# **Not Final!**

Isaac Asimov

Nicholas Orloff inserted a monocle in his left eye with all the incorruptible Briticism of a Russian educated at Oxford and said reproachfully, “But, my dear Mr. Secretary! Half a billion dollars!”

Leo Birnam shrugged his shoulders wearily and allowed his lank body to cramp up still farther in the chair, “The appropriation must go through, commissioner. The Dominion government here at Ganymede is becoming desperate. So far, I’ve been holding them off, but as secretary of scientific affairs, my powers are small.”

“I know, but-” and Orloff spread his hands helplessly. “I suppose so,” agreed Birnam. “The Empire government finds it easier to look the other way. They’ve done it consistently up to now. I’ve tried for a year now to have them understand the nature of the danger that hangs over the entire System, but it seems that it can’t be done. But I’m appealing to you, Mr. Commissioner. You’re new in your post and can approach this Jovian affair with an unjaundiced eye.”

Orloff coughed and eyed the tips of his boots. In the three months since he had succeeded Gridley as colonial commissioner he had tabled unread everything relating to “those damned Jovian D.T.’s.” That had been according to the established cabinet policy which had labeled the Jovian affair as “deadwood” long before he had entered office.

But now that Ganymede was becoming nasty, he found himself sent out to Jovopolis with instructions to hold the “blasted provincials” down. It was a nasty spot.

Birnam was speaking, “The Dominion government has reached the point where it needs the money so badly, in fact, that if they don’t get it, they’re going to publicize everything.”

Orloff’s phlegm broke completely, and he snatched at the monocle as it dropped, “My dear fellow!”

“I know what it would mean. I’ve advised against it, but they’re justified. Once the inside of the Jovian affair is out; once the people know about it; the Empire government won’t stay in power a week. And when the Technocrats come in, they’ll give us whatever we ask. Public opinion will see to that.”

“But you’ll also create a panic and hysteria-”

“Surely! That is why we hesitate. But you might call this an ultimatum. We want secrecy, we need secrecy; but we need money more.”

“I see.” Orloff was thinking rapidly, and the conclusions he came to were not pleasant. “In that case, it would be advisable to investigate the case further. If you have the papers concerning the communications with the planet Jupiter-”

“I have them,” replied Birnam, dryly, “and so has the Empire government at Washington. That won’t do, commissioner. It’s the same cud that’s been chewed by Earth officials for the last year, and it’s gotten us nowhere. I want you to come to Ether Station with me.”

The Ganymedan had risen from his chair, and he glowered down upon Orloff from his six and a half feet of height.

Orloff flushed, “ Are you ordering me?”

“In a way, yes. I tell you there is no time. If you intend acting, you must act quickly or not at all.” Birnam paused, then added, “You don’t mind walking, I hope. Power vehicles aren’t allowed to approach Ether Station, ordinarily, and I can use the walk to explain a few of the facts. It’s only two miles off.”

“I’ll walk,” was the brusque reply.

The trip upward to subground level was made in silence, which was broken by Orloff when they stepped into the dimly lit anteroom.

“It’s chilly here.”

“I know. It’s difficult to keep the temperature up to norm this near the surface. But it will be colder outside. Here!”

Birnam had kicked open a closet door and was indicating the garments suspended from the ceiling. “Put them on. You’ll need them.”

Orloff fingered them doubtfully, “Are they heavy enough?”

Birnam was pouring into his own costume as he spoke. “They’re electrically heated. You’ll find them plenty warm. That’s it! Tuck the trouser legs inside the boots and lace them tight.”

He turned then and, with a grunt, brought out a double compressed-gas cylinder from its rack in one corner of the closet. He glanced at the dial reading; and then turned the stopcock. There was a thin wheeze of escaping gas, at which Birnam sniffed with satisfaction.

“Do you know how to work one of these?” he asked, as he screwed onto the jet a flexible tube of metal mesh, at the other end of which was a curiously curved object of thick, clear glass.

“What is it?”

“Oxygen nosepiece! What there is of Ganymede’s atmosphere is argon and nitrogen, just about half and half. It isn’t particularly breathable.” He heaved the double cylinder into position, and tightened it in its harness on Orloff’s back.

