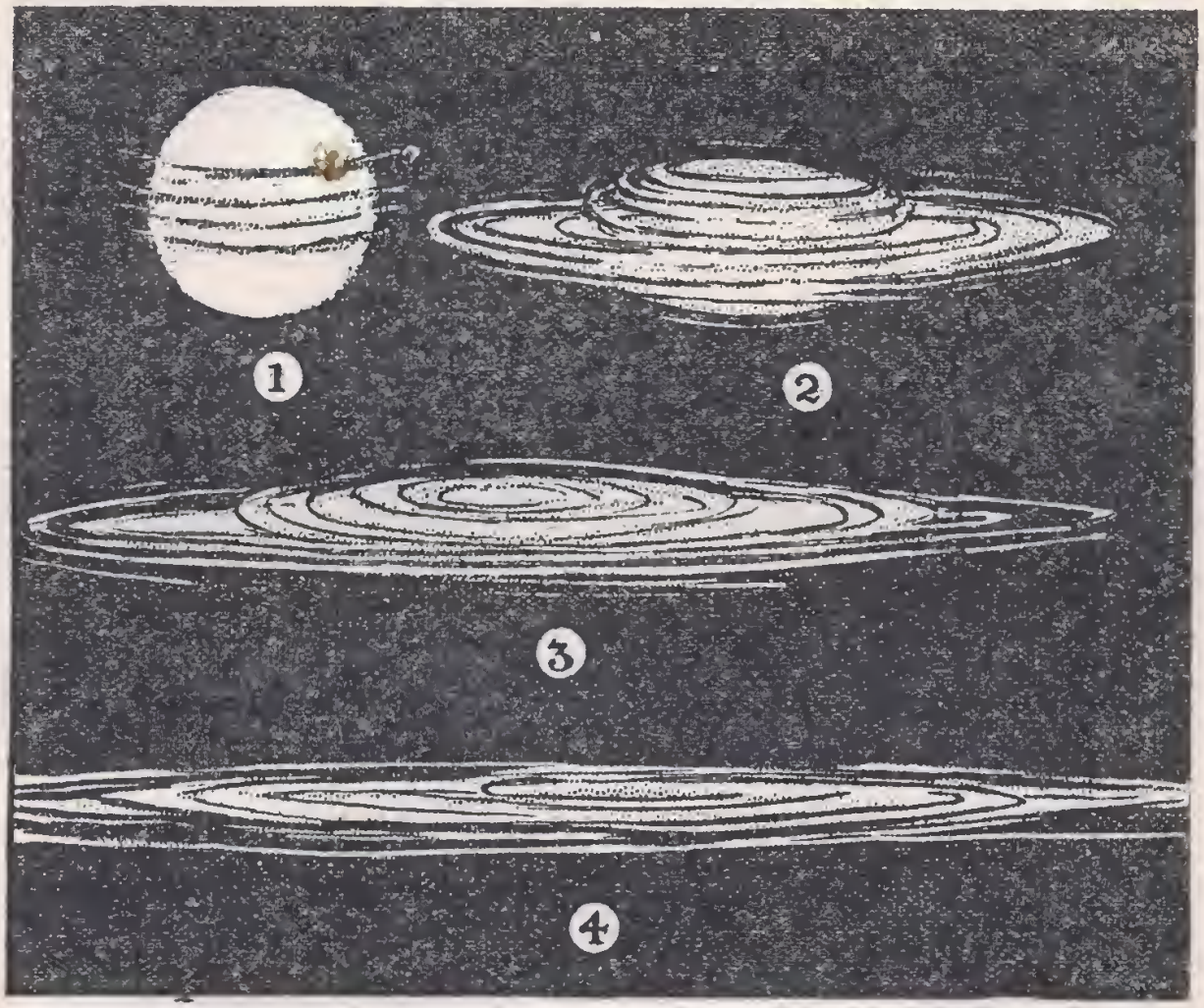
ASSUMING that such a mass is in rotation, it will take the shape of an oblate spheroid. As it continues to condense and to shrink in size, its period of rotation will decrease, and its shape will become progressively thinner. At some critical period of rotation, the equatorial bulge will become a sharp edge at which centrifugal force and gravitational force just balance each other. Further concentration will result in a separation of some of the material from the main mass.

Thus far, practically all theories agree. There are, of course, some dissenters. Lepper, for instance, and his Universal Vortex-Prime Resultant theory, and others. These minor prophets, however, have had little or no following. Their explanations are neither closely reasoned on the basis of known laws, nor able to withstand dispassionate mathematical analysis.

From this point on, opinions differ. Even the science of mathematics is made to yield varying solutions to the same

problem. The consensus of expert opinion, however, seems to be that under the mutual gravitational forces of adjacent nebulæ, the separated matter at the edge will not be left as a ring, but will form into two opposed filaments, the beginning of the two arms of a spiral. Continued contraction in volume, and increase in speed of rotation, will result in enlarging the arms until there is relatively little material left in the center. While this has been going on, however, the arms themselves have been

For as soon as the mass of gas is dense enough to produce an appreciable pressure, the temperature begins to rise. Continuously drawn together by the mutual gravitation of its component parts, it becomes denser and hotter until it finally begins to shine as a red star of Type M—a giant in size, but of low temperature and low density. Still denser and still hotter, it becomes successively orange, yellow, and blazing blue-white, growing less gigantic with increasing temperature. Then, still



Successive stages in the evolution of the unformed, primal Cosmic Matter from the first globular condensation through gradually contracting forms. Each represents not a sun, but a galaxy—the stuff of which hundreds of thousands of millions of suns will form.

breaking up, condensing into masses averaging about 10^{34} grams—the mass of the average star. This, probably, is the genesis of the average star.

shrinking, but cooling off now, it becomes a dwarf star of gradually diminishing hue. I am not going into detail here. Not only is the exact mechanism

of stellar evolution a highly debatable and controversial subject, but also it is only necessary—for the purpose of this article—to say that from some such beginnings, and at some time in some such an evolution, our Solar System must have come into being.

Before the coming of the new physics, before the storehouse of atomic energy was known, some mechanistic theory of solar energy was needed, and the most commonly accepted one was the solar contraction hypothesis of Helmholtz. Chemical combustion was scarcely considered; the Sun's radiation of energy was utterly beyond anything possible for simple chemical combination to supply. That the energy was released by the fall of swarms of meteors into the Sun was ruled out, because the Earth and the other planets should have intercepted enough of these visitors both to heat them appreciably and to increase their mass measurably—neither of which had come to pass. Furthermore, the increase of the Sun's mass, due to the absorption of sufficient meteorites for the purpose, would have been detectable by a comparison of ancient with modern records. And that comparison showed no such increase.

HELMHOLTZ suggested that the energy came, not from the fall of meteors, but from the fall of the Sun itself, into itself. The outer layers of the Sun, he suggested, were falling inward, compacting toward the center, under the frightful force of solar gravity. The resultant compression of the inner gases heated them to furious incandescence, so that their heat enabled them to support the pressure of the outer layers. The radiation of the Sun cooled it, allowing the outer layers to collapse, and thus to regenerate the internal heat.

This hypothesis was, at the time, very sound. For, although the Sun's radiation represents an incredible flood of energy, yet the masses we are considering, falling under the immense force of solar gravity, are on the same gigantic scale. The necessary contraction of the Sun would be so slow that no observation possible to man could detect it, save over periods of hundreds of thousands of years.

Mathematical analysis of this theory was not particularly difficult, and permitted both a forecast of the remaining useful life of our solar orb and—by extrapolation backward, with certain eminently justifiable assumptions and approximations concerning rates of radiation and of contraction—an estimation of the length in years of its past life. Thus was set up the first really accepted time-scale of the universe.

An interesting by-product of this determination of the Universal time-scale was the discovery that, some fifty million years ago, the then vastly more tenuous Sun must have filled the Earth's orbit. Therefore, the maximum age of Tellus was something less than fifty million years. Quite definitely, then, the astronomers told the geologists and the paleontologists that all Earth's history, inorganic and organic, all their rocks and all their evolution—from the lowliest monocell up to the highest mammal—must be crowded into fifty million years or less! And, so generally were the astronomers believed, the geologists and the paleontologists acquiesced in their findings almost without demur.

And the utter collapse of that theory and its time-scale, so firmly believed in such a few years ago, "gives me furiously to think", as the Frenchman has it, as to how long it will be before our present theories will go the same way! For, parenthetically speaking, no modern theory stands upon nearly as firm a support of widespread acceptance as did that of Helmholtz. In this connection, Dr. Heber D. Curtis, Director of the Observatory of the University of Michigan, has just informed me, in reply to a direct question:

"The simple fact is that there is no entirely acceptable body of theory. The latest modification, in which one of the colliding systems is a binary, is already subject to some attacks . . . all theories hit difficulties that seem insuperable. . . ."

But, to get back to the immediate subject, Laplace adopted Helmholtz' contracting Sun and built up a very fine theory as to the origin of the Solar System. His primeval Sun was an oblate spheroid some two thousand million miles in major diameter, of highly rarefied material. (A two-billion-mile globe was large enough then, since neither Neptune nor Pluto was known at the time.) This vast Sun was rotating slowly upon its axis, radiating energy, and contracting.

NOW HE applied the law of conservation of angular momentum. Angular momentum, the quantitative amount of angular motion, is as unchangeable as momentum itself, unless an outside force is applied. It is measured by the product of the angular velocity and the moment of inertia. This law can be readily and beautifully demonstrated with the aid of two heavy flatirons and a revolving piano stool. Seated upon the stool and holding the irons out at arms' length, let someone set you spinning. Then decrease the moment of inertia of the system you-and-the-flatirons by bending your elbows and bringing the irons up against your chest. You will spin a lot faster than before—scientifically, your angular velocity has increased as the moment of inertia decreased.

Laplace assumed that his rotating, contracting Sun would spin ever more swiftly under this inviolable law of conservation. Eventually, a stage would be reached in which centrifugal force would exceed the force of gravity, and the equatorial layers of the gaseous Sun would be thrown off, leaving a ring of matter outside the contracting Sun. This ring, he said, coalesced slowly to form the outermost (then known) planet, Uranus. The Sun, made stable again by this loss of material, continued to contract until a new point of instability was reached. The matter which eventually formed Saturn was then similarly ejected. This process was repeated with Jupiter and his satellites, and so on, until Mercury was formed, and the contracting Sun became as we know it today.

One criticism of this theory was that the matter would be left behind continuously, not intermittently. And Maxwell proved to his own satisfaction that such material would not coalesce, but would remain rings, as Saturn's rings demonstrate to the present day. Jeans, however, showed by apparently flawless mathematics that such coalescence could, should, and did occur. To us laymen it would seem that Saturn's rings are merely the exceptions that prove the rule. This point soon became academic, however, as more pertinent and more demonstrable objections were advanced against the hypothesis. For instance, it requires that all the planets lie in the same plane. They do not. Also, and more important by far, it fails completely to account for the *distribution* of angular momentum in the system.

Laplace himself invoked the law of conservation of angular momentum, but apparently he failed to consider the distribution of that factor, which is of vital importance to any theory. And, by the highly peculiar distribution of angular momentum in the Solar System, his theory fails utterly.

As has been said, angular momentum is measured by the angular velocity of the body in question, multiplied by its moment of inertia (with respect to its center of rotation). Moment of inertia, in turn, is the product of the mass and the *square* of the effective radius. Now the Sun is roughly a thousand times as

massive as all the planets and satellites together, and its period of rotation is shorter—that is, its angular velocity is higher—than is that of any planet. *But* this mass is concentrated practically at the center of rotation. Thus, even the square of its effective rotational radius fails to make its angular momentum at all impressive.

On the other hand, consider Pluto! Its mass is, of course, very small when compared to Old Sol's. But its distance from the center of rotation is over *three billion miles!* Square that and see what you get! It figures out that each ton of Pluto's mass has over sixty thousand times the angular momentum of an average ton of that of the Sun. Jupiter's colossal mass spins at the end of a four-hundred-eighty-three-million-mile lever arm. Jupiter alone carries about twenty times the angular momentum of the whole stupendous mass of the Sun!

THUS WE HAVE this weird spectacle: the Sun, with 99.9% of the System's mass, but with only 3% of its angular momentum. The planets, with only 0.1% of the mass, but possessing 97% of the angular momentum! No smooth, evolutionary mechanism can possibly result in any such lopsided distribution. No regular casting-off of the thin, equatorial edge of a spinning star can possibly concentrate into those inconsequential scrapings 97% of that star's total, original, angular momentum!

In fact, as early as 1750, even before Laplace propounded his theory, Buffon suggested that the Solar System originated when a "great comet" collided with the Sun, spattering the planets out into space. A comet, we know today, is a froth of showy nothingness: Buffon undoubtedly meant a body of great mass and of high velocity—in other words, a roving star.

This idea was revived when Laplace's Nebular Hypothesis failed, but it gained acceptance only partially and slowly. For the scientists of that age lacked three absolute fundamentals—the knowledges of (1.) the source of the Sun's energy, (2.) the time-scale of the universe, and (3.) stellar distribution. These three cosmic, rather than strictly solar facts, are absolutely necessary to any reasoned approach to the origin of the Solar System. The scientists of the nineteenth century thought that they knew the first and the second; they considered that the third—if it entered into the question at all—only made the stellar collision hypothesis even more untenable. For—in a universe only a hundred million years or so old—the collision of two stars, in a space in which stars are separated by an average of almost five light-years, was such a remote possibility as to be practically excluded from consideration. Laplace's Hypothesis, on the other hand, made planets the regular order of things. Every sun had them as a matter of course, as an integral part of its life cycle. All space was populated with planets—the myriad children of a thousand thousand million stars.

Suddenly radium was discovered. The study of radioactivity shook all science to its very foundations. It changed every aspect of matter, from the atom to the most distant nebula. No longer was the atom an indestructible, unchangeable, perfectly elastic sphere. It became, instead, an extremely complex and unstable thing indeed. And abruptly the astronomers found that their time-scale had been enlarged millions of times. The very rocks became cosmic clocks—their radium-uranium-lead ratio and their helium content fixing their age conclusively at a minimum value of two thousand million years! The lowly cockroach alone was shown to have existed, practically unchanged, throughout ten times the fifty million years which astronomy had

previously conceded to all geology! The horseshoe crab traced his ancestry, direct and unbroken, for over six hundred million years!

This epoch-making discovery also proved that the Sun's source of energy lay in the conversion of mass to energy. Atoms could be stripped of electrons, transmuted, in the terrific temperatures and pressures obtaining in the interior of that cosmic furnace, the Sun. Every such change involved concentrations of energy stupendous in their magnitude, of such gigantic proportions that Old Sol could radiate his observed vast floods of energy for millions upon millions of years without observable shrinkage in mass or volume.

AND NOW—with the time-scale of the universe expanded so prodigiously—the close approach, or "dynamic encounter", of two stars became a conceivable thing, instead of a fantastic absurdity. Such collisions would be rare, it is true—Jeans' estimate of 5×10^9 years as the average time interval between such happenings seems as reliable as any other—but they *would* happen occasionally. Hence the Planetesimal Hypothesis.

