

# Space Travel

FDC

4-75

TODAY'S CHALLENGE:  
SATELLITES TO A  
**SPACE  
STATION**

JULY 1958 - 35c



# "I call it a bad day if I don't make \$25 before noon"

(This chair alone brought \$4.50 with twenty-five minutes work and 32¢ in cleaning materials.)

"Just a few months ago I made the big move. I gave up my job and started spending all my time in the little business I had been running on the side. It wasn't an easy decision, but, now I'm tickled to death I made it. Not just because I'm my own boss or because I have an excellent chance of making over \$10,000 this year. It goes deeper than that.

"You see, this idea has caught on like wildfire in my town. Not a day goes by without my phone ringing with women calling for appointments. The beauty of it is that once a woman becomes my customer, she calls back year after year. Not only that, she tells her friends, too, and they call me. Before I know it I'm swamped with work. (And at \$7.50 an hour net profit it doesn't take long before my bank account is really mushrooming.)

"Funny thing, but back last year, before I started, I never realized the money there was in this business waiting for someone to come along and collect it. Just think: every house in town has furniture and most have rugs or carpeting. I concentrate on just the better homes and have more work than I can handle. You know why? Because women are fussy about their furnishings. Can't stand to see them dirty. That's why they call me over every year.

"The average job is worth \$25.00 to me and takes a little over 2 hours. Out of this, after paying for materials, advertising and other expenses I net about \$15.00 clear profit. This means I need just 3 jobs a day to clear \$11,250.00 in a year. Frankly, since this will be my first full-time year I'll be glad to hit the \$10,000 mark. But after that this business should grow larger each year until I have to hire men to help me handle the business.

## Personally Trained by Another Dealer

"Believe me there's nothing magic about it. I didn't know a thing about cleaning and mothproofing before I became a Duraclean dealer. But after my application was accepted I was trained right here in town by a successful dealer from another city. I was astonished by the short time it took me to become an expert. Actually, much of the credit must go to the Duraclean process, which is so safe it has earned the Parents' Magazine Seal.

"The portable machine you see is just one of the electrical machines I use. It manufactures a light aerated foam with a peculiar action chemists call 'peptizing'. It means that instead of being scrubbed deep into the fabric, dirt is gently ABSORBED by the foam, leaving the fabric clean all the way down. Women can't believe their eyes when they see how it works. Colors appear bright again, and rug pile un mats and rises like new. I don't have to soak rugs or upholstery to get them clean, which ends the problem of shrinkage, and means the furnishings can be used again the very same day. This alone has brought me a lot of customers.

"As a Duraclean dealer I make money with four other services, too: **Duraproof** . . . which makes furnishings immune to moth and carpet beetle damage (it's backed by a six year warranty). **Durashield**, a brand new dirt-delaying treatment. It coats fabrics with an invisible film that keeps dirt out. **Duraguard**, another new service, flameproofs draperies, upholstery and carpets to reduce charring

by  
**Harold  
Holmes**



and the tendency of fires to flame up. And **Spotcraft**, which consists of special chemical products for removing stubborn spots and stains. On jobs where I perform all five services, I multiply profits!

"One of the nicest things about being a Duraclean dealer is that I get continuous help from Duraclean Headquarters. My services are nationally advertised in famous magazines like McCall's, House Beautiful and many others. I also get a complete advertising kit prepared by experts. (There's even a musical commercial!) I get a monthly magazine full of methods to build business and I can meet with other dealers at Duraclean conventions. I'm also backed by insurance. In fact there are over 25 regular services I get under their unique System.

## No Shop Needed

"Maybe you too would like to break away from your job and make a fresh start in a business of your own. Do you need a shop? Certainly not. I operate from home. Need a lot of money to start? Not at all. Duraclean finances reliable men, after a moderate down payment, and furnishes enough supplies to return your TOTAL investment.

"You get everything you need: equipment, supplies, advertising matter, personal training, and regular help from Headquarters. To get all the details, fill out the coupon. There's no obligation and you can decide for yourself. I'll say one thing: if you DO become a Duraclean dealer, you'll be glad the rest of your life that you took time today to write."

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Desk 8-Y36, 839 Waukegan Avenue, Deerfield, Ill.