Orloff staggered, “It’s heavy. I can’t walk two miles with this.”

“It won’t be heavy out there,” Birnam nodded carelessly upward and lowered the glass nosepiece over Orloff’s head. “Just remember to breathe in through the nose and out through the mouth, and you won’t have any trouble. By the way, did you eat recently?”

“I lunched before I came to your place.”

Birnam sniffed dubiously, “Well, that’s a little awkward.” He drew a small metal container from one of his pockets and tossed it to the commissioner. “put one of those pills in your mouth and keep sucking on it.”

Orloff worked clumsily with gloved fingers and finally managed to get a brown spheriod out of the tin and into his mouth. He followed Birnam up a gently sloped ramp. The blind-alley ending of the corridor slid aside smoothly when they reached it and there was a faint soughing as air slipped out into the thinner atmosphere of Ganymede.

Birnam caught the other’s elbow, and fairly dragged him out.

“I’ve turned your air tank on full,” he shouted. “Breathe deeply and keep sucking at that pill.”

Gravity had flicked to Ganymedan normality as they crossed the threshold and Orloff after one horrible moment of apparent levitation, felt his stomach turn a somersault and explode.

He gagged, and fumbled the pill with his tongue in a desperate attempt at self-control. The oxygen-rich mixture from the air cylinders burned his throat, and gradually Ganymede steadied. His stomach shuddered back into place. He tried walking.

“Take it easy, now,” came Birnam’s soothing voice. “It gets you that way the first few times you change gravity fields quickly. Walk slowly and get the rhythm, or you’ll take a tumble. That’s right, you’re getting it “

The ground seemed resilient Orloff could feel the pressure of the other’s arm holding him down at each step to keep him from springing too high. Steps were longer now-and flatter, as he got the rhythm. Birnam continued speaking, a voice a little muffled from behind the leather flap drawn loosely across mouth and chin.

“Each to his own world,” he grinned. “I visited Earth a few years back, with my wife, and had a hell of a time. I couldn’t get myself to learn to walk on a planet’s surface without a nosepiece. I kept choking-I really did. The sunlight was too bright and the sky was too blue and the grass was too green. And the buildings were right out on the surface. I’ll never forget the time they tried to get me to sleep in a room twenty stories up in the air, with the window wide open and the moon shining in.

“I went back on the first spaceship going my way and don’t ever intend returning. How are you feeling now?”

“Fine! Splendid!” Now that the first discomfort had gone. Orloff found the low gravity exhilarating. He looked about him. The broken, hilly ground, bathed in a drenching yellow light, was covered with ground-hugging broad-leaved shrubs that showed the orderly arrangement of careful cultivation.

Birnam answered the unspoken question, “There’s enough carbon dioxide in the air to keep the plants alive, and they all have the power to fix atmospheric nitrogen. That’s what makes agriculture Ganymede’s greatest industry. Those plants are worth their weight in gold as fertilizers back on Earth and worth double or triple that as sources for half a hundred alkaloids that can’t be gotten anywhere else in the System. And, of course, everyone knows that Ganymedan green-leaf has Terrestrial tobacco beat hollow.”

There was the drone of a strato-rocket overhead, shrill in the thin atmosphere, and Orloff looked up.

He stopped-stopped dead-and forgot to breathe!

It was his first glimpse of Jupiter in the sky.

It is one thing to see Jupiter, coldly harsh, against the ebon backdrop of space. At six hundred thousand miles, it is majestic enough. But on Ganymede, barely topping the hills, its outlines softened and ever so faintly hazed by the thin atmosphere; shining mellowly from a purple sky in which only a few fugitive stars dare compete with the Jovian giant-it can be described by no conceivable combination of words.

At first, Orloff absorbed the gibbous disk in silence. It was gigantic, thirty-two times the apparent diameter of the Sun as seen from Earth. Its stripes stood out in faint washes of color against the yellowness beneath and the Great Red Spot was an oval splotch of orange near the western rim.

And finally Orloff murmured weakly, “It’s beautiful!”