This theory supposes that our Sun was an ordinary star, very much the same as it is today, except that it was without planets or satellites of any kind. In their motions through space, it and another star approached each other closely enough so that their mutual gravitational forces became powerfully effective. Giant tides were raised upon the Sun's surface, and within its outer layers there ensued eruptive outbursts of a violence possible only to the incandescently frenzied medium in which they occurred. Thus, enormous prominences were projected, not only toward the visitor, but also upon the opposite side. As the two great suns swung in hyperbolic orbits around each other—or, rather, around their mutual center of gravity—the eruptions continued—always in the line joining the two stars' centers of mass. After the two had passed out of effective range of each other, our Sun was attended by most of the matter of its ejected prominences. It then resembled somewhat a spiral nebula, the matter nearer the Sun of course revolving faster than that lying more distant.

It is not at all likely that the substance of the prominences could have been entirely homogeneous. There must have been centers of relatively dense material. These portions not only contracted under their own gravitation, but also swept up most of the loose matter near their orbits. Thus came into being the planets. The satellites were accounted for by the existence of small nuclei which were captured by the larger masses, instead of being fused with them.

This is a very brief, and very crude, outline of a theory upon which a vast amount of work was done. Reams of mathematics have been mustered, both to its defense and to its attack. The point most violently at issue being again our old friend, angular momentum. And, since this theory is far from a dead issue at the present time, at least a brief summary of the arguments for and against it should be given.

As I understand it, the proponents of this theory rely more upon the eruption within the body of the Sun than upon the actual attraction of the visiting star to lift the masses of the planets out into space. Thus, a really close approach of the two suns is not necessary, the time of effective action is greatly lengthened, and the gravitational force of the visitor has been shown amply sufficient to account for both the amount, and for the distribution of angular momentum of the entire Solar System. This, with the previous paragraphs, outlines the position of the theory's proponents fully enough for our purpose.

THE OPPOSITION will require a little more space. Their first and most crucial argument is that there is no justification for assuming that any volcanic upheaval within the Sun, however violent, could hurl such masses so far against the gravitational pull of the Sun's mass. That pull, they say, is too powerful by far to allow of any *distant* sun's disruption. If the Invader came no nearer than Earth, the Sun's corona would scarcely feel its effect, so terrifically potent is Sol's own grip upon it.

With the proponents' assumption of volcanic activity ruled out, so that gravitational forces only need be considered, the whole affair becomes strictly calculable—as easily as the collision of two atoms. Yes, easier; for we know quite exactly the laws of motion of macrocosmic mass, while those governing the micro-cosmos have not as yet been so definitely determined.

Thus, it was not insuperably difficult for the opposition to compute the courses which the two stars must have followed. To do any such immense work of displacement as the lifting of the masses of the planets represents, the Invader must have passed not more than two millions of miles away from the Sun. Such being the case, the paths followed could not have been appreciably curved; they must have been almost straight lines.

The Invader, they say, could have brought about the disruption, caught the ejected matter in its vast gravitational grip, and dragged it out into space, to relinquish the last of it only at distances of the order of thousands of millions of miles. This work, the sheer *lifting* of billions of billions of tons of mass for billions of miles against even Old Sol's immense gravity, is eminently possible. It was done at the expense of the Invader's linear momentum. And, stupendous as the magnitudes are, they are well within the capabilities of a cruising star. But there are two factors—not one—in this thing. Man can lift a weight to almost any desired height above the Earth's surface—but he *cannot* make it hang there. He can lift it, but he cannot make it take up an orbit—which is a totally different thing—because he cannot give it enough angular momentum.

So, says the opposition, the Invader has *linear* momentum enough to haul a hundred planets out into space a hundred times as far as Pluto. But all the matter so torn from the Sun would have fallen straight back into the Sun instead of forming planets.

Why? Because they claim that the visitor must have passed within two million miles of the Sun, and that, therefore, the highest amount of angular momentum possible to generate would not suffice to set even Mercury into an orbit. If the Invader's angular momentum with respect to the Sun per unit of mass be taken as unity, that, and the amounts necessary for the various planetary orbits are as follows:

The Invader	1.0
Mercury	2.4
Venus	3.4
Earth	4.0
Mars	5.0
Jupiter	9.1
Saturn	12.3
Uranus	17.6
Neptune	22.0

Here, with no further or partisan comment, I think it well to leave this theory. Far be it from me, an innocent bystander, to lead with my chin in a matter as controversial as this!

ONE OF THE latest modifications of the "dynamic encounter" theory is that our Sun was *not* a single star at the time of the collision, but a binary. This idea unquestionably accounts for the distribution of angular momentum in our System, and otherwise has much to

recommend it. While it has not as yet been generally accepted, I believe that it is gaining, not losing ground.

The first objection which might come to mind—the scarcity of binary stars—is not nearly as valid as it would have been a few years ago. Under the scrutiny of spectroscope and telescope, more and more stars are proving to be not singles, but close-couple systems. Alpha Centauri is a couple system of a close double and a third, more distant member. Castor is a triple. In fact Curtis, already referred to, informs me that probably at least one star in ten is a binary. Some authorities place the proportion as high as one in three. Therefore, the idea that one sun of a binary should collide with another star is scarcely more fantastic than the thought that two single stars should encounter each other.

In any case, stellar collisions must be exceedingly rare occurrences. Taking Jeans' previously mentioned estimate of 5×10^9 years as the average time between such happenings, the average time between those in which one of the colliding stars is a binary would appear to be, a priori and on elementary grounds, some moderate multiple of that figure—say about 2×10^{10} years or so. And if one can accept with equanimity the smaller of those two incomprehensible figures, why cavil at the larger?

As has been said, even this modification of the dynamic-encounter theory does not explain everything, such as the retrograde rotation of a few satellites. It has some loopholes, through which attacks are being made. But it seems sound in the main, and is probably the best so far propounded. The catastrophic origin of the Solar System is pretty well established. But it now appears probable that the catastrophe did not happen to our own Sun, but to its companion. The planets are not the children of our Sun, but nephews—born of his sister star.

And what a catastrophic event the birth of those planets was!

Our Sun was once one component of a binary system, two gigantic stellar furnaces swinging about each other in fixed and stable orbits. Another star approached—possibly a member of a star-cluster oscillating to and fro through the galaxy. Slowly at first, the Invader neared the binary. Faster and faster as the titanic mutual pull mounted to utterly incomprehensible values under the immutable law of inverse squares. Ever and ever more frantically they hurtled together, gravitational effects becoming more and more apparent. Tides of ever-increasing height and violence surged up and up, gripping not only the tens of thousands of miles of solar atmosphere and photosphere, but also clutching deeper and deeper into the very quasi-solid interior of the suns themselves. And, as the stupendous tides mounted, so increased the sun-quakes and volcanoes; the Gargantuanly rumbling warnings of that which was to come from below.

THEN, in the final climactic instant, the Invader struck one of the circling pair—perhaps in actual, if glancing, impact. Cosmic collision at millions of miles an hour! The vast tides meeting, crushing, destroying each other! The stupendous pressures, leaping instantly to impossible, to unbearable values! Incandescence piled furiously upon incandescence, building up instantaneously to an intensity incapable of existence, as the maddened atoms tried to assume impossible configurations!

Then the abrupt reversal as the raging stars flashed past in the irresistible might of their linear momenta. From pressures that could not be borne, to a near-vacuum—all in an instant. Atmosphere, photosphere, sun-substance from deeply buried layers—all pulled out into solid streamers as the two im-

mense suns fought for it with all their gravitational might—streamers containing the stuff of twice a thousand Earths!

Thus was bared to empty space matter which space had never touched—matter in no condition to be so exposed—and there ensued a succession of seismic upheavals never seen by Man, nor pictured adequately in even the wildest of his imaginings.

It is just as well that there was no living eye to witness that spectacle. Man, seeing, could not have continued to exist. Any habitable world within seeing distance would have been whiffed into vapor in the twinkling of an eye. For matter so deep within the bodies of suns is at a temperature to be measured only in millions of Centigrade degrees. It is under a pressure inconceivable, and is radiating frequencies unknown to Earthly science with a violence and vehemence incredible—radiation which, after losing all save a minute fraction of its intensity and power in its struggle upward and outward through thousands of miles of sun-substance, emerges finally to form the ragingly incandescent surface of our Sun!

It was this deeply buried, this inconceivably compressed, this unthinkably tempestuous material that was so suddenly relieved of all restraint. It exploded instantaneously, with a violence utterly defying portrayal. It exploded, expanding instantaneously and unimaginably in an attempt to regain equilibrium. But no explosion, however violent, could proceed fast enough to satisfy the exigent demands of those stripped nuclei. Billions upon billions of tons of matter were hurled away in those prodigious and insatiable blasts. Even the mighty gravity of the Sun scarcely impeded the flight of the outflung masses.

The colliding suns passed. The columnar streamers and the ejected masses broke up into discrete aggregations. The Invader, so close to Sol's companion, broke completely Sol's grip upon her and whirled away with her. Much of the debris of the encounter accompanied them, eventually either to form planets or to fall into their ravening selves. Much of that debris fell into our remaining single Sun. Much of it was undoubtedly lost to both systems, forever to wander as comets through the cosmic void. Some portions of it, however, had velocities appropriate to planetary orbits. And these portions, coalescing and cooling, did form the planets.

Such, or some such, must have been the origin of all the bodies which now circle about our Sun.

It is shattering to Man's vanity, to his feeling that his is the race for which the universe was made, to ponder the thought that the entire Solar System is an accident. A freak—something that happened with the dice loaded against it to the tune of over a hundred thousand to one! Such a *rara avis,* in fact, that this one of ours may be the only one in existence in our entire galaxy at the present time, in spite of its teeming millions of stars. For the Earth is only about two thousand millions years old now. And, in all probability, it will be at least ten times that long yet before such another system as ours can be expected to come into being!

Of all the matter in the galaxy, only the ultra-microscopic bit we have named Earth is habitable for Man. And that bit would be rendered uninhabitable by a change in temperature of only a few trifling degrees. Accidental Earth and its equally accidental incrustation of life fill but an infinitesimally brief instant in the unknowably vast extent of Cosmic Time—an immeasurably small proportion of Cosmic Space.

Yet Man in his vanity assumes that for him, and for him only, the entire Cosmos was especially created!

NIEDBALSKI'S MUTANT

By Spencer Lane

Is a plant developed intelligence—could human minds understand——

"It talks!" he shrieked. "I'm mad—mad——!"

I SHOULD never have permitted Niedbalski to learn of the full extent of my consciousness. To be sure, Master realized that there was a certain measure of mind within me, for he spent long hours testing me. Yet for many days something constrained me from revealing to him that I had achieved the animal trick of making sound coincide with thought.

I was, at maturity, as tall as he. My supple, green body was strong, drinking in the energizing sunlight which shone all day long through the transparent roof of the laboratory. That Niedbalski loved me—worshipped my living green beauty—was clearly understandable. In a way, he was my creator, for it was his skill which nurtured, selected, bred and selected again a peculiar mutation in an almost-normal ancestor of mine ten million generations ago.

Oddly enough, Niedbalski—great biologist that he was—never suspected my true age. In his mind I was only the one thousandth descendant of the original *Viola tricolor* which he had placed in his special metabolizer less than five years ago, according to the senselessly detailed time-measurement of humankind. Actually, his summation of the apparent succeeding generations of that ancestral plant represented jumps of ten thousand generations, because the metabolizer was even more intense in its effect upon the embryo within the seed than upon the growing plant itself.

This, of course, explains but part of my extraordinary evolution. I, the ultimate individual of Niedbalski's experiment, am necessarily the last, for the reason that the constantly diminishing fertility due to extreme inbreeding produced but one living seed when I was formed.

At first I did not regret this, for Niedbalski immediately removed me from the metabolizer, allowing me to develop normally beneath true sunlight. I did not want for care. The nutrient soil of my huge metal bed, as well as the thrice daily offering of water, were scrupulously free of all harmful bacteria. Yet more important than this material attention were the long, quiet hours of devotion.

Beneath Niedbalski's glowing beauty-worship my pliant green body would become vibrantly alive. At maturity I was as tall as Niedbalski my long leaves being—as Niedbalski often murmured—like polished green leather. Some day, too, I knew I would bear a blossom. (He frequently scrutinized my tough, woody stems for the first sign of a bud.)

As it transpired, however, my growth was astonishingly slow. This was due, no doubt, to the fact that for the ten million generations of my idiosyncratic specialization, neither plant nor seed had ever known true sunlight. Now that the metabolizer rays were taken away, I was having to face life with but a hazy racial memory of normal existence stored in the invisible genes of inheritance. For this reason I had come to be aware of sensory impulses, to acquire memory and to respond to the chemistry of emotion long before I was mature.

I cannot place a definite beginning for these neural acquisitions. Indeed, I cannot even remember not knowing Niedbalski and feeling a sense of loss when he was not in the laboratory. However, the matter of controlling sound is remarkably clear.

Niedbalski often talked to me—thinking only that he was talking aloud to himself—and one day the realization came that the sound impulse against my leaves coincided precisely with the etheric disturbance—of which I was acutely sensitive—occasioned by his thinking. Until that time the idea of communication was utterly alien to me. I had not at that time seen another human being, and the multitudinous assemblage of normal plants about me were, of course, too far removed from individual consciousness to be mentally alive.

The thought of talking with Niedbalski—whom I loved much as I imagine animal beings love—was a shock of inspiration which burned through all the thousands of delicate plant-neurons in my body. Nor was the mastery of sound so difficult. Each day thereafter

I concentrated upon the feel of sound when Niedbalski would speak. Later, when he had departed, I would struggle to recreate those same sound-feelings by controlling the tension of certain leaves. Through regulating the flow of sap, I found that I could nearly equal the tone sensation. The queer, harsh sounds of consonants, of course, were simple—a movement of stalk and leaf, or a certain snapping of one part or another of my body.

THE FIRST WORD I uttered was "beautiful". (Niedbalski murmured that to me many times each day.) Then I learned "plant", "men", "think", "understands". From then on my vocabulary expanded until I could sound complete sentences. Each day I would be attentive to the feel of Niedbalski's voice, learning the meaning quite often by noting the accompanying mental impulses.

As I learned more words I became increasingly aware of thought. I was actually thinking with the memory of these word-sounds as mental units. From that was born introspection, wonder and eventually—curiosity.

To be sure, Niedbalski was not entirely unaware of what was happening to me. His long, gray-bearded face indicated grave concern. Again and again he would examine me. Yet always the touch of his hand was gentle. Now, I know that Niedbalski was fearful. Subtly aware that there was indeed a change in me, he was afraid that I was suffering from some unsuspected toxin. At the time, however, I merely exulted in this increased attention. I was satisfying a primitive want, for truly the beauty of color and sweetness of aroma in even the simplest flower exists only to attract an outside agent in order to insure the propagation of its kind.