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# Space Travel

★ DENOTES SPECIAL  
FEATURE ARTICLE

JULY 1958

## FACT & FICTION

- ★ **TODAY'S CHALLENGE—SPACE STATION** 6  
Special science feature by Henry Bott, Research Engineer
- ★ **SURVIVAL PROBLEMS FACING—MAN IN SPACE** 18  
Special science feature by Guenther Schmidt, Ph.D.
- PLANET OF EXILE** 30  
Interplanetary science fiction novel by Edmond Hamilton
- BLIZZARD-BRAIN** 86  
Science fiction short story by Darius John Granger
- THE ULTIMATE VICE** 100  
Science fiction short story by A. Bertram Chandler
- TO PLEASE THE MASTER** 110  
Science fiction short story by Margaret St. Clair

## FEATURES

- THE EDITORIAL** ..... 4
- MAGNETISM** ..... 28
- ROBOT TRANSLATORS** ..... 99
- REMAKING THE EARTH** ..... 116
- SCIENTIFILM MARQUEE** ..... 118
- THE COSMIC PEN CLUB** ..... 123

Front cover painting by Malcolm Smith, depicting coming Space Station

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# The Editorial

**Y**ou're reading a magazine which we hope will become very important to you. If you believe that the destiny of man is to venture beyond the puny confines of this planet, it will be important. If you believe that the dawning space age will affect *you* during your lifetime, it will also be important. Even if your interest is only a passive one from the standpoint of entertainment, it will certainly be important.

**W**hat better title to give a magazine dedicated to the space age, than SPACE TRAVEL . . . Each issue of SPACE TRAVEL will present timely articles to keep you abreast of technological developments and research. Each issue will also present entertaining stories of the future—the very near future too, we predict!—to take you on adventures into outer space. Stories that not only *might* happen—but undoubtedly will as we delve into the vast unknown areas of the void we fondly call the “sky.”

**T**he concept of SPACE TRAVEL therefore will be educational as well as entertaining. We will present articles by experts—extrapolating on current developments in science. We will also give you the best stories by the best authors. (And for a chuckle or two we'll give you science fiction cartoons.) There will also be departments for read-

er interest and participation. The departments will be carry overs from IMAGINATIVE TALES, which we have revamped into this new magazine, SPACE TRAVEL. We're sure all our old readers will like the improvement in title and concept, and for new readers we welcome you into the most fascinating era of Earth's history.

**W**ith satellites already circling our globe the next big step toward interplanetary travel will be the construction of a space station. With a space station comes the question of man's survival in the void. We present two feature science articles this issue covering both subjects. Our cover depicts a forthcoming space station. Scientists generally agree that a space station will be wheel-shaped, and Malcolm Smith, a science fiction artist who is expert in his work, has utilized what is known with a few innovations of his own. The result is quite effective, we're sure you'll agree.

**L**et us hear from you. We want to include a letter column at the earliest moment so don't hold back. If you have any ideas to discuss, by all means write us. As in the case of our companion magazine, IMAGINATION, this is your magazine. So enjoy SPACE TRAVEL with the confidence that one day soon you'll be doing it!.....*wllh*

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## SPECIAL SCIENCE FEATURE

### Today's Challenge: From Satellites to a

# SPACE STATION

by

*Henry Bott*

Research Engineer

**T**HE SKY HAS NOT changed greatly over the few thousand years that men have observed it. It has not altered much until this past year. In that year men looked into the sky with mingled awe and fear; for the first time in their history they were seeing something which had not been there before, which was man-made, and which, for better or for worse, was to alter their role in the universe. Like the discovery of fire, agriculture, the wheel, the steam engine, and atomic energy—satellites are the precursors of men into space.

We have previously discussed the fantastic power of the gravitational chain which binds us to this planet and the equally astonishing power

of the rocket engines which will liberate us. This article proposes to consider the first faltering but positive uses which will be made of the rocket to construct a stepping stone from which astronauts will go to the Moon, the planets of the Solar System and ultimately—the stars.

The first question is: "What is a satellite? To what in our experience does a satellite conform?"