Leo Birnam stared, too, but there was no awe in his eyes. There was the mechanical weariness of viewing a sight often seen, and besides that an expression of sick revulsion. The chin flap hid his twitching smile, but his grasp upon Orloff’s arm left bruises through the tough fabric of the surface suit.

He said slowly, “It’s the most horrible sight in the System.”

Orloff turned reluctant attention to his companion, “Eh?” Then, disagreeably, “Oh, yes, those mysterious Jovians.”

At that, the Ganymedan turned away angrily and broke into swinging, fifteen-foot strides. Orloff followed clumsily after, keeping his balance with difficulty.

“Here, now,” he gasped.

But Birnam wasn’t listening. He was speaking coldly, bitterly, “You on Earth can afford to ignore Jupiter. You know nothing of it. It’s a little pin prick in your sky, a little flyspeck. You don’t live here on Ganymede, watching that damned colossus gloating over you. Up and over fifteen hours-hiding God knows what on its surface. Hiding something that’s waiting and waiting and trying to get out. Like a giant bomb just waiting to explode!”

“Nonsense!” Orloff managed to jerk out. “Will you slow down. I can’t keep up.”

Birnam cut his strides in half and said tensely, “Everyone knows that Jupiter is inhabited, but practically no one ever stops to realize what that means. I tell you that those Jovians, whatever they are, are born to the purple. They are the natural rulers of the Solar System.”

“Pure hysteria,” muttered Orloff. “The Empire government has been hearing nothing else from your Dominion for a year.”

“And you’ve shrugged it oil. Well, listen! Jupiter, discounting the thickness of its colossal atmosphere, is eighty thousand miles in diameter. That means it possesses a surface one hundred times that of Earth, and more than fifty times that of the entire Terrestrial Empire. Its population, its resources. its war potential are in proportion.”

“Mere numbers-“

“I know what you mean,” Birnam drove on, passionately. “Wars are not fought with numbers, but with science and with organization. The Jovians have both. In the quarter of a century during which we have communicated with them, we’ve learned a bit. They have atomic power and they have radio. And in a world of ammonia under great pressure-a world in other words in which almost none of the metals can exist as metals for any length of time because of the tendency to form soluble ammonia complexes-they have managed to build up a complicated civilization. That means they have had to work through plastics, glasses, silicates and synthetic building materials of one sort or another. That means a chemistry developed just as far as ours is, and r d put odds on its having developed further.”

Orloff waited long before answering. And then, “But how certain are you people about the Jovians’ last message. We on Earth are inclined to doubt that the Jovians can possibly be as unreasonably belligerent as they have been described.”

The Ganymedan laughed shortly. “They broke oil all communication after that last message, didn’t they? That doesn’t sound friendly on their part, does it? I assure you that we’ve all but stood on our ears trying to contact them.

“Here now. don’t talk. Let me explain something to you. For twenty-five years here on Ganymede a little group of men have worked their hearts out trying to make sense out of a static-ridden, gravity-distorted set of variable clicks in our radio apparatus. for those clicks were our only connection with living intelligence upon Jupiter. It was a job for a world of scientists, but we never had more than two dozen at the Station at anyone time. I was one of them from the very beginning and, as a philologist, did my part in helping construct and interpret the code that developed between ourselves and the Jovians, so that you can see I am speaking from the real inside.

“It was a devil of a heartbreaking job. It was five years before we got past the elementary clicks of arithmetic: three and four are seven; the square root of twenty-five is five; factorial six is seven hundred and twenty. After that, months sometimes passed before we could work out and check by further communication a single new fragment of thought.

“But-and this is the point-by the time the Jovians broke off relations, we understood them thoroughly. There was no more chance of a mistake in comprehension, than there was of Ganymede suddenly cutting loose from Jupiter. And their last message was a threat, and a promise of destruction. Oh, there’s no doubt-there’s no doubt!”

They were walking through a shallow pass in which the yellow Jupiter light gave way to a clammy darkness.

Orloff was disturbed. He had never had the case presented to him in this fashion before. He said, “But the reason, man. What reason did we give them-”

“No reason! It was simply this: the Jovians had finally discovered from our messages-just where and how I don’t know-that we were not Jovians.”

“Well, of course.”