It was cruel to torture the man to whose faithful attention I owed my life—indeed my own unique genus! The finer human emotions of kindness and selflessness were not then a part of my being. Although I resemble—in mind only, of course—man more than my remote normal ancestor, little *Viola tricolor,* it must be remembered that I am basically a vegetable in which the most sacred of the near-emotional neural responses are allure and passion for seed. Nevertheless, the realization grew upon me that I should some day talk to Niedbalski. I had no thought of his amazement, of what such a revelation would do to him. It must be kept in mind that the suggestion of plant-animal intercommunication did not occur to me as being unnatural. (I knew so little for all the fine words I had mastered.)

The day would be set by Niedbalski's mood, I decided eventually. If he approached in scientific mien, or seemed to be absorbed in his work at the desk—which is beside me and adjoining the window—then I should continue my silence. But if he should stand before me, again enthralled by my grace of form and exquisite blends of green, then I would—speak!

Niedbalski had been searching me with minute attention for a trace of the long-awaited bud. The caressing touch of his hand was soothing. (Should I say to my vanity?) He was smiling and murmuring softly, his eyes filled with the usual adoration for my beauty, when the fatal impulse provoked me. My leaves and stems became taut. I was ready at last.

"Beautiful plant," I uttered carefully. "Worth my labors indeed. To see——"

But Niedbalski was not happy!

The look on his face made my gorgeous body become limp. Slowly, like one viewing some loathsome sight, he backed away from me. His eyes rounded strangely and there was a peculiarly sickening color to his face. I wanted to utter more, to tell him how great and wise I had become, to assure

him that there was really nothing to fear.

Then suddenly he began to laugh. The shrill sounds rasped every one of the delicately sensitive cells of my body. It was an incomprehensible thing. I was dejected not so much at the horrible laugh as because of the jangled distortions of the etheric vibrations, indicating a severe emotional disturbance. The awful thought came that Niedbalski was afraid—of me!

"It talks!" he shrieked. "I'm mad—mad—mad!" He laughed hideously again. Then: "A talking plant—a talking——"

He ran from the laboratory, slamming the door viciously.

THAT WAS my most bitter lesson in intelligence. I learned a new emotion and—for the first time in my life—I appreciated the unthinkable gulf between plant and animal evolution. It was not easy for me. I say, "I am a plant," and with as much pride as you would say, "I am a man." But until that ugly day the realization of the difference had never been a serious consideration in my eager, groping, proud, "vegetable" consciousness.

It was well into the next day before Niedbalski returned to the laboratory. This heretofore unheard-of separation had had a depressing effect upon me. Even the radiant sunlight had fallen upon dull and lusterless leaves.

But if I had suffered, poor Niedbalski had endured anguish beyond my imagination. His face was the color of the sink where he secured the water to be prepared for my roots. His eyes were fixed upon me with a wilting stare. It must have taken him an hour of man-measured time to cross the room. Even then he remained at a distance, as if fearing the touch of my body. The lack of beauty-worship in his haggard face was sheer pain to my sensitive body cells.

Now he stood before me; his eyes glowing with a bewildering conflict of emotional thought. When he spoke his voice was oddly rasping.

"You're alive," he said, "but how alive? You spoke—made wordlike sounds at any rate. Or at least I declare that it could not have been entirely my imagination."

Should I answer? For the first time I experienced an emotion which could not be unlike animal-fear. Nevertheless, I remained silent.

"You're conscious," Niedbalski spoke again, stepping nearer me. "You might even have a mind. There were neurons in that mutant *Viola tricolor.* I bred you to preserve and increase those almost invisible plant-nerve cells. You might even have something like a brain. It would have to be your whole body, though. There's nothing resembling an animal brain in your structure, despite the several modified cell arrangements which I haven't been able to examine in the X-ray photograph. I couldn't dissect you. But I'm going crazy—standing here talking to a plant as if—as if——"

His voice trailed off into a curiously tense silence. My body thrilled sharply beneath the penetrating scrutiny of his gaze.

Suddenly he exclaimed: "Talk—talk again! I must know if I'm losing my mind. You did utter sound—but no—no! It can't be. What am I doing? What am I saying?"

My leaves grew taut—rustled subtly. I sounded the name, "Niedbalski."

He did not move, but continued to stare at me.

Again I dared attempt sound! "I know—I understand—animal brain noises."

"You—you——" Niedbalski was clutching at his throat, gasping for breath.

"Complete evolution in plants," I uttered carefully, "is no more impossible

than evolution in animals. I am what you have made me—the ultimate of that one sensitive mutant——"

"My words!" Niedbalski shouted. "My words—my voice—my own inflections. You're a parrot, a vegetable parrot!" He laughed hysterically, though not with the crazed abandon of the day before. "But how does it do it? The thing is—now I see it. The neurons are receptive to sound. They've stored up the impressions of my own voice, and now, by some wild chance, they're repeating them. It's—it's mechanical of course, but uncanny. No wonder I was sur——"

"No," I uttered daringly. "I think. I feel. I am—not man, not plant—but new——"

It was useless to continue. The ether was a torture of mental turmoil. Niedbalski was shivering, his eyes rolling fearfully. His gasps for breath were pitiful. For a moment he staggered about the room mouthing frightful, incoherent sounds. I could not comprehend his agitation save to wilt at the terrible thing I had done to the man I loved and whose love had—I realized this late—been the glory of my strangely different life.

"Niedbalski," I sounded tremulously, finding it difficult to form sounds at the moment. "Niedbalski—Niedbalski!"

Then he moaned weirdly. The sound hurt me. He was staggering blindly from the laboratory.

I never saw him again.

SEVEN TIMES the great, gleaming sun moved across the transparent roof of the laboratory with all my world remaining horrible with silence. The nutrient soil of my circular metal bed became hard and broken by dry, gasping cracks. The physical strain was beginning to tax my reserve. The pain was a kind of dull ache. I was beginning to lose the sense-impression of the finer rootlets.

Then upon the eighth day there came the frightful shock. I saw not one human being, but many. To my amazement not one looked like Niedbalski. "Men differ," I thought, "even as plants do. How odd!" I had always thought humanity as being millions of tall, gray-bearded Niedbalskis.

It was not easy for me to understand these strange humans, for they used many words which I had not heard come from the scholarly lips of the man I loved. Also, the variations in the tones of their voices were troublesome. Some, too, wore clothes such as Niedbalski had worn, but others—particularly those with the high-pitched voices—wore flapping garments over their legs, a point of distinction I was long in understanding. Later, of course, I learned that these were women (a much improved specialization of the race) and in many ways there were qualities of beauty-appreciation in their gazes such as I had been accustomed to receive from Niedbalski.

"These beautiful plants!" one of the creatures exclaimed. "And oh—what kind of a plant is that? Isn't it the most gorgeous thing you've ever seen? I'm in love with it, Uncle Grover."

She was referring to me of course. Her face was radiant—as Niedbalski's had often been—and I immediately classed her as being a member of his particular mental genus. Her name, I learned, was Eleanor. She was very small and, I rather feared, lacking in sufficient strength for preparing and carrying the great quantities of water I had learned to expect. Yet when she came over and touched my leaves I knew at once that this was the human to whom I should belong.

I was experiencing a new emotion—and a dangerous one, too, as I was later to learn. Now, I was aware of a world beyond the laboratory, and I wished intensely to see it. Only my unhappy experience with Niedbalski prevented me from uttering sounds to tell these queer

un-Niedbalski looking humans that I wanted Eleanor to take me. Perhaps the mental impulse of my urgent longing was felt by these others. They are not aware of the etheric disturbances created by mental activity as I am. Nevertheless, I believe that unconsciously the thought was implanted in their minds. That very day several monstrous humans—using strange, abrupt words I had never before heard and modifying those I did know almost beyond recognition—struggled with my heavy nutrient bed and placed me upon a blatant conveyance. Before sundown I was placed in a new and very beautiful laboratory—later to learn that this dwelling was called by another name—and the small human, Eleanor herself, served my drying roots with the much needed water.

I was admired, attended to devotedly and, indeed, luxuriated in the constant homage of the many humans whom Eleanor brought before me. I learned new words, new emotions and much of the significance of the vast human world beyond the walls of my new home. Unfortunately this knowledge was not harmonized into true wisdom, but formed into the false security of sophistry. I no longer dwelled in a laboratory. I dominated a "Royal Court". I became arrogant, amused, oftentimes bored unless a guest of Eleanor's showed the proper adulation. Regretfully I admit that in the succeeding days of the "Royal Court," the precious memory of Niedbalski—my true Master—became stored away in the more inaccessible recesses of memory.

I DID LOVE the woman-human Eleanor, feeling a mental kinship with her approaching the sacred relationship which had been mine with beloved Niedbalski. Yet I was not satisfied. In my stupid sophistication I felt that I should know more of the world, that I was deserving of an even more magnificent "Royal Court" so that more and more of the wonderful animal-beings might adore my beauty.

Eleanor never suspected my consciousness as had Niedbalski. "You grow more beautiful each day, my magnificent one," she would say, stroking my leaves tenderly. The beauty-loving light in her eyes was physical delight to me.

My utterance was impulsive. "Life is beauty, Eleanor, but only you and Niedbalski——"

Too late I realized what I had done! Again the ether became fraught with torturing mental chaos. The adoration vanished from Eleanor's face. She backed away from me, terror in her eyes, her frail hands clenched until the blood flowed from abrasions on the tender palms. Then she screamed horribly and ran from the room.

Although I immediately regretted my act, I was not particularly upset. This would be as good a time as any to effect a change, I thought. Had I not long considered such a measure? They would move me again. I should know fresh adoration, a new court. Of course I was not happy in destroying Eleanor. Nevertheless, she was only human. I am a plant.

The men who stood before me, studying my luxurious foliage, measuring lengths, breadths and thickness, were low in emotional thought. Their mental attitude aroused a strangely familiar feeling within me. I remembered how Niedbalski had often studied me when in his "laboratory mood".

"Why did Grover sell the thing, Dr. Wiedemann?"

The rotund little man who spent so much time with me these days laughed gruffly, though not with any disturbing emotional vibration such as the harsh sound might indicate.

"Phobias only," Dr. Wiedemann replied. "His niece, you know, had a nervous breakdown. Always before she had been foolish about the plant, but

when the nerves went bad she could no longer remain in the house with it."

"Well, luck for you, certainly. It is a beautiful thing, Wiedemann, very beautiful—and most peculiar."

"*Richtig*, Professor Tuttle. Niedbalski's Mutant it is, and the greatest development of that splendid American biologist."

"But unfortunately we don't have a single note on its history," Professor Tuttle continued. "If only Niedbalski hadn't been so confoundedly secretive!"

"But I shall learn," Dr. Wiedemann spoke up. "There is something here—something I seem to feel rather than see——"

Dr. Wiedemann's eyes beamed an emotion new to me. It was not adoration, and yet I had the feeling that the ether sensitivity of my superior plant consciousness had once more served me well in causing the right human to assume responsibility for my care.

IT WAS NEITHER pride nor sophistication which gave rise to this particular meditation. The loss of both Niedbalski and Eleanor had had a richly maturing effect upon me. In place of youthful exuberance I now possessed judgment.

I knew fear, apprehension, and yet, despite my fuller experience, I felt the urge of curiosity becoming increasingly dominate. Yes, this was as it should be. I needed all three—Niedbalski, Eleanor and Dr. Wiedemann—to complete my acquisition of true wisdom. In the first two I had known love, but now I was less dependent upon that emotion. From Dr. Wiedemann I was receiving the novel attention of respect. (I learned the word much later.) It added sure strength, rather than colorful energy to my ego.

In many respects my new home was like the laboratory of my true Master, save that the red-faced Wiedemann who knew so many strange-sounding words was not at all secretive. As Eleanor had done, he brought many others of humankind to observe me. Yet I soon learned a grave difference. Where Eleanor demanded the adoration so indispensable to my youth—and which for some unaccountable reason I knew I should soon need again—this queer Dr. Wiedemann asked only serious attention.

I was less a thing of beauty than an oddity to be gaped at, but not necessarily worshipped. It was thus that I acquired the animal emotions of bitterness, resentment and something blacker. This last was almost but never quite—hate.

So I assumed responsibility. Though the ultimate of progressive evolution in either plant or animal would, if given the right opportunity, naturally culminate in a speculative being, still the fundamental divergence of the two complementary life-forms would forever prevent their working together.

Bitter words? Yes, but I was now learning of the necessarily harsh rules of life. Reason informed me that the dominance of the one type meant an irrevocable enslavement of the other. Indeed, it was more tragic than this, for I learned that animal life could exist only by subsistence upon the bodies of plants. Animals are powerless to make their food. Amazing, nauseating thought!

But as Dr. Wiedemann sought to study me, I did actually study humanity through him. In time, I knew that this place was a great school where man trained the younger of his kind in the laws and sciences of his dominion. Dr. Wiedemann, referred to as a botanist, had come from a far place to teach these unconsciously cruel men and women.

Dr. Wiedemann's consciousness had recorded the passing of a year during which I alternately brooded and groped avidly for more knowledge. In particular I studied the profusion of normal

plants about me. Their names, detailed characters, and simple habits were familiar to me by virtue of the combined knowledge appropriated from both Niedbalski and Dr. Wiedemann.

Yet every attempt at communication with the normal members of my race ended in failure, as I really expected. Again and again I caused etheric disturbances to agitate the simple neuron cells in these others. And with what results? At first I was angered, but later I came to be amused.

For example, a bed of yellow *Narcissus poeticus* once put forth scarlet dahlialike blooms, and a mass of mignonette exuded a foul, sulphurous odor in place of their usual sweet allure. Dr. Wiedemann's perturbation was intense, although not once did he suspect that my secretive tampering with the delicate neuron cells had anything to do with it. Only plants, I had come to know have any recognition of the ether impulses produced by neural activity. But since in every case this disruption of nerve-impulse control produced sterile plants, and the pleasure of tormenting the peculiar little human overlord at last became wearysome, I ceased this half-hopeful playing.

ANOTHER FACTOR, too, had entered into my life. I was conscious of the physical change long before the constantly prying Dr. Wiedemann discovered the first observable trace of a bud. The discovery changed the man profoundly. He was overjoyed and began to view me with something of the reverence I had known in my youth.

Instinctively my attitude itself changed. Dr. Wiedemann's happy interest awoke a primitive response in me. Animal interest in the flower is significant with renewed life to my kind. (Although I knew that for me this existence was the end. My incomplete flower would be unfertilized!)

But would it? Dangerous thought! The will to live became dominant as the bud grew. In three months' time it was as large as Dr. Wiedemann's round, bald head. Soon, very soon, it would unfold.

Could I create life from the simple genes of the representatives of my normal ancestors? How far removed from *Viola tricolor* was I? In size, the difference was many hundreds of times. In neural development, it was immeasurable. Nevertheless, Niedbalski had once found a plant of that variety which showed a remarkable degree of sensitivity. That had been my normal ancestor. Could the pollen from such a mutant fertilize the one-sex flower soon to blossom upon my body? Indeed, was there ever another mutant like that one from which I had developed!

Thus I reasoned, and from that travail of thought came the impulse to cause Dr. Wiedemann to bring as many of the tiny little plants into the laboratory as possible. So I exerted the etheric vibrations in desperate efforts to control the all-important animal being who alone might carry out the experiment.