Hitherto a satellite has meant, "a planetary body which orbits around another planetary body, the Moon around the Earth, the Earth around the Sun." October 4, 1957 changed that however. It is likely that to most of us, the word "satellite" will stand exclusively for an artificial object designed to circle



Figure 1

Scientists agree first Space Station will be "wheel-shaped" as above.

the Earth and which will be thrown into that position by rocket motors.

In principle the establishment of a satellite is simple. The satellite, whether it weighs ten or ten thou-

sand pounds, is mounted in the nose of a rocket. The rocket carries it to the desired altitude. At that altitude the rocket tips into a tangential position with respect to

a circle of the radius of its height, accelerates the satellite to a pre-ordained velocity and then releases it to course around the Earth while it, the rocket, returns to Earth.

"In principle" the words had it. Actually this is an exceedingly difficult thing to do. Nevertheless it has been done.

We shall assume only circular orbits in this article although they are the most difficult to establish. They also are the most desirable, and as we become more sophisticated in the techniques of rocketry, they will be the orbits actually used.

It has been established that for any altitude above the Earth's surface outside the Earth's atmosphere there is a specific tangential velocity which a body must have to remain in a circular orbit precisely as a stone swung at the end of a string remains in a circular orbit about the swinger provided he sustains its motion at a certain and requisite velocity.

Figure II shows the relationship between velocity and altitude above the Earth's surface for circular orbits. It is merely a plot of  $v$  against  $r$  from the formula previously derived, which equates gravitational force to centrifugal force.

The mechanics of orbits in gravitational fields have been considered. All we require to know is the rela-

tionship described in Figure II. The weight of the satellite which can be placed in a circular orbit is dependent upon the size and power of the step-rockets which launch it. Given these instruments, satellites of any physical size can be constructed, piece by piece if necessary. We shall see later that an inhabited satellite undoubtedly will be built in this manner. It is much less costly in terms of rockets and fuel.

The satellites already established are modest affairs compared with what ultimately will be set up, although Sputnik II was astonishingly sophisticated for the time in which it kept its canine passenger alive.

The main reason for establishing a satellite of any magnitude—and manned—is to use it as a central core for the construction of a space station which in turn will be used as a jumping-off point for rockets to the Moon and to the planets. But before we consider the space station, let us examine the sequence of events which will lead to it.

The series of satellites now existing in their temporary orbits about the Earth have—and will continue—sent invaluable information on the shape of the Earth, the variation of air density with altitude, the intensity of cosmic radiation, the density of meteoric dust, and innumerable vital other intelli-



height above Earth's surface	tangential velocity re- quired for circular orbit
200 miles	16700 miles/hour
4200 "	11850 "
8200 "	9600 "
12200 "	8450 "
16200 "	7500 "
26200 "	6080 "
46200 "	4750 "

This table is computed from the formula

$$v_{\text{tangential}} = \sqrt{g \frac{R^2}{r}}$$

which is found by equating the centrifugal force on a satellite with the gravitational force on it.

Figure 2

gences.

It requires very little more power and skill to send up a satellite equipped with a television transmitter, powered by solar cells, into a permanent and more nearly circular orbit than were the original sputniks. Satellites of this type will be sent up to various altitudes in-

cluding undoubtedly the altitude of 22,000 miles above the Earth. The characteristic of this altitude is that it provides a twenty-four hour orbit, coinciding with the period of the Earth so that the satellite would remain at one point fixed with respect to a point on the Earth. To an observer on the Earth

it would be fixed in the sky. Arthur Clarke points out that a chain of such satellites could serve as television and radio relays capable of blanketing the Earth—and only a few would be needed.

Remember that we are still speaking of *un-manned* satellites.

The military aspects of such satellites are obvious, although it seems hardly necessary to point out that the capability of establishing such a satellite automatically includes the capability using un-stoppable intercontinental ballistic missiles. In the view of many observers, military considerations of satellites are not worth discussing simply because the present state of rocketry, aircraft and hydrogen bombs have already made the concept of war as an instrument of national policy absurd—such a thing as a war of the World War II character can mean only the destruction of most living things on Earth—victor and vanquished. Nevertheless, we can think of rockets and satellites in terms of “massive deterrents” if we like, although it is hard to imagine the irrationality