“It wasn’t ‘of course’ to them. In their experiences they had never come across intelligences that were not Jovian. Why should they make an exception in favor of those from outer space?”

“You say they were scientists.” Orloff’s voice had assumed a wary frigidity. ‘Wouldn’t they realize that alien environments would breed alien life? We knew it. We never thought the Jovians were Earthmen though we had never met intelligences other than those of Earth.”

They were back in the drenching wash of Jupiter light again, and a spreading region of ice glimmered amberly in a depression to the right.

Birnam answered, “I said they were chemists and physicists-but I never said they were astronomers. Jupiter, my dear commissioner, has an atmosphere three thousand miles or more thick, and those miles of gas block off everything but the Sun and the four largest of Jupiter’s moons. The Jovians know nothing of alien environments.”

Orloff considered. “And so they decided we were aliens. What next?”

“If we weren’t Jovians, then, in their eyes, we weren’t people. It turned out that a non-Jovian was ‘vermin’ by definition.”

Orloff’s automatic protest was cut off short by Birnam, ‘In their eyes, I said, vermin we were; and vermin we are. Moreover, we were vermin with the peculiar audacity of having dared to attempt to treat with Jovians-with human beings. Their last message was this, word for word-’Jovians are the masters. There is no room for vermin. We will destroy you immediately.’ I doubt if there was any animosity in that message-simply a cold statement of fact. But they meant it. “

“But why?”

“Why did man exterminate the housefly?”

“Come, sir. You’re not seriously presenting an analogy of that nature.”

“Why not, since it is certain that the Jovian considers us a sort of housefly-an insufferable type of housefly that dares aspire to intelligence.”

Orloff made a last attempt. “But truly, Mr. Secretary, it seems impossible for intelligent life to adopt such an attitude.”

“Do you possess much of an acquaintance with any other type of intelligent life than our own?” came with immediate sarcasm. “Do you feel competent to pass on Jovian psychology? Do you know just how alien Jovians must be physically? Just think of their world with its gravity at two and one half Earth normal; with its ammonia oceans-oceans that you might throw all Earth into without raising a respectable splash; with its three-thousand-mile atmosphere, dragged down by the colossal gravity into densities and pressures in its surface layers that make the sea bottoms of Earth resemble a medium-thick vacuum. I tell you we’ve tried to figure out what sort of life could exist under those conditions and we’ve given up. It’s thoroughly incomprehensible. Do you expect their mentality, then, to be any more understandable? Never! Accept it as it is. They intend destroying us. That’s all we know and all we need to know.”

He lifted a gloved hand as he finished and one finger pointed. “There’s Ether Station just ahead.”

Orloff’s head swiveled, “Underground?”

“Certainly! All except the Observatory. That’s that steel and quartz dome to the right-the small one.”

They had stopped before two large boulders that flanked an earthy embankment, and from behind either one a nosepieced, suited soldier in Ganymedan orange, with blasters ready, advanced upon the two.

Birnam lifted his face into Jupiter’s light and the soldiers saluted and stepped aside. A short word was barked into the wrist mike of one of them and the camouflaged opening between the boulders fell into two and Orloff followed the secretary into the yawning air lock. The Earthman caught one last glimpse of sprawling Jupiter before the closing door cut off the surface altogether.

It was no longer beautiful!

Orloff did not quite feel normal again until he had seated himself in the overstuffed chair in Dr. Edward Prosser’s private office. With a sigh of utter relaxation, he propped his monocle under his eyebrow.

“Would Dr. Prosser mind if I smoked in here, while we’re waiting?” he asked.

“Go ahead, “ replied Birnam, carelessly. “My own idea would be to drag Prosser away from whatever he’s fooling with just now, but he’s a queer chap. We’ll get more out of him if we wait until he’s ready for us.” He withdrew a gnarled stick of greenish tobacco from its case, and bit off the edge viciously.

Orloff smiled through the smoke of his own cigarette, “I don’t mind waiting. I still have something to say. You see, for the moment, Mr. Secretary, you gave me the jitters, but, after all, granted that the Jovians intend mischief once they get at us, it remains a fact, “ and here he spaced his words emphatically, “that they can’t get at us.”