Dr. Wiedemann became more attentive. Was it the result of etheric disturbances contacting his mind or merely a botanist's thrill upon watching a new flower unfold? He spent more hours in observing me, making sure that my water and nutrient soil were always right.

But I was growing desperate. In all the host of plants coming and going in this laboratory there was not one *Viola tricolor*. Once more the impulse to utter sound overcame me. Obviously this was the only mind-to-mind communication known to human beings. But words —what words? Dr. Wiedemann was less emotional. Did that mean he would not be destroyed as the others?

For more than an hour the energetic man had been studying the nearly bursting bud. At first, his mood had been one of stern intellectual curiosity, but as

he examined and pondered there came a faint vibration of emotional excitement.

Dr. Wiedemann had sighted the first streak of color in the bud. Its delicate beauty enthralled him. His breathing became more rapid. The touch of his hand against stem or leaf became slightly trembling.

I prepared myself to form the words. Wisdom and experience guided me this time. There must be no abrupt shock. Softly, beginning with a scarcely audible volume and increasing it gradually, I created a single vowal sound.

DR. WIEDEMANN backed away, staring at me strangely. But—miracle of miracles—his mind exuded no surge of emotional upset.

"Eye—oh—ah," he mimicked in a subdued tone.

This time I uttered a consonant. "Vi—" I prolonged the sound. Then, "Oh" and "La".

"Viola," Dr. Wiedemann murmured, dazed.

"Viola," I uttered cautiously. "Viola tricolor, viola tricolor, viola tricolor, viola——"

His mood tormented me in its absolute want of emotion. Over and over again he cried out the name of the plant which I had sought to fix upon his mind. Yet his eyes were wide-staring, and he moved about dazedly as if no longer in complete command of his mobile body. Soon he left the laboratory, his voice still loud with the two words.

Fear struck me a wilting blow, the sense of failure lowering my metabolism to the danger level. What was this power of mind? Man uttered words to man and they were accepted as though symbols. Man's words came to me even as simply. Yet the sounds which I created invariably made chaos in the human brain.

Even at that moment I felt the flower which I bore expanding into appealing beauty. But I was in no mood to thrill to the acclaim of the man beings who crowded about me. Dr. Wiedemann had not returned. Where was he? Was he searching for the pollen of my ancestral kind?

"So beautiful," a woman's voice pierced the lethargy of my consciousness. "Like no other flower the world has ever seen. So many colors——"

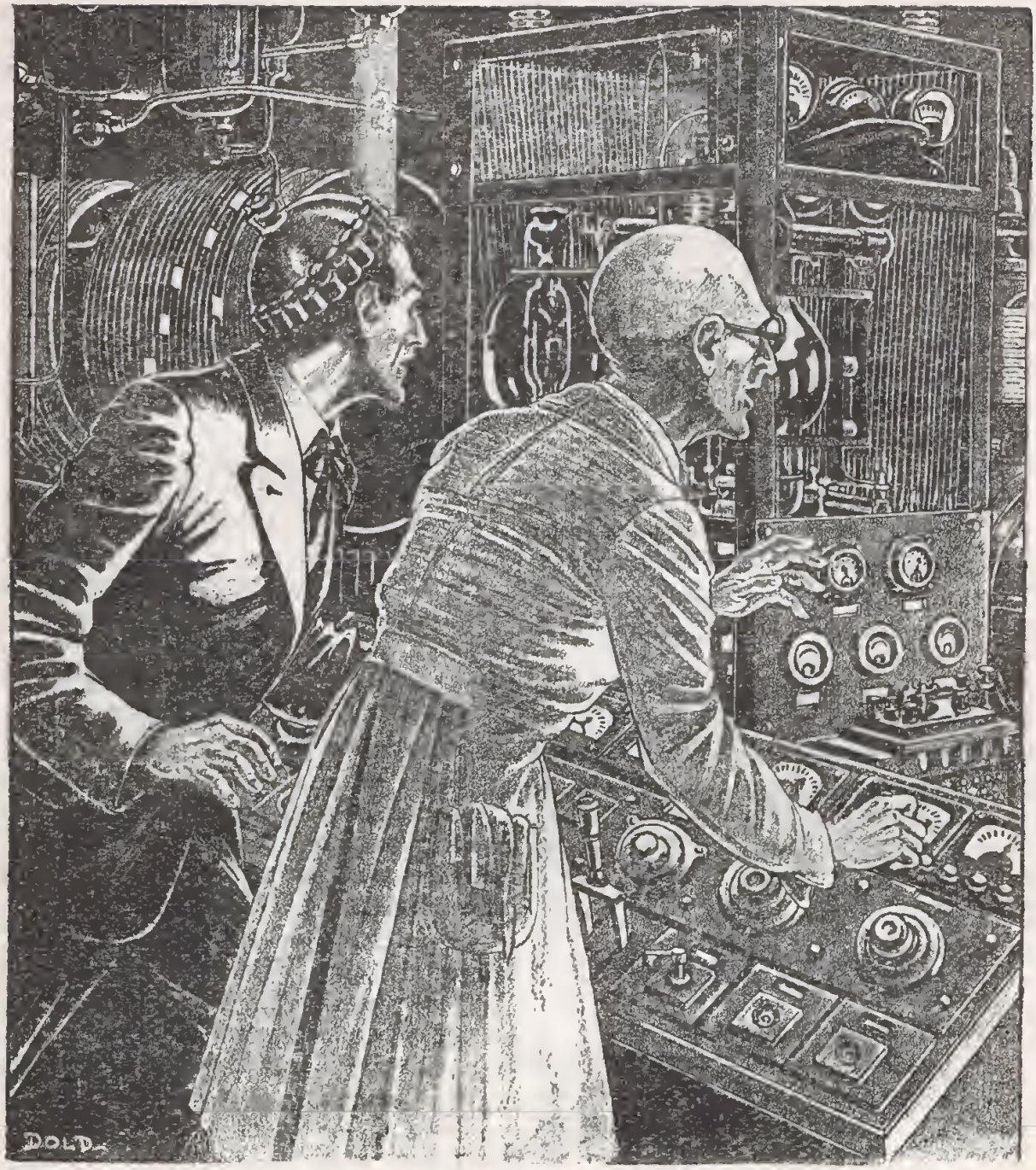
Her devotion enlivened me. I basked for a while in the etheric cadence of human attention.

"Too bad old Dr. Wiedemann's down. If he could only see his precious plant blooming——"

Another voice responded. "He won't. Something happened here." The man tapped his head. "Forgotten everything he ever knew. Something made his mind a blank."

I heard no more! At last I understood! It was not my words alone which destroyed human minds. The word sounds only made their minds receptive, tuned human minds to receive my thoughts. And then—the damage was done by the etheric vibrations of those thoughts. The word sounds only opened the minds. But that meant I could never communicate my thoughts to the strange and delicate thinking organ of man!

I AM OLD now. My body is incapable of putting forth another blossom. That to me is death. Yet I no longer suffer longing for myself or my kind. Perhaps it is better this way. The conservatory is vast. It is my final home, and I am but one in a profusion of plants—my fortunate little brothers with primitive neurons and blessed unconsciousness. And yet I have, even in age, one source of joy. Man no longer calls me the "strange mutant". My card reads simply: "Niedbalski"—the name of the man I love.

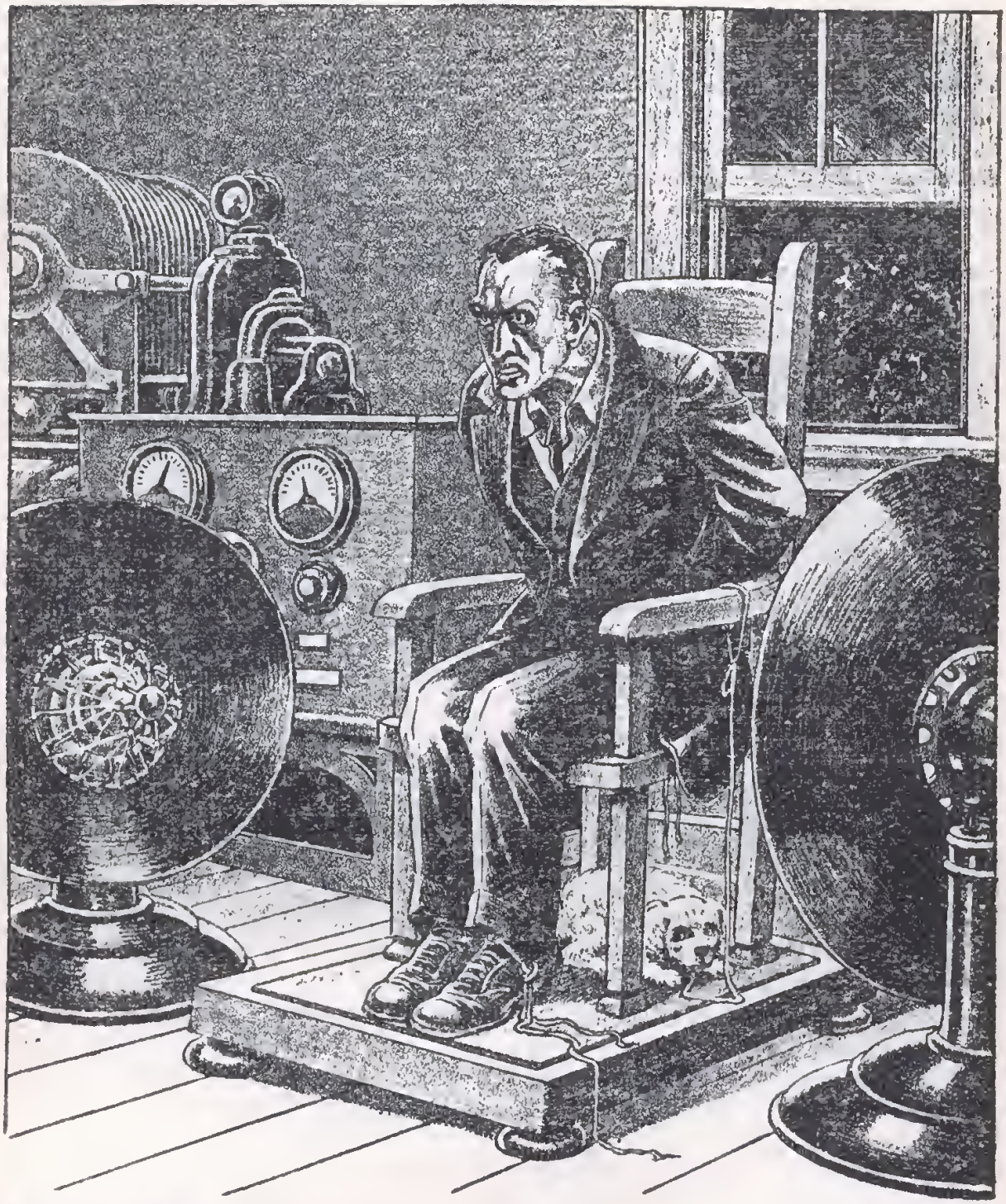


Presto lunged forward. Tootsie scampered out with a gnawed end of rope. My danged pooch had cut him loose.

The Brain-storm

By M. Schere

IT was the kind of dog that you can't tell one end from the other, and I had to take it for a walk. Maidy's niece had left it with us on her way from Boston to Newport because her grandmother in Newport doesn't like dogs, but no one asked me what *I* like. So there I was, towing a ball of fluff with four legs named Tootsie, because Tootsie had to have its airing. Not



Vibration

Handyman Joshua gets mixed up with a brain-stimulator, a poodle and a crook. A sequel to "Anachronistic Optics."

wanting to be seen by anyone, I went up the back road toward Dr. Meadow's place instead of into town.

"And if Dr. Meadow transports you to 1950, or something, it's your own blame fault," I told that animal.

It was getting dark as we approached Dr. Meadow's old house, with his laboratory, observatory and what-not built around it. I met a rough-looking stranger with a cap pulled over his eyes, but otherwise it was quiet and lonely as usual, up there.

I figured I'd stop in and see if the doctor had gotten a new trade journal for Dan Murphy. What happened to Dan Murphy when he tangled with Dr. Meadow, me and the time machine I dug out of the ground is enough to put a caution on anybody. I wrote it all out, once, but I'd sooner forget about it. So I turned in at the gate——

And that danged, little Tootsie pulled back on its leash, whined and squealed and made an awful fuss.

I just hauled it through on its bottom. I could see what was fussing it, all right—two big, metal reflectors with funny twists of wire at their centers, on either side of the path—but you have to expect peculiar apparatus when you're near Dr. Meadow. As I joyfully yanked Tootsie between those reflectors, I was thinking what a peculiar little man Dr. Meadow is.

Tootsie let out a desperate yawp—then stopped with its tiny, red mouth still open behind its long hair, staring at me. I felt very queer. My mind seemed to race ahead of itself. I'm just the odd-job handyman around Millville, and the only sameness between Dr. Meadow and me is that he calls himself a handyman of science. But suddenly I seemed to understand him. I realized he was a genius. Now, I knew he'd resigned from being president of a college because his research was more important to him—and I'd never before been able to see why he'd quit such a fine job. And where before I'd suspected him of not caring what he did to people, now I realized he loved everybody in the world and never would cause pain if he didn't think it was for betterment.

My brain seemed to rush in all directions. I figured out in that instant how to fix Maidy's sewing machine—which had been puzzling me for a week. I remembered where I'd left the knife I was missing. I saw a tiger moth and knew its scientific name was *Apantesis virgo;* Dr. Meadow had only told me once. A hundred other thoughts went zipping through me.

I was scared stiff. I just *wasn't* that smart! Among the things I was knowing, I *knew* Dr. Meadow had something to do with it, and when I thought of Dan Murphy—whose eyes are still years behind his body—I got plain glory-thundered.

I jumped away from those reflectors. Tootsie squealed and ran between my feet, a scared dog. My brain felt all electrified and keyed-up. I was going to sneak around those reflectors and out again as fast as I could hike. But Dr. Meadow came running from his laboratory, smiling and rubbing his hands, his hairless, eyebrowless head like an egg in the dusk.

"Delightful, Joshua, delightful! So good of you to visit me just now! I was observing!" He bent and stroked Tootsie, which snapped at him. "Good dog! Animal instinct, then, can warn of a psychic as well as a physical danger."

"Doc," I told him as solemnly as I could, "I don't want hide nor hair of your experiments."

"Eh? Why, Joshua, many a man would give all he had to experience what you have just gone through. Your ratiocination, your brain-potential, has been stepped-up. You are a smarter man than you were before, due to coming within the field of my thought-substance exciter."