“A bomb without a fuse, hey?”

“Exactly! It’s simplicity itself, and not really worth discussing. You will admit, I suppose, that under no circumstances call the Jovians get away from Jupiter.”

“Under no circumstances?” There was a quizzical tinge in Birnam’s slow reply. “Shall we analyze that?”

He stared hard at the purple flame of his cigar. “It’s an old trite saying that the Jovians can’t leave Jupiter. The fact has been highly publicized by the sensation mongers of Earth and Ganymede and a great deal of sentiment has been driveled about the unfortunate intelligences who are irrevocably surface-bound, and must forever stare into the Universe without, watching, watching, wondering, and never attaining.

“But, after all, what holds the Jovians to their planet? Two factors! That’s all! The first is the immense gravity field of the planet. Two and a half Earth normal.”

Orloff nodded. “Pretty bad!” he agreed.

“And Jupiter’s gravitational potential is even worse, for because of its greater diameter the intensity of its gravitational field decreases with distance only one tenth as rapidly as Earth’s field does. It’s a terrible problem-but it’ s been solved.”

“Hey?” Orloff straightened.

“They’ve got atomic power. Gravity-even Jupiter’s-means nothing once you’ve put unstable atomic nuclei to work for you.”

Orloff crushed his cigarette to extinction with a nervous gesture. “But their atmosphere-”

“Yes, that’s what’s stopping them. They’re living at the bottom of a three-thousand-mile-deep ocean of it, where the hydrogen of which it is composed is collapsed by sheer pressure to something approaching the density of solid hydrogen. It stays a gas because the temperature of Jupiter is above the critical point of hydrogen, but you just try to figure out the pressure that can make hydrogen gas half as heavy as water. You’ll be surprised at the number of zeros you’ll have to put down.

“No spaceship of metal or of any kind of matter can stand that pressure. No Terrestrial spaceship can land on Jupiter without smashing like an eggshell, and no Jovian spaceship can leave Jupiter without exploding like a soap bubble. That problem has not yet been solved, but it will be some day. Maybe tomorrow, maybe not for a hundred years, or a thousand. We don’t know, but when it is solved, the Jovians will be on top of us. And it can be solved in a specific way.”

“I don’t see how-“

“Force fields! We’ve got them now, you know.”

“Force fields!” Orloff seemed genuinely astonished, and he chewed the word over and over to himself for a few moments. “They’re used as meteor shields for ships in the asteroid zone-but I don’t see the application to the Jovian problem.”

“The ordinary force field,” explained Birnam, “is a feeble rarefied zone of energy extending over a hundred miles or more outside the ship. It’ll stop meteors but it’s just so much empty ether to an object like a gas molecule. But what if you took that same zone of energy and compressed it to a thickness of a tenth of an inch. Molecules would bounce off it like this-ping-g-g-g! And if you used stronger generators, and compressed the field to a hundredth of an inch, molecules would bounce off even when driven by the unthinkable pressure of Jupiter’s atmosphere-and then if you build a ship inside-” He left the sentence dangling.

Orloff was pale. “You’re not saying it can be done?”

“I’ll bet you anything you like that the Jovians are trying to do it. And we’re trying to do it right here at Ether Station.”

The colonial commissioner jerked his chair closer to Birnam and grabbed the Ganymedan’s wrist. “Why can’t we bombard Jupiter with atomic bombs. Give it a thorough going-over, I mean! With her gravity, and her surface area, we can’t miss.”

Birnam smiled faintly, “We’ve thought of that. But atomic bombs would merely tear holes in the atmosphere. And even if you could penetrate, just divide the surface of Jupiter by the area of damage of a single bomb and find how many years we must bombard Jupiter at the rate of a bomb a minute before we begin to do significant damage. Jupiter’s big! Don’t ever forget that!”

His cigar had gone out, but he did not pause to relight. He continued in a low, tense voice. “No, we can’t attack the Jovians as long as they’re on Jupiter. We must wait for them to come out-and once they do, they’re going to have the edge on us in numbers. A terrific, heart-breaking edge-so we’ll just have to have the edge on them in science...

“But,” Orloff broke in, and there was a note of fascinated horror in his voice, “how can we tell in advance what they’ll have?”

“We can’t. We’ve got to scrape up everything we can lay our hands on and hope for the best. But there’s one thing we do know they’ll have, and that’s force fields. They can’t get out without them. And if they have them, we must, too, and that’s the problem we’re trying to solve here. They will not insure us victory, but without them, we will suffer certain defeat. And now you know why we need money-and more than that. We want Earth itself to get to work. It’s got to start a drive for scientific armaments and subordinate everything to that. You seer

Orloff was on his feet. “Birnam, I’m with you-a hundred percent with you. You can count on me back in Washington.”

There was no mistaking his sincerity. Birnam gripped the hand outstretched toward him and wrung it-and at the moment, the door flew open and a little pixie of a man hurtled in.

The newcomer spoke in rapid jerks, and exclusively to Birnam. “Where’d you come from? Been trying to get in touch with you. Secretary said you weren’t in. Then five minutes later you show up on your own. Can’t understand it.” He busied himself furiously at his desk.

Birnam grinned. “If you’ll take time out, doc, you might say hello to Colonial Commissioner Orloff...

Dr. Edward Prosser turned on his toe like a ballet dancer and looked the Earthman up and down twice. “The new un, hey? We getting any money? We ought to. Been working on a shoestring ever since. At that, we might not be needing any. It depends.” He was back at the desk.

Orloff seemed a trifle disconcerted, but Birnam winked impressively, and he contented himself with a glassy stare through the monocle.

Prosser pounced upon a black leather booklet in the recesses of a pigeonhole, threw himself into his swivel chair and wheeled about.

“Glad you came, Birnam,” he said, leafing through the booklet. “Got something to show you. Commissioner Orloff, too.”

“What were you keeping us waiting for?” demanded Birnam. “Where were you?”

“Busy! Busy as a pig! No sleep for three nights.” He looked up, and his small puckered face fairly Hushed with delight. “Everything fell into place of a sudden. Like a jig-saw puzzle. Never saw anything like it. Kept us hopping, I tell you.”

“You’ve gotten the dense force fields you’re after?” asked Orloff in sudden excitement.

Prosser seemed annoyed. “No, not that. Something else. Come on.” He glared at his watch and jumped out of his seat. “We’ve got half an hour. Let’s go.”

An electric-motored flivver waited outside and Prosser spoke excitedly as he sped the purring vehicle down the ramps into the depths of the Station.

“Theory!” he said. “Theory! Damned important, that. You set a technician on a problem. He’ll fool around. Waste lifetimes. Get nowhere. Just putter about at random. A true scientist works with theory. Lets math solve his problems.” He overflowed with self-satisfaction.

The flivver stopped on a dime before a huge double door and Prosser tumbled out, followed by the other two at a more leisurely pace.

“Through here! Through here!” he said. He shoved the door open and led them down the corridor and up a narrow flight of stairs onto a wall-hugging passageway that circled a huge three-level room. Orloff recognized the gleaming quartz-and-steel pipe-sprouting ellipsoid two levels below as an atomic generator.

He adjusted his monocle and watched the scurrying activity below. An earphoned man on a high stool before a control board studded with dials looked up and waved. Prosser waved back and grinned.

Orloff said, “You create your force fields here?”

“That’s right! Ever see one?”

“No.” The commissioner smiled, ruefully. “I don’t even know what one is, except that it can be used as a meteor shield.”

Prosser said, “It’s very simple. Elementary matter. All matter is composed of atoms. Atoms are held together by interatomic forces. Take away atoms. Leave interatomic forces behind. That’s a force field.”

Orloff looked blank, and Birnam chuckled deep in his throat and scratched the back of his ear.

“That explanation reminds me of our Ganymedan method of suspending an egg a mile high in the air. It goes like this. You find a mountain just a mile high and put the egg on top. Then, keeping the egg where it is, you take the mountain away. That’s all.”

The colonial commissioner threw his head back to laugh, and the irascible Dr. Prosser puckered his lips in a pursed symbol of disapproval.