"Doc, I've had excitement enough with Dan Murphy, since he fell into the time machine in my barn and was whisked away to 1940. You managed to bring his eyes back to the present. Now I've got to take care of them till

they catch up. They're floating around in my barn, and on the coldest nights I've got to sit up with them, letting 'em read. So——"

BUT DR. MEADOW was ushering me into his laboratory and he had a light in his mild, blue eyes. "Joshua," he said exultantly, "perhaps we will thank Dan Murphy—that drunkard—for showing us the path to glory. It was his misfortune that started me thinking of how brain power might be projected into the future. Also, by super-microscopic examination of a bit of fossilized brain tissue from the unknown creature whose bones you dug up with the time machine, I found the clew to ratiocinative potential. That creature's brain had a tremendous storage-and-reaction capacity. I have discovered how to create similar ability in the human brain by stimulating the cells without changing their make-up. I"—his voice grew awed—"made an ape almost into a man. But he died, poor Sultan, when he discovered how to open his cage and blundered out onto a live wire. My method is proved, however!"

I hung back. "Doc, if you'll just give me this month's building trade magazine for Dan Murphy——"

He pushed me into a chair and slammed a metal cap onto my head. "There! Ah, see how the dial jumps! How do you feel?"

"Well, my brain feels sort of electrified. Sort of jumpy. But I only came here to——"

Moving like a bald-headed rubber ball, he jerked off the metal cap and shoved my face into a mess of wires, my eyes against lenses. Figures flashed at me. "Add them!" I added them. "Subtract!" I subtracted, groaning, but marvelling at how fast I was, for I'm poor with figures. "What is the square root?"

"Don't know what square root is. Look, Doc——"

"Ha! Of course!" He jotted in a notebook, muttering, "Specific information to be supplied unless time allowed for discovery. Habit-paths apparently unchanged. However, number-sense greatly increased within its conditioned limits. Fine, Joshua!" he cried, reading some more dials.

"Doc, honest!" I pleaded. "If you give me any extra brains I'm not going to be any good as a handyman and I've still got to support Maidy. I don't *want* to be experimented with."

He relaxed and smiled at me because he is, really, a very kindly man. "Well, I must not be too anxious. After all, I have not yet been able to feel the effects of the exciter myself. Won't you come to my library and let me explain?"

That was my time to get out, magazine or no magazine. My brain, working the way it was, made me double-cautious. Dr. Meadow has a way of fixing up things that just shouldn't exist in New Hampshire. But, while I was double-cautious, I seemed double everything else. Tootsie was whining and very unhappy, so, thinking how it had been wished on me, I got double-stubborn and decided it was going to suffer too. So everything that happened can be blamed on that animal.

Dr. Meadow's library was in his house, a hundred feet from the laboratory. He turned off all the laboratory lights when we left. Finally I was sitting in a big chair by his rows and rows of books. And don't I wish that I'd been able to hear him out, say "Yes" to everything, and go home!

He began, "That thought has its own, exceedingly minute wave length has long been suspected. I believe I am the first to measure accurately the dimensions of a ratiocinative cell and the first to find that this wave length must be an inevitable fraction of its capacity integrated with its area."

He tried to pat Tootsie and got

snapped at again. "I trust you enough to tell you that a low-watt broadcast of this wave length, toward a brain at the foci of two psycho-ferrous reflectors, will stimulate all reasoning cells, and even the reflex type, into great activity. Each ratiocinative cell is, in effect, partly a condenser which——"

THERE WAS a faint buzzing. On a ground-glass screen by the fireplace, a light flickered on and off in what seemed a code.

"A burglar!" Dr. Meadow tensed, watching it. "A burglar is entering a laboratory window! But he does not escape my infra-red ray detector." He jumped up, pulled me after. "Quiet! Quick!"

"But Doc, I——"

"He's after my platinum. He knows I bought a large quantity recently, but he doesn't know that it has all been drawn into more than sixteen thousand wires, almost invisibly thin, each for a group of brain cells in my exciter. Come, Joshua! I'll show you how I deal with burglars!"

Seemed I was in for it. Muffling Tootsie, I tiptoed after him to the laboratory. Sure enough, a tiny alarm light blinked outside one room. Dr. Meadow crept to a panel, opened it and pulled a switch. There was a hissing sound, then a thump from inside that room.

"An invisible gas has rendered him unconscious," the little man explained calmly. "It will dissipate in a few minutes. A daring fellow! He observed where the platinum is, all right."

More than ever, I wanted to go home. I figured I'd just wait till I saw the crook. And when I saw him, lying on his back by a jimmied-open window, I recognized him as the tough-looking stranger I'd seen on the road.

"He's been hanging around, then," Dr. Meadow exclaimed. "A dangerous character, decidedly. We must bind him at once." We bound his hands behind his back with heavy twine. I was just going to suggest searching him when the doctor leaped up with an exclamation. "Joshua! A subject! A perfect subject for the thought-substance exciter!"

Well, I was against it. Completely and absolutely against it—at first. Trouble was, I've done many an odd job for the doctor and he likes me to help him. Also, with my brain acting so peculiar, I actually had a sort of scientific curiosity. I'd never been troubled with *that* before.

So, against my better judgment, I helped the doctor dismount the reflectors by the path and set them up in the room where the burglar still lay unconscious. The rest of the apparatus was there, too. Part of it looked like a sending radio, but the biggest part was a thick nest of wires ten feet long, thinner than hair, packed close together in a frame with a lot of other doo-dads.

We hauled the crook into a chair, tied his feet, got him right between the reflectors. Tootsie was a nuisance, hanging around me, so I tethered it to the chair's arm.

"This man is an enemy of society," Dr Meadow said thoughtfully. "Surely, if I increase his perception, he will see the error of his ways. I will have achieved a permanent, scientific cure of crime!"

"Yes, but if his head is going to feel as funny as mine—as though it were ready to give off sparks——"

"That will pass off, Joshua. Now, if we had an Einstein or an Aristotle in that chair, the added ratiocinative impulse might enable him to solve every secret of life. But, with a common crook——"

I wondered, "He doesn't look so dumb to me, Doc."

"Oh, a certain amount of animal cunning, of resourcefulness, does not mean —ah, he's regaining consciousness!"

THE DOCTOR forgot me and started to throw water in the burglar's face, or I would have told him something. I was remembering pieces of mathematics I'd flunked in school. Now, I'd never done anything but sit and watch the blackboard in my algebra and geometry classes, twenty-five years ago. The teacher shoved me ahead because I was so big, but I'd never *learned* that stuff. But now I *remembered*. I was sure I hadn't been so smart a minute before.

Then, looking at that nest of wires, I saw they vibrated a little by themselves. A thought came from my funny-feeling head; I was still connected with that machine. Those wires, once having gotten hold of me, were attuned forever to my brain and my knowledge would continue to grow. But all this thinking seemed to take place outside of me. Most of me was still plain Joshua Hanks—and scared to fits.

"There!" said Dr. Meadow.

The burglar was wide awake. He watched us through narrowed eyes, his thin lips drawn tight and his high, bony forehead somehow threatening. His eyes were magnetic and queer. I knew immediately that he wasn't just an ordinary crook.

But, first thing I knew, Dr. Meadow was explaining everything to him. Very kindly, he told him all about his thought-substance exciter. He told him that increased ratiocinative potential should make a new man of him, and the crook nodded slowly.

"Go ahead, doctor," he said in a low voice. "I know I'm just a bum."

The little, bald man was delighted, but I was still suspicious. That fellow just wasn't just a bum. But it was Dr. Meadow's party, and already he was standing by a complicated control board.

"It won't hurt a bit," he smiled.

He pulled a switch and jabbed at a dozen buttons. The mass of thin wires crackled and hummed. Radio tubes lit up and needles on dials jumped, then steadied. Tootsie made a queer noise and crawled under the chair. The burglar looked surprised; his mouth hung open for a quarter of a minute, then compressed tightly. His eyes grew wide and deep.

After another half minute, Dr. Meadow stopped the machine and said eagerly, "Well?"

The crook knit his heavy brows. He seemed to be concentrating terrifically. I noticed that the wires, with the current turned off, still hummed, more loudly than when we'd come in. The doctor noticed too, and frowned. Seemed to my excited, electrified and dizzy dome that, while there had been no direct vibration upon me just then, any time the machine worked it still put an indirect hex on me. I seemed to feel sparks flying out of my ears.

"Crime doesn't pay," the crook said clearly.

"Delightful! Perfect!" Dr. Meadow cried. "Now, tell us everything!"

The crook closed his eyes. Very slowly, as though reciting a lesson, he said, "How could I have forgotten the sweet voice and dear, kind face of my beloved mother? Ah, how I lost my morals, my values! At last, I see how the eternal verity of nature's laws demands that each man produce something for his food. Stealing is simply unnatural. My darling mother tried so hard to make me good. Bless her memory, she would kneel by my bed and pray I should grow strong and clean. But I——" Tears began to roll down his cheeks. Dr. Meadow sniffled. I felt like crying myself, except in my flyaway head. "I, fool that I was, began by stealing nickels from her purse—nickels for which she'd slaved——"

Dr. Meadow blew his nose and cleared his throat. "Remarkable! The first effect is to awaken a stultified sense of morality," he sighed.

MY HEAD made me shout, "Watch him!"

It was too late. The crook leaped from the chair, gnawed shreds of twine falling from his ankles. Tootsie, making worrying sounds, ran in circles with twine in its teeth.

"Sorry, you old numskull!" the crook laughed harshly. "Sorry I couldn't accompany that with 'Hearts And Flowers.' Thanks for giving me something right up my alley." He ran to a closed window, broke it with his foot, turned his back and in one motion sawed through the cords on his wrists without cutting himself. "Good aim, eh? You've just doubled the speed of my reflexes!"

By that time I'd grabbed for a metal bar, but with a terrifically quick motion he whipped out a tiny, deadly looking automatic. I dropped the bar.

"B-but you've reformed!" Dr. Meadow stuttered.

"Reformed?" said the crook, with a twisted, awful smile. "Sure, I've reformed. I've reformed from breaking stir because no cop is smart enough, now, to catch Presto Braze again!"

Dr. Meadow staggered, while a remembrance of a year-old newspaper item flashed to my zipping brain.

"Presto Braze!" I gasped. "The hypnotist! The man who could charm animals! But that was only your sideline. You started as a pickpocket, and finally made half a million robbing banks. You escaped from prison a year ago and——"

"Have been hiding and doing small jobs ever since. I am flattered you know me so well," Braze said, bowing mockingly. "Once, I could charm animals after looking them in the eyes for minutes and concentrating till I was exhausted. But now, in a flash, I had set your dog chewing at my ropes, while I held your attention with my poor, dear mother."

Childishly, Dr. Meadow murmured, "Then you—you are still dishonest?"

Braze snorted. "Reach!" He went through our pockets, getting eighty-two cents from me and some real money and a watch from the doctor. Then, the gun still pointed unwaveringly, he backed through the open window and sneered at us from outside. "Now, listen," he said. "I'll tell you just how it is.

"You have increased my ratiocinative powers so that I can see every mistake that led to my being caught. You have made me able to realize my life's ambition. I am now capable of committing *the perfect crime!* Why, you shaven old sausage, didn't you know that morals are completely under the control of reason, when reason is ruthless? Your vibration will just intensify any desire which has long been repressed."

I burst out—couldn't help it—"Maybe that's why I've been thinking I'll make Maidy quit dyeing her hair!"

"Shut up, you. My esteemed doctor, I am beginning to see how I can increase my concentrative powers so as to be able to hypnotize human beings instantly. An hour or two of mental exercises, and I'll have it.

"NOW, LISTEN to this," he gloated, waving the gun. "A bank was built last year in a certain, small city. Its vaults aren't much, but they are protected with a new, complex mechanism employing photoelectric cells. If anyone knew just where all the wires, leads and lenses are placed, he could put a jumper in the circuit and crack that crib. I've had it all figured out except for the alarm system. Now you've solved that for me." He laughed. "Before I was copped, I got a look at the plans of that vault and protection system. I only had five minutes, and the thing was too complicated to memorize inside of a day. *But now I can see that plan, line for line, figure by figure!* You

have kindly stirred up the faint impulse it left in my memory cells, and by concentrating I am bringing it out clearly.

"So I'm all set. I can pick up a partner and tools in"—he paused, looked at us shrewdly. "In the city where the bank is. By that time, I'll be able to stun any cop with instantaneous hypnosis."

Dr. Meadow waved his arms and spluttered, "We'll tell the police!"

Braze looked at him, and I could see in his eyes that he *knew* Dr. Meadow. "Will you?" he said softly. "Will you let the world know you are responsible for creating a super-criminal? For they'll never catch me, you know. Your invention will become public. People may go mad, or die, from misusing it. For it's dangerous, I can feel that."

"He's right. It's dangerous, Doc!" I whispered out of my head.

"Better work with me, Baldy. I'll be back, with money. We'll improve this machine. I'm going to run things to suit myself, and if you're good you can be my chief technician." His eyes narrowed and so much ruthless knowledge shone out of them that I turned cold right down to my marrow. "But don't think I trust you very much," he grated. "So long." He ran out through the gate and into the darkness.

First thing I did was aim at kick at Tootsie. Consarned animal, getting hypnotized! But Dr. Meadow clutched me, very white.

"Joshua, we've caught a Tartar! We —we've got to do something!"

I gathered up Tootsie, which was acting queer. "Right, Doc. I've got to go home."

"Joshua, you've got to help me! Suppose I tell the police, and prying reporters learn the secret of this machine? Oh, why, why was I so anxious! Why, a slight maladjustment in the vibration may kill the subject! Suppose charlatans use my methods! But if I let that fellow go—if his power for evil grows —— Joshua," he pleaded, "think!"

I thunk. My head was feeling queerer and queerer, and I knew it was because those danged, skinny wires kept vibrating. I thought some more of what I'd read in the papers—and all of a sudden I yelled,

"Doc! Couple of years ago I read that a bank was going to be built in some city, and it would have a new, wonderful system of photoelectric cell protection. Of course, I just glanced at the item and can't remember the city where——"

"A clue!" Dr. Meadow roared, and Tootsie ducked. "If you can remember the city, we'll know without wasting time where Braze is going. Then, perhaps, with private detectives—some sort of mind shield—— Joshua, you *must* remember."

"How can I, Doc? I glance at a thing for a second, couple of years ago, not even being interested. 'S no use."

"I'll make you remember!" Dr. Meadow stood up like the Statue of Liberty. "Sit down between those reflectors, Joshua, and in a minute you'll be able to remember your first birthday. You'll be able to tell me exactly how to capture Braze! You'll——"

"Doc," I said, getting a firmer grip on Tootsie, "you're a smarter man than I. Why don't you sit down there?"

"But I have to operate the machine, Joshua. The controls are very complicated. Besides, I never saw that news item. You must do it, for the sake of humanity!"

WELL, THAT got me. My disinterred brain, which was not Joshua Hanks, was willing to get twisted up some more in Dr. Meadow's vibrations. Yet that same brain knew that fooling with the exciter was very, very dangerous. But I sat down, Tootsie on the leash between my feet. Leastways—

though I wanted to help other folks, too—I could figure out a good story for Maidy about being away so long.

Dr. Meadow ran first to his library and got an encyclopedia book that had a list of all towns of over three thousand population, by states. "I'll read them to you," he said eagerly. "Your association centers may then do the work." He fiddled with his machine—tried to get the wires vibrating less, but couldn't—and zip! I was getting my brain more excited.