“Come, come. No joke, you know. Force fields most important. Got to be ready for the Jovians when they come:’

A sudden rasping bur from below sent Prosser back from the railing.

“Get behind screen here,” he babbled. “The twenty-millimeter field is going up. Bad radiation.”

The bur muted almost into silence, and the three walked out onto the passageway again. There was no apparent change, but Prosser shoved his hand out over the railing and said, “Feel!”

Orloff extended a cautious finger, gasped, and slapped out with the palm of his hand. It was like pushing against very soft sponge rubber or superresilient steel springs.

Birnam tried, too. “That’s better than anything we’ve done yet, isn’t it?” He explained to Orloff, “ A twenty-millimeter screen is one that can hold an atmosphere of a pressure of twenty millimeters of mercury against a vacuum without appreciable leakage.”

The commissioner nodded, “I see! You’ d need a seven-hundred-sixty-millimeter screen to hold Earth’s atmosphere then.”

“Yes! That would be a unit atmosphere screen. Well, Prosser, is this what got you excited?”

“This twenty-millimeter screen? Of course not. I can go up to two hundred fifty millimeters using the activated vanadium pentasulphide in the praseodymium breakdown. But it’s not necessary. Technician would do it and blow up the place. Scientist checks on theory and goes slow.” He winked. ‘We’re hardening the field now. Watch!”

“Shall we get behind the screen?”

“Not necessary now. Radiation bad only at beginning...

The burring waxed again, but not as loudly as before. Prosser shouted to the man at the control board, and a spreading wave of the hand was the only reply.

Then the control man waved a clenched fist and Prosser cried, “We’ve passed fifty millimeters! Feel the field!”

Orloff extended his hand and poked it curiously. The sponge rubber had hardened! He tried to pinch it between finger and thumb so perfect was the illusion, but here the “rubber.. faded to unresisting air.

Prosser tch-tched impatiently. “No resistance at right angles to force. Elementary mechanics, that is...

The control man was gesturing again. “Past seventy,” explained Prosser. “We’re slowing down now. Critical point is 83.42.”

He hung over the railing and kicked out with his feet at the other two. “Stay away! Dangerous!”

And then he yelled, “Careful! The generator’s bucking!”

The bur had risen to a hoarse rnaximum and the control man worked frantically at his switches. From within the quartz heart of the central atomic generator, the sullen red glow of the bursting atoms had brightened dangerously.

There was a break in the bur, a reverberant roar, and a blast of air that threw Orloff hard against the wall.

Prosser dashed up. There was a cut over his eye. “Hurt? No? Good, good! I was expecting something of the sort. Should have warned you. Let’s go down. Where’s Birnam?”

The tall Ganymedan picked herself up off the floor and brushed at his clothes. “Here I am. What blew up?”

“Nothing blew up. Something buckled. Come on, down we go.” He debbed at his forehead with a handkerchief and led the way downward.

The control man removed his earphones as he approached and got off his stool. He looked tired, and his dirt-smeared face was greasy with perspiration.

“The damn thing started going at 82.8, boss. It almost caught me.”

“It did, did it?” growled Prosser. “Within limits of error, isn’t it? How’s the generator? Hey, Stoddard!”

The technician addressed replied from his station at the generator, “Tube 5 died. It’ll take two days to replace.”

Prosser turned in satisfaction and said, “It worked. Went exactly as presumed. Problem solved, gentlemen. Trouble over. Let’s get back to my office. I want to eat. And then I want to sleep.”

He did not refer to the subject again until once more behind the desk in his office, and then he spoke between huge bites of a liver-and-onion sandwich.

He addressed Birnam, “Remember the work on space strain last June. It Hopped, but we kept at it. Finch got a lead last week and I developed it. Everything fell into place. Slick as goose grease. Never saw anything like it.”

“Go ahead,” said Birnam, calmly. He knew Prosser sufficiently well to avoid showing impatience.

“You saw what happened. When a field tops 83.42 millimeters, it becomes unstable. Space won’t stand the strain. It buckles and the field blows. Boom/”

Birnam’s mouth dropped open and the arms of Orloff’s chair creaked under sudden pressure. Silence for a while, and then Birnam said unsteadily, “You mean force fields stronger than that are impossible?”

“They’re possible. You can create them. But the denser they are, the more unstable they are. If I had turned on the two-hundred-and-fifty-millimeter field, it would have lasted one tenth of a second. Then, blooie! Would have blown up the Station! And myself! Technician would have done it. Scientist is warned by theory. Works carefully, the way I did. No harm done.”

Orloff tucked his monocle into his vest pocket and said tremulously, “But if a force field is the same thing as interatomic forces, why is it that steel has such a strong interatomic binding force without bucking space? There’s a Haw there.”

Prosser eyed him in annoyance. “No Haw. Critical strength depends on number of generators. In steel, each atom is a force-field generator. That means about three hundred billion trillion generators for every ounce of matter. If we could use that many-As it is, one hundred generators would be the practical limit. That only raises the critical point to ninety-seven or thereabout.”

He got to his feet and continued with sudden fervor, “No. Problem’s over, I tell you. Absolutely impossible to create a force field capable of holding Earth’s atmosphere for more than a hundredth of a second. Jovian atmosphere entirely out of question. Cold figures say that; backed by experiment. Space won’t stand it!

“Let the Jovians do their damnedest. They can’t get out! That’s final! That’s final! That’s final!”

Orloff said, “Mr. Secretary, can I send a spacegram anywhere in the Station? I want to tell Earth that I’m returning by the next ship and that the Jovian problem is liquidated-entirely and for good.”

Birnam said nothing, but the relief of his face as he shook hands with the colonial commissioner, transfigured the gaunt homeliness of it unbelievably.

And Dr. Prosser repeated, with a birdlike jerk of his head, “That’s final!”

Hal Tuttle looked up as Captain Everett of the spaceship Transparent, newest ship of the Comet Space Lines, entered his private observation room in the nose of the ship.

The captain said, “ A spacegram has just reached me from the home offices at Tucson. We’re to pick up Colonial Commissioner Orloff at Jovopolis, Ganymede, and take him back to Earth.”

“Good. We haven’t sighted any ships?”

“No, no! We’re way off the regular space lanes. The first the System will know of us will be the landing of the Transparent on Ganymede. It will be the greatest thing in space travel since the first trip to the Moon.” His voice softened suddenly, “What’s wrong, Hal? This is your triumph, after all:’

Hal Tuttle looked up and out into the blackness of space. “I suppose it is. Ten years of work, Sam. I lost an arm and an eye in that first explosion, but I don’t regret them. It’s the reaction that’s got me. The problem is solved; my lifework is finished. “

“So is every steel-hulled ship in the System.”

Tuttle smiled. “Yes. It’s hard to realize, isn’t it?” He gestured outward. “You see the stars? Part of the time, there’s nothing between them and us. It gives me a queazy feeling.” His voice brooded, “Nine years I worked for nothing. I wasn’t a theoretician, and never really knew where I was headed-just tried everything. I tried a little too hard and space wouldn’t stand it. I paid an arm and an eye and started fresh.”

Captain Everett balled his fist and pounded the hull-the hull through which the stars shone unobstructed. There was the muffled thud of flesh striking an unyielding surface-but no response whatever from the invisible wall.

Tuttle nodded, “It’s solid enough, now-though it flicks on and off eight hundred thousand times a second. I got the idea from the stroboscopic lamp. You know them-they flash on and off so rapidly that it gives all the impression of steady illumination.

“And so it is with the hull. It’s not on long enough to buckle space. It’s not off long enough to allow appreciable leakage of the atmosphere. And the net effect is a strength better than steel.”

He paused and added slowly, “And there’s no telling how far we can go. Speed up the intermission effect. Have the field flick off and on millions of times per second-billions of times. You can get fields strong enough to hold an atomic explosion. My lifework!”

Captain Everett pounded the other’s shoulder. “Snap out of it, man. Think of the landing on Ganymede. The devil! It will be great publicity. Think of Orloff’s face, for instance, when he finds he is to be the first passenger in history ever to travel in a spaceship with a force-field hull. How do you suppose he’ll feel?”

Hal Tuttle shrugged. “I imagine he’ll be rather pleased.”