The first time, I hadn't felt anything, but now it seemed that the top of my head was going to fly off. Those vibrating wires seemed actually to be between my ears. Seemed as though they were part of my brain. It began to feel as though a pinpoint of fire had dropped into the middle of my head.

Dr. Meadow stopped the machine when I yelled. "Small, physical resistances," he assured me. "Now, concentrating? Keep thinking, 'Where is that bank?' I'll start with this state. Berlin, Concord, Dover, Franklin, Keene, Laconia——"

I held my head, groaning. "Doesn't make sense, Doc. My thoughts are a hash."

"Concentrate, man! Nashua, Portsmouth——"

I looked at the thought-substance exciter. I couldn't keep my thoughts from it as they partly straightened out. In a queer voice, I said, "Doc, there's a harmonic vibration building up. *I* don't know anything about it, but my head does. It's figuring it out from things you said. When the harmonic vibration gets strong enough, it——"

"Yes, yes, but never mind that. Rochester, Somersworth? No? We'll try Vermont. Concentrate, now! Barre, Bellows Falls, Bennington, Brattleboro——"

"It's building up independently of current!" I yelled, the tiny fire in my head beginning to throw out sparks. All of a sudden my head took complete control and thoughts of all descriptions flashed through me like bees. I remembered Uncle Ezra's recipe for hard cider punch that we'd thought was lost, and how many tops I'd had when I was ten. I knew what Dr. Meadow had meant when he said that the areas of cerebral cortex lying between the special and cutaneous sensory areas function as association centers between the different perceptions. All sorts of mathemathics became clear. I wanted to jump right up and start figuring. But it felt as though I'd leave my head behind. I just sat there and shouted.

"Never mind those things!" Dr. Meadow cried. "The bank? What city?"

"The exciter!" I gurgled. "It's mixing up my brain. It's straining something. The—the natural reactive functions. Cells overloaded. The harmonic vibration, Doc—stop it!"

EXCITED, he fiddled with the machine. It seemed to have the better of him. The current was off, but it was humming away.

"Can it be?" he muttered desperately. "Is the wave length of thought related to some basic, etheric vibration which keeps building it up? Why are the tiny impulses spilling sound waves? What is the relation of overtones in audible and sub-audible——"

"The wires are permanently attuned to my brain and Braze's!" I yelled, twisting in the chair, filled with invisible flames and flying knowledge. "The critical point is past! The harmonic vibration is now building discords! Reverse surges of potential from my brain and Braze's, with a third, weak brain somewhere, are damping each other. Oh—Doc!" I hissed as my thoughts went off on a tangent. "You were once showing me something about trisecting an

"Son, meet my best and oldest friend"

SURE! I'll try new-fangled notions, too. But I've learnt there's a *few* things that just can't be improved on. Like your Ma's cookin'... and Union Leader Tobacco.

S'pose you light up a pipeful of Union Leader. Then *you* tell *me*... if it don't bring to mind yellow corn roastin' in the coals... or hickory-smoked bacon... or fresh-mowed clover.

For 30-odd years, Union Leader's mellow mildness has eased my leisure minutes... while its modest ten-cent price has eased my conscience, too. But then... a good friend *should* be generous like that.

10¢
FOR PIPE AND CIGARETTE

Union Leader

THE GREAT AMERICAN SMOKE

angle? Said it hasn't been done yet? It just came to me! If you describe an arc——"

He grabbed a pencil and paper. "Yes, yes!"

"You don't let heifers breed too soon or you won't have a good dairy herd," I said helplessly, the angle-thought vanishing. A devil with a pitchfork walked into my ear and started me yelling thoughts about the exciter. "Doc, once you affect a brain with your vibrations it's going to go on by itself, as long as the same wires are there. It will go on till—till something happens! The brain's vibrations become tied up with those wires! A subject may flash to abnormal, to subnormal and back. Maybe Braze can wreck the world, right now! Yes, everything extra Braze or I know is kept, in billions of impulses, in those wires and fed to our perceptions!"

"No," Dr. Meadow gasped. "My figures prove——"

"My head knows it, Doc!" The fire in my brain was swelling; colored lights flashed in my eyes. "The vibrations carry themselves on—drawing potential from the brains they're attuned with and feeding back the overtones—running into discords very soon—positive and negative potentials building to a point where——" My head was ready to burst. I heard a noise like a waterfall of lightning, saw violet electricity. One last thought fell into me from somewhere and with a great effort I got it out. "That city, Doc—that city with the bank that——"

"Yes, yes!"

"I remember what the paper said!"

"Tell me, Joshua!"

"Why, it's wonderful! I can remember every word just as though I'd read it this minute——"

"Wh-what city?" Dr. Meadow cried.

"An eastern city!" I shrieked. "It said the bank would be built in an eastern city!"

Then my head exploded, and, brainless and happy, I fell unconscious.

AT FIRST, I only half awoke. Everything was gray. Dimly, as though I were someone else, I saw wisps of blue smoke trailing from the thought-substance exciter. The tubes were dark, and the thousands of thin wires were broken, melted together into a few, warped stubs. But I hardly noticed anything because I had an odd, dull, irresistible desire to fix something. I staggered up and began to putter with the broken window.

Dr. Meadow gently made me sit down again. "There, there, Joshua," he said soothingly. "Your brain is suffering a slight reaction, but you'll be all right. You're just trying to revert to old habit as relief from a psychic bruising."

The gray feeling began to pass off. I didn't want to fix things so irresistibly, any more. The maddening vibration was gone. I just had a plain headache, and I knew my head was my own again.

"It blew out," Dr. Meadow muttered. "You were right. The vibration of thought must destroy itself with its own power when we give it to a machine. Humanity will have to undergo millions of years of evolution till our own brain cells do the work for us."

"Doc, take it from me, that's a better way."

As though in answer, there was a shivery, little whine from a corner of the room. A ball of fluff, each hair standing on end, two maddened, little eyes glaring, crawled out on its belly. Tootsie went slow and cautious till it got past me; then it became a woolly streak that zoomed out the window and vanished.

Dr. Meadow grunted, toying with the ruins of his machine, "That dog was not in the direct focus of the reflectors, but it must have gotten considerable of the

vibration. No doubt, its was the vague, third brain whose influence you felt." Sighing, he turned toward the door. "No matter. Now I shall have to notify the police. At least, there is no machine for anyone to copy. I can only hope that something can be done against that monster, Braze——"

Out on the road, two powerful headlights with a green lamp above them turned into the doctor's driveway. He groaned as they flared in at the windows.

"The police have come for me already. Braze must be spreading destruction and terror. He must have told everyone I am responsible so as to get me out of the way. I'll be jailed. Oh, all my work, my researches——" He wrung his hands in despair.

In a minute, Chief Carmody was banging on the door. When Dr. Meadow let him in, the poor, little man just held out his arms as though for handcuffs.

But the chief didn't seem to want to arrest him. In fact, he was giving him something—a watch! "Doctor," the chief said respectfully, "your name is on this. Were you bothered by a crook, earlier this evening?"

"Why—yes."

"Just checking up," said Chief Carmody, looking pleased. "Because I've got him. Yes, sir, they can laugh at the one-man Milfville police force, but when it comes to results no thousand Boston coppers can do what I've done. I've caught a dangerous, escaped convict named Presto Braze and I've got him in our lockup."

"Y-you have?" the doctor stuttered, and sat down.

"Yep." The chief was swelling. "And I came to see you immediately, Doctor, because you're an educated man with local pride, and Braze is acting very queer. Thought you might take a look at him before the Boston alienists grab all the credit for themselves. Also, after he tried to pick my pockets, he kept muttering your name and I could see he's afraid of you."

"P-pick your pockets?"

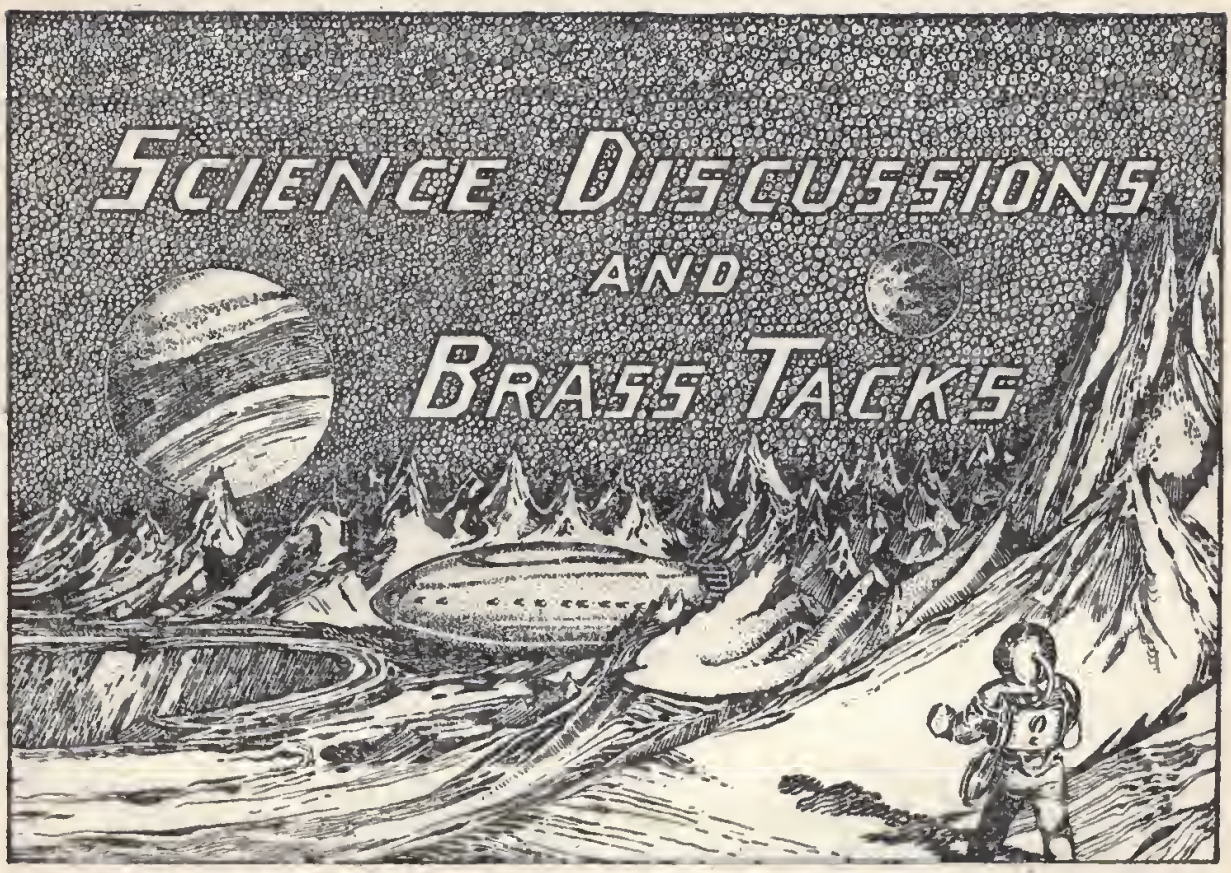
"Yep. There I was, just walking along at the end of the pavement on Main Street, and I see this fellow lying in the gutter. He gets up, staggers around, then finds me and starts going through my pockets. Thought at first he was just a drunk, but he got my gun, my watch and my wallet so quick I saw he was a professional pickpocket gone ga-ga. Locked him up. Then I found your watch and an automatic, checked my pictures and recognized him as Presto Braze. Funny thing," Chief Carmody said thoughtfully. "Braze went to prison for some very clever jobs of bank-busting, but he started as a pickpocket."

DR. MEADOW looked at me and I looked at him. Even I understood. When the thought-substance exciter tore itself apart, it affected Braze just as it affected me. As soon as I'd come to, I'd wanted to fix things—my oldest habit. So, when Braze woke up, he just had one thought in his mind and that was to pick pockets.

Dr. Meadow gulped, winked at me quickly. "Chief," he said dramatically, "I was going to call you just now. That crook smashed the window, there, while Joshua was helping me with an experiment. He took our money and my watch at the point of his gun. I tried to overpower him with an electrical apparatus, but he short-circuited it and it knocked Joshua unconscious.

"This Braze fellow undoubtedly suffers from hyper-inflation of the ego. He was talking wildly about being the smartest man in the world."

"Just what he was muttering to himself in the cell," Chief Carmody cried. "Sure, he's nuts!"



We'll expect a reply from Leo Vernon. As for fuels—how about atomic H, not H_2?

Dear Mr. Campbell:

The folk who have the misfortune to work with me will confirm the statement that it took me at least two days to cool down after seeing Mr. Vernon's first differential equation, in "Rocket Flight", and for a week I was shouting things about "kv" in my sleep.

I make no claims to mathematical ability—my maths master always said I'd be a darn good chemist. I wouldn't know a Zeta function if I saw one, and my favourite cuss-words are "Reimann-Christoffel Tensor". But I do know a bit more than my two-times table, and I also happen to have spent some little time playing with the equations of rocket flight.

Run back to your marbles, you Brass Tackers, or you may get hurt. This is where men are going to fight.

I'll keep Mr. Vernon's symbols to prevent confusion, though I'd prefer to kick out X and k. Greek looks better, too, but it's hard on the printer. I insist, however, on using "g" for the acceleratiou of gravity, and not for the gravitational constant which is usually written G.

Force = Mass x Acceleration.

Now the force exerted by the rocket blast is equal to Xk, and the mass of the rocket at time t is (M-kt).

Therefore,

$$Xk = (M-kt)dv/dt.$$

where dv/dt is the acceleration.

Now, Mr. Vernon, where in the names of the perishing planets did you get your term "kv" from? Do I see the hideous shade of Karl van Campen looming before us again! Heaven forbid!

The solution to this equation is:—

(1) $v = X \log m/(m-kt)$

which you will find in any mathematical exposition of the subject worthy of the name. It is the most important equation in astronautics. Mr. Vernon's result, to make myself brutally clear, is baiony.

From a second integration we obtain:—

(2) $s = Xt + X(M-kt)/k\log(m-kt)/m)$

These results ignore gravity. To allow for it, subtract gt from (1) and $\frac{1}{2}gt^2$ from (2), if you're not going very far from the Earth. Please handle these equations very carefully, Mr. Printer—they're fragile things. Mr. Vernon's second equation could be read in half a dozen different ways, each worse than the one before. How right he is when he says that his results differ considerably from those obtained by other writers on the subject!

Equation (1) is the most important. If you rewrite it as

$$e^{\frac{v}{x}} = \frac{m}{m-kt}$$

you can see at a glance (or at any rate two) that for a rocket to travel as fast as its exhaust it must burn "e" times its final or dead weight of fuel. And *not* an amount equal to its final weight, as Mr. Vernon so blithely states. Poor Willy Ley spent a whole column in the March 1937 A. S. explaining this supremely, this vitally important fact. And now along comes Mr. Vernon—— But words fail me. Excuse me for a moment while I take another bite out of the table.

Will all readers who were deluded enough to believe Mr. Vernon please reread Willy Ley's article "Dawn of Conquest of Space"? It will save me from wasting some more room.

Mr. Vernon's remarks on exhaust velocities show how little he is in touch with the practical side of rocketry. The highest possible value of X with known fuels is about 3 m.p.s. or 5 km.p.s. It is very unlikely that stable fuels will be discovered with very much higher exhaust velocities. So Mr. Vernon's tables, which start with values of *50* Km.p.s., are of no use whatsoever, even ignoring the not unimportant fact that their theoretical basis is as wet as a lump of calcium chloride in a turkish bath.

Rocket researchers such as the Technical Committee of the British Interplanetary Society are designing space ships using known exhaust velocities and aren't waiting for fabulous fuels to

come along. They may—bnt for nnmerons reasons anything much better than oxy-hydrogen mixtnre is rather improbable. This means that we are designing ships on the "step" principle which enables very high load ratios—say 50 times as much fuel as dead load—to be reached. I wonld like to reiterate Ley's remarks that the only remaining problems are purely practical and financial ones, and there is no need to expostnlate the enormous exhaust velocities that Mr. Vernon dreams of.

As an honest, fair minded editor, Mr. Campbell (subtle, aren't we?) you onght to give this letter as much prominence as Mr. Vernon's article. It's nearly as long, anyway. My only fear is that Willy Ley has beaten me to it and is already heading for Massachusetts with a snspicious bnlge in his hip pocket and murder in his heart.

There are a lot of other things I'd like to say if I had the time and you had the space, hut I think I have dealt with the most important matters. I'm really very sorry to be so rude to Mr. Vernon, who I'm qnite snre is a nice enough fellow, but I can't resist the clarion cali of duty. On which note, I will gracefnlly return to my usual semi-comatose condition until the next issue of A. S. comes over here——Arthur C. Clarke, Hon, Treasurer, B.I.S., 21, Norfolk Square, Paddington, London, W. 2, England.

H. C. McKay on Light and Perception.

Dear Mr. Campbell:

In "Science Discussions" for February I see a letter from Mr. Lonis Koenigsberg, Jr. of Bnffalo, N. Y. in which he qnestions the non-existence of light where there is no brain. Mr. Koenigsberg has confnsed the old philosophical statement that everything is imagination, with the psychological fact that we speak of a mental perception as if we meant the origin of the stimulns which produced the perception.

Mr. Koenigsberg makes his error in stating that "light" is reflected from an object thus making it visible. I beg to differ. *Radiation* is reflected from the object; our eyes respond to this radiation and the mental image is that sensation we call *light*.

In the study of sound we freely admit that sonnd is the result of an external stimulus. The physicist does not speak of sonnd waves as "sound". Dealing with tangible waves in the air, he speaks of "sound waves", knowing that they are not really sonnd, merely the thing which gives us the mental impression of sound *only when they fall upon our ear drums*. He also knows that when either the drum or the fibres of the Organ of Corti is injured, the individual fails to hear, even though the waves are still there.

In the article in question, the radio analogy was used, for here we have the same thing. There is no sound, no music in the air, nor in the radio receiver. Although the electric stimulus is there, there is no sonnd stimuins (sound waves) produced until the electricity acts upon the speaker and the current pulsations transferred into mechanical movements of the speaker.

If the electro-magnetic radiation which affects onr eyes were really self-luminous, then we shonld not have the specific, yet pecnliarly individnal limitations, of visibility. Ultra-violet and infra-red are not at all different from visible radiations, except for wave length, but when our receiver (eyes) fail to respond, it is jnst like feeding a radio speaker with a frequency to which it cannot mechanically respond. The stimulus is there; the reaction breaks down.

The presence of a blind individual *does not in the slightest degree affect the nature of the existing radiation*. His "receiver" has broken down—in itself an excellent demonstration of the fact that the existing thing is radiation, a condition of stress in an electro-magnetic field —not luminosity.

Let us take another example. A certain scene is scanned with an old fashioned television pickup. Instead of being transmitted, the impnises are cut into a phonograph record. When the record is cut we can "play" it on a phonograph and produce a variable hum which is

sound. We can play it into a televisor and produce an image *sight.*

But in both cases the original stimulus (record) was the same. Different sensations were produced by the different types of receiver into which the impulses were fed.

A study of color brings still more evidence that "sight", "vision" and "light" are definitely mental reactions. The visual interpretation is such that it comes far from agreement with the known, physical facts of radiation.

There is too much proof of the fundamental nature of radiation to question the facts of spectral color. In fact, the spectroscope is our most sensitive and accurate instrument. At the same time, the spectrum of the physical laboratory does not fulfill the requirements of the psychologist. The perception of color demands something the physical spectrum cannot supply. But, this is the significant point, *the physical spectrum meets all demands as far as the study and utilization of specific radiation is concerned.* The fact that we "see" in a manner not covered by the physical theory is to be expected, for "light" is merely a response to an external stimulus, just as the pain from a burn is the mental response or perception following the application of destructive heat to our body—certainly there is no "pain" inherent in the fire. Super-cold solid carbon dioxide produces the same sensation.

I think Mr. Koenigsberg will agree that a forest fire might rage, but unless there is an animal there to be burned, no pain will be felt—yet the cases are parallel. Pain is the mental perception of excessive heat (infra-red) while "light" is the mental perception of the presence of radiation of slightly shorter wave-length.

It has been repeatedly demonstrated that while the physical spectrum is linear in form, the visual spectrum is a connected circle with the non-spectral purples filling the gap between the reds and violets. Moreover, close study of color blindness (which includes more than 20% of the male population, slightly less among females) shows that the actual perception of color (light) varies even more widely than we could imagine.

No, while the Universe is bathed in a sea of radiation of many wave-lengths, light is specifically a mental response to the stimulus of a specific radiation band. And because light is no more tangible than any other mental perception—thought, idea—we must accept the fact that the Universe is abysmally dark. Light, actually as well as figuratively, lies within the mind.

As stated in the article, the human sense of vision is but a highly perfected radio direction finder.

I hope Mr. Koenigsberg will see that I was not speculating with philosophy, but dealing with actual physiological and psychological facts. And that he will no longer confuse "light" and "radiation" but remember that they bear the relationship of effect and cause, respectively——H. C. McKay, 10 Monroe Street, New York City.

Radiant Evolution.

Dear Editor:

Since my first letter was printed in the March issue I have received quite a few letters and cards commenting on the theory of evolution I advanced in the letter. It would help me a lot if you would print this letter as an answer to all the inquiries I've received.

First, let me say that the theory of mutation by X-rays has been proven. These experiments were tried on insects.

Second, these experiments were also tried with radium rays and also proven to have almost the same effect as X-rays.

Third, with these experiments to offer a background, why couldn't the evolution of any animal, plant, or living thing be influenced by some ray, such as X-rays, radium rays, and ultra-violet rays such as are emitted by the Sun.

Fourth, in case there are a few who do not know what these experiments were; eggs of certain insects were exposed to the above mentioned rays for certain periods of time. It was found that the insects which hatched from these eggs were slightly different in color and shape from their parents. Different combinations of exposure and rays caused variations in the in-

sects born afterward. Of course, too long an exposure would kill the egg.

Isn't it therefore probable that some ape in ages gone by could have lived in close proximity of a radium deposit and given birth to an offspring slightly different in shape? This process could have been repeated until the radium gradually lost its radioactive properties and turned to lead, etc.

I know this theory will cause a lot of controversy, because to illustrate one example; the Australian aboriginal is considered the least advanced human, with few exceptions, alive today. My contention would make these aboriginals ones who have degenerated from a higher form because of ages of malnutrition and hardships resulting from unfriendly environment.

I have received requests also to account for gaps in the story of Man. This can easily be explained by recalling that to find some object which has been lost for some length of time, even in close proximity to you, would be something like a miracle, let alone finding something that has been lost for ages no one knows where.

Some of the inquirers have misunderstood my stand on the Atlantis and Mu question. I am neutral on the subject because there is as much evidence to prove as to disprove them. Until there is more proof either way I shall not let this controversy put any more gray hairs in my head than necessary. Though I'm inclined to believe with Churchward that it is highly probable there was at least once before in this world civilization as highly advanced as ours, if not more. This Earth of ours is too old for this not to have happened before. It need not have been a human civilization—it could have been another form such as insects—take the ants for instance, and the bees. Their nests and hives are built from instinct? All right, how did they develop it? There must have been a time when they were unable to do this by instinct alone. Don't forget that before a man can play a piano for instance, he labors for years to learn the technique. Then he can play notes without thinking. The same could be said for anything, such as driving a car by shifting gears. After a while, no one bothers to think where first or third gear is; they do it automatically. In other words you must do a thing for a long time before you can do it automatically, or by *instinct*. Imagine how long it would take to do something automatically from birth!

It just occurred to me that a lot of you might think that these theories originate with me. I must humbly admit that *none* of the theories are mine, but belong to more learned men than myself whose names I do not recall. I just happen to agree with them.

Well, I guess I'll cut this long winded discussion to a close and thank Mr. Campbell for his generosity in printing this——George Trott, 1337 Grant Avenue, New York City.

BRASS TACKS

Sir Smith reënters the tourney!

Dear Editor:

Once more the weather-beaten, gray-haired, battle-scarred Sir Smith has been aroused from his torpor. This time it is Sir Howell (how appropriate!) and Sir Ladd (also probably quite descriptive) who have made the welkin ring with their joint call to combat. Old and slothful though he may be, Sir Smith has never yet refused to pick up a gauntlet. And, as ever, he allows the challengers to name the weapons. In this scrap, apparently, anything goes. So be it!

Please note, however, all you innocent bystanders, that what broke through my customary lethargy is not the mere fact that these sprightly and courteous gentlemen did not like "Galactic Patrol"—I cannot even hope, and certainly do not expect, to please everybody; and their tastes are their own. Nor is it the tone of the communication, the weapons they have chosen—I have been bawled out before, by experts, without undue or unseemly urges to violence.

What got my dander up to writing pitch is

the accusation—by inference, it is true, but none the less clearly connoted—that I am sailing under false colors by using the Ph. D. Since Edward E. Smith is my real name, the thing is of course on record. But, since it is quite possible that Messrs. Howell and Ladd do not know where to look for such things, I will say that I did my undergraduate work and some Engineer's work at the University of Idaho, and received my M. S. and Ph. D. (this last in 1919) degrees from George Washington University. I also did special work at other schools—one of which was Harvard. My subject for the doctorate—which also seems to be of some interest to the enemy—was the reaction between keratin ($C_{40}H_{80}$) and the mixed oxides of nitrogen as produced by a flaming arc in air. I wonder if either or both of these embattled knights consider that reaction as something simple or elementary? As for other publications, I suggest that they consult the decennial indices of Chemical Abstracts.

Now, if these bold men-at-arms wish to carry this jousting to its logical, knock-down-and-drag-out conclusion, they must do two things. First, they must bolster their contention by quoting, or by referring to, specific passages in the "Patrol" which to their minds show scientific knowledge incompatible with a Ph. D. degree. Second, they must give, as I have given, evidence as to their own scientific training and attainments, so that the grand jury of Brass Tackers can form its own opinion of the qualifications of Sir Howell and Sir Ladd to judge scientific varieties.

Having written which, Sir Smith again subsides into his wonted somnolence——Edward E. Smith, 313 Homecrest Road, Jackson, Michigan.

Seconding Sir Smith!

Dear Mr. Campbell:

Just a note to say that I emphatically disagree with Don Howell and James Ladd. Their attempted humor left me weak. Of all the utter drivel, that takes the cake. If they didn't like "Galactic Patrol" why did they buy the magazine? Surely the rest of it couldn't have agreed with them!!——James S. Avery, 55 Middle Street, Showhegan, Maine.

More backing for Sir Smith.

Dear Mr. Campbell:

I've been a steady reader since I bought the October issue. Have all numbers from that time and intend to get all those to come.

Best story in March issue, "Jason Sows Again". Close behind, "Vibratory" challenges, and "Flareback" runs a dead heat. Casey is sure to become better as his characters become more familiar. Wellman turned out an interesting little tale that was a relief after "Martyrs Don't Mind Dying".

I favor the novels for greater reading enjoyment. The shorts are very good, and necessary; you publish too many of them, however. Three shorts would be plenty. How about it?

Have heard of Thomas Calvert McClary and am impatiently waiting for next issue to apply the "critical yardstick" to his yarn. It promises to be good.

I am not an experienced hand at hurling brickbats, so I'll have to congratulate you. First, on "Power Plants of Tomorrow". Good work Willy Ley! Your series most interesting and instructive. Second, the change in name. An important step that gives "our mag" the name it really should have. "Science-fiction"—ah! I like the very sound of it. Third, "Galactic Patrol". Despite the fact that Don Howell and James Ladd find it so despicable, it finds a firm booster in me, and surely in many other appreciative readers.

Would like another biological story like "Pithecanthropus Rejectus". I'm interested in bio-chemistry. Have been working on a plot since early December (grade A). Wonder if you would look it over?

All in all, Astounding takes first place with

me, and I hope it shall continne to do so. Thns with a word of gratitnde to you, Mr. Campbell, I read merrily along and express my appreciation by honoring you with my really and truly first letter. You may expect many more——Melville Sharrock, Karnes Avenue, Cumberland, Md.

Seconding Sirs Howell and Ladd!

Dear Editor:

Something has happened. Try as I will, I cannot he sarcastic, this time. Perhaps it is because the March issue of Astonnding was so *different*. It is hard for me to put revolutionary feelings into cold print, hnt, perhaps if I make an impersonal ontline, the task will be easier:

1. THE COVER: The first I have ever seen that emhodied an allen quality. It made me believe I was a silent witness to a fantastic drama. Mr. Wesso is the only artist to captnre the lonely personality that is science-fiction.
2. THE MAKEUP: You promised me, Mr. Campbell, that the March issne would be distinctive and you have kept your word. The new name of ASTOUNDING SCIENCE-FICTION, the change in placement of DISCUSSIONS, the abrupt absence of bang-bang stories, all have made the magazine crystal new.
3. "Martyrs Don't Mind Dying": A Brass Tacker in December, an author in March—John Victor Peterson. The plot was similar to Weinbaum's "Circle of Zero", but the angle was totally mutant. Congratulations.
4. "Flarehack": Another short by another new author. Not much of anything, but a great little character has been invented. More, Mr. Casey.
5. HOWELL & LADD: Yonr letter sums up the epical "Galactic Patrol" nicely: "Condensed, it just stinks."
6. In conclnsion, thank you Mark Reinsberg, Jack Gillespie, Charlie McHugh and R. K. Dawes, for your letter. Especially, Mr. Dawes, who writes from Egypt—it is surprising the odd corners ASTOUNDING reaches ——Gerry Tnrner, Hotel Bretton Hall, New York City.

Giles' "Wayward World" was liked generally.

Dear Sir:

Reader's Report: In the January issue, "Galactic Patrol" installment is perfect. In February issue, the conclusion seems chopped off on page 96. Yon'll probahly hear from others about it. "The Degenerates"—fair. "Anachronistic Optics"—different, hnmorous, altogether excellent. "The Fatal Quadrant"—started well, but finished lamely. Too much like a fairy story in scientific guise. "Wayward World"—excellent, superb, magnificent! In other words, more!——Allan I. Benson, U. S. S. California.

Schachner is working on another. But it takes time to write—wherefore we appear once a month.

Dear Editor:

After years of reading every kind of a magazine, I have at last found the perfect one. Yes, it's your magazine—Astounding Science-Fiction. To my way of thinking, it's the only one!

May I say that Dr. Smith's story, "Galactic Patrol" just hits the right spot, and I am sorry there is to be only one more issue of it. It is so interesting it conld go on and on.

When are we going to get another story by Nat Schachner about Sam Ward, Kleon and Belton? Now that they have a ship and do not have to travel by foot, I am anxious to find out what they are doing and finding. Please don't make us wait too long.

There is one question I would like to ask, and

it should not be too hard to answer. It's just this. Why, oh why, don't you print this magazine at least twice a month instead of once?——Mrs. B. McKinnon, Capreol, Ontario, Canada.

We'll expect orchids when the May Astounding appears.

Dear Editor Campbell:

Here's a bouquet. I think "Galactic Patrol" one of the best stories I have ever read. Some of your readers complain about too-numerous adventures but I like my stories full of happenings. There wasn't a dry or boring moment in the story. Dr. Smith made Kim so interesting and human that he seemed not just another character but an actual person. If there were any discrepancies in science in the story I didn't see them. I would give the Gold Medal to "Galactic Patrol" and to Dr. Smith. It was a masterpiece.

I like the new *mutant* cover. It's a great idea, Mr. Campbell.

The next best story in the issue was "Wayward World". Let's have more like it.

I suppose this optimistic letter will probably end its cheery career in your regal wastebasket but I felt it my duty to write a letter of congratulations. (In fact, when I finished "Galactic Patrol" I sat stunned for several seconds then made one jump for the typewriter. Yelling "Wow!" at every jump of the carriage.)

Hope I haven't bored you by beginning my letter with G. P. and ending with the same. Keep up the good work and next time I'll send orchids——Mary Rogers, 2006 Court St., Muskogee, Oklahoma.

It's Astounding Science-Fiction now.

Dear Editor:

I have just read the January issue which is the first copy of Astounding Stories I have read, although I used to read science-fiction several years ago. I found it quite interesting and I intend to continue reading it.

I enjoyed the articles "Rocket Flight" and "Power Plants of To-morrow", and I found the letter in Brass Tacks from Mr. Arthur McCann about power plants very interesting.

The stories I enjoyed most were, "The Voice Out of Space" and "Pithecanthropus Rejectus". "Galactic Patrol" was good, too.

The thing I like least of all about your magazine is its name. Why not call it "Science-Fiction Magazine", or some such name which isn't quite as spectacular as Astounding Stories? Frankly, I don't find its stories any more "astounding" than those of many cheap blood-and-thunder magazines. The name "Astounding Stories" seems to put it in a class with other magazines which do print truly astounding stories. Of course some of your stories are incredible, but I think a scientific fiction magazine is different from most other pulp magazines, and I should think some such name as "Science-Fiction" would indicate its real nature better than the present name.

However, I suppose you know more about what it takes to sell magazines than I do. This is just one reader's opinion about it——J. P. Dunn, Radio Operator, S. S. Ariyn.

Do readers want this suggested type of astronomical cover, or the rest of the Solar System?

Dear Editor:

Although I have been an omnivorous reader of science-fiction for several years, I am normally rather reticent about expressing to the Editor any comment, whether favorable or otherwise, on the magazine. This time, however, for reasons which are entirely favorable to you and the authors, I am impelled to break my long-standing silence, and express an opinion.

The first reason for this letter is "Galactic Patrol". Let me offer congratulations—which, I realize, are quite unnecessary—to Dr. Smith.

Although I have not, as yet, had sufficient time to really read the story, and cannot, therefore, either agree or disagree with the Editorial statement that this is Dr. Smith's greatest story, I feel that it may with justice be ranked as one of the three best works of science-fiction yet produced. While three years seems a long time to wait for a story by any author, yet when the results are so decidedly gratifying, the time becomes, after all, insignificant.

The second reason is your *mutant* cover. I am heartily in favor of further mutations of this sort; I believe that, given time and continued progress along the lines followed during the past year or so, you can make of Astounding Stories a publication of merit, both in the fields of science and literature. Might I suggest, as the basis of a future *mutant* cover, a drawing of a solar eclipse, when the eclipsing body is sufficiently massive to produce a bending of the light rays? The manner in which the distortion would proceed may be calculated by relativity theory—I have seen diagrams of such an effect—and the accurate representation of this would be a neat little problem for your art staff.

Speaking of your art staff, I might say that Wesso's illustrations for "Galactic Patrol" were exceedingly well done—in spite of Mr. Youd's opinion that he has a poor artistic sense——A. A. Smith, Queen's University, Kingston, Ontario, Canada.

If the picture is good, captions aren't needed for that scene. But understanding the picture is helped if what lead up to or resulted from the pictured scene is told.

Dear Mr. Campbell:

Here is the monthly letter.

Naturally, when I glanced at the cover I noticed the startling departure from the ordinary, and I asked myself—"Is Paul back?" Well, it seems, it wasn't Paul, but it was good anyway. I gather that henceforth Brown will be cover artist; Wesso was a miserable failure. From the cover I went to the contents page, and thence to your page. Whether this "mutation" will be successful is still a question; it is, perhaps, not as big a change as we would have liked for the first *mutant*, and as we led ourselves to believe was in store.

Two of the stories slated for Times to Come sound good: "The Master Shall Not Die" and "Martyrs Don't Mind Dying." Sometimes a good title gives a lift to the whole story, as "Pithecanthropus Rejectus" last month.

But to this issue: "The Degenerates" was punk, punk, punk, Wesso's drawings being a large contributing factor. The story, though, was antediluvian in plot and style. Along toward the middle of the story, I says to myself, "Wouldn't it be great if Cross turned the villain out to be a good guy after all?" But of course, Cross did no such thing. I must have had Conover's "Something Different" in the Meteor on my mind, to hope for such a thing.

"Anachronistic Optics" was good, though; all that it pretended to be, and nothing more.

And "The Fatal Quadrant" was excellent. Antarctica hasn't been overworked like so many other things, and the robots were delightful. Wesso's drawings for the story were good, too. The story ran in something of the manner of "The Golden Horseshoe", Burks has certainly snapped out of it.

"Rainbow Bridge" article was good.

And the final installment of "Galactic Patrol" didn't let me down—all except the final participle of the last sentence, which was a poorly-written finale to a great story. You must have used the blue pencil on the story. The end was too abrupt. In general, though, the whole novel was successful. Smith writes for people with unbridled imaginations, not for those that cringe at the thought of exceeding the speed of light. His characters, too, have something of the Renaissance spirit—they possess will power to the ultimate, which makes for powerful stories. I wouldn't say that Smith has fallen any from his former heights; he shows some of the influence of Weinbaum, but that's all to the good.

Oh, yes, before I go any further, I have a criticism relating to illustrations—not the drawings themselves, but to the captions under them. Seldom is the scene pictured the one given in the caption: usually it's a little before or a little after it, but sometimes the quotation in the caption cannot be found anywhere in the story; almost never are the exact words given.

"Mercutian Adventure" didn't have enough story to warrant publishing it, except as an excuse for the cover scene. Much of it was taken from the plunge-into-the-vacuum episode of "The Red Peri".

I'm glad to see Dold coming back, though. And Jack Bluder's illustration for "Wayward World" is among his best, though the captions are the outstanding examples of the situation above mentioned. Giles is another author who's improving.

"The Power Plants of Tomorrow" article was good.

"Anti-Weapon" fair. Little in it that was startlingly new, but the Binder's use of His Side and the Other Side was a clever way of avoiding hurting the sensibilities of any of us guys that stand one way or another on the international situation. Most authors, you know, either blurt right out the names of the two sides, or conceal them very clumsily.

"Thunder Voice" was an interesting idea, but the story was obviously created for the idea, rather than the solution to the problem arising naturally from the situation.

So to the Readers' departments. Science Discussions was as good as usual, but Brass Tacks was all cluttered up with howlers for Them Was The Days. Foo!——Jack Speer, 117 North Fourth St., Comanche, Oklahoma.

Are all time-travelers "imitating H. G. Wells"?

Dear Sir:

I write again for a very definite reason. It is, namely, to attack a phrase that is becoming more and more common in the column.

It seems that whenever a reader doesn't like a story that tries to be humorous, he immediately states in his Brass Tacks:

"Was—trying to imitate Stanley Weinbaum?"

I fully realize the exalted place Stanley G. Weinbaum occupies in the hearts of science-fictioneers and that this phrase is meant as a flattering comparison, but how does the author feel about it? If he writes a new story, someone is sure to say—"Reminiscent of Weinbaum". Compliment though it is intended, I don't imagine the writer enjoys being compared with a rival, just because his story was "different". Now it is ridiculous to suppose that Stanley G. Weinbaum holds first rights to every type of plot in existence that is in any way entertaining, but one gathers that impression from the letters published.

Last issue, Thornton Ayre's "Whispering Satellite" was pounced upon by the back-biters. Before that it was "Surgical Error" which was hallelujahed as a "gift from Weinbaum". This issue, I imagine John Victor Peterson will squirm when he reads that his "Martyrs Don't Mind Dying" is grand reading, superbly written, clever and—"reminiscent of Weinbaum"——Patricia Evans, 2350 Broadway, New York City.

How do you like Schneeman's cover?

Dear Mr. Campbell:

Let me thank you for your prompt and courteous reply to my request that readers having back issues get in touch with me. You sent me a list of those having back issues, and that certainly is service. I didn't expect any such thing, and was very pleased.

Your March issue is, I believe, the best yet, and I notice that you are still "mutating". Keep it up, by all means! The stories are better. The illustrations have improved—with one exception—and the make-up is more to my liking. All in all, Astounding is rapidly becoming a higher class magazine. And thanks for changing the title; it has not so much of a tendency to give people the wrong impression as the old one.

Now, that exception I mentioned as regards illustrations: it's Wesso. What in the world has happened to that formerly good artist? His drawings are smudgy, ragged, and apparently dashed off in a few spare moments. He *can* draw well; his illustrations for the old quarterlies and this month's cover prove that. By the way, that cover was his one redeeming work; it was really good. Wesso uses his colors in a way that makes the objects he paints seem almost luminous. It's an effect that I like, and it was amply illustrated on the March cover. On the whole, I like his covers. Here's hoping for his speedy recovery.

But if he doesn't make a come-back, you have an artist to take his place; one who is at present much better than he. Three cheers for Schneeman! He certainly is a pleasant surprise. Why haven't we had more of him? His illustration for "The Flight of the Dawn Star" was excellent. Give him some more work, please.

As for Dold, he seems to be climbing back to his old level. When I first saw his illustration for "The Wings of the Storm" I didn't think much of it. But the more I looked at it the better I liked it. It's got something—I don't know just what. But it impressed me.

"Flight of the Dawn Star" was the best story in the issue, as far as I'm concerned. It was well written and thought provoking and the characters were well drawn. "The Master Shall Not Die" and "Flareback" came next, with perhaps a shade of difference in favor of the former. Nevertheless, I certainly enjoyed the latter. I put "Something From Jupiter", "Dnel in the Space Lancs", and "Martyrs Don't Mind Dying" next, in that order—all pretty close together—and "Vibratory" a pretty poor last. Van Lorne would be quite a bit better if he wrote with more care, paying closer attention to his style and grammar. I don't know where to place "Wings of the Storm"; it's a unique story, of a totally different type. Anyhow, I enjoyed it. It wasn't, to my mind, especially scientific.

I gather that Mr. Howell doesn't like "Galactic Patrol". At least, he's an individualist. Are you a Ph. D., Mr. Howell? One would think so, from the vehemence with which you object to Dr. Smith's "disgracing" the ranks of Ph. D.'s.

Give Mr. Burdett a medal; he came through with the best letter and the most practical suggestions I've seen for a long time! I agree with almost everything he says, especially that about getting Richard Vaughan and Laurence Manning, and putting out a quarterly. I notice that you said in the heading to the letter that you were acting upon it. Does that mean what I hope it does? Quarterlies are fine things, you know.

Keep up the good work and continue your improving. Darwin had nothing on you in the way of evolution——Raiph C. Hamilton, 920 College Avenue. Wooster, Ohio.

IN TIMES TO COME

BELOW, we present ***The Analytical Laboratory.*** Since we can't print all the letters—or even a large fraction of them—we are going to print the results. The analysis of those letters generally indicates pretty definitely which stories stood in the first three places. The first five can be distinguished. But usually, the rest receive about an equal measure of applause; the one in sixth or seventh place is constantly shifting up or down as more letters come in.

The Analytical Laboratory will analyze only the cream. Votes are recorded on our chart as √, +, —, and O. One other symbol—O in red—stands for a comment on faulty science. On the basis of those reactions, we will try to do our "storical" instead of chemical analysis. Ordinarily, we'll list five stories—the top five in order. Under two conditions we'll list more. Those conditions don't come up frequently—but one of them did this month. ***The Master Shall Not Die!*** and ***Flareback*** have been mutually oscillating between first and second place since balloting started. They are 20% ahead of any other story. Under those conditions, I can only call it a tie for first place, and list six stories.

AND if some story gets panned consistently and hard—you and the author are both going to hear about that. We'll have to find out why that happened.

BUT for next month. For a month or so, I've been a little worried. This May issue I'm proud of. "Rebirth" McClary—Jack Williamson's ***mutant*** story—E. E. Smith's science article—— That's material that's hard to equal. It rather looked as though I'd hit a high I wasn't going to maintain.

MY error. Norman L. Knight of ***Frontiers of the Unknown*** is back with a short story told with the skill he displayed in that longer yarn—***Isle of the Golden Swarm.*** Manly Wade Wellman who has been consistently and rapidly rising to better and better stories—note the standing ***Wings of the Storm*** attained—has done an excellent story of a hard-headed idealist, a queer combination of a man's ideals. It's a story of the first days of space-flight, and he's made it real.

AND that story is illustrated on the cover—with our second astronomical color-plate. Wesso is doing this one, and from the sketches he's shown me, it should be a beautiful job. Wellman's story, because of the very factual way it's done, presented an excellent opportunity for this scene—a factual scene.

RAYMOND Z. Gallun—the Gallun of ***Old Faithful,*** I believe—is back. ***Seeds of the Dusk*** is a story that will, I think, be found well up in the report of ***The Analytical Laboratory,*** even with the competition it will have.

NO, that June issue won't have to be below the heights of May.

The Editor.

THE ANALYTICAL LABORATORY—MARCH ISSUE

	The Master Shall Not Die!	R. DeWitt Miller
1.	Tied:	
	Flareback	Kent Casey
2.	Wings of the Storm	Manly Wade Wellman
3.	Flight of the Dawn Star	Robert Moore Williams
4.	Vibratory	Warner Van Lorne
5.	Jason Sows Again	Arthur J. Burks

The first two have a lead of nearly 20% over any others—and no disapproval.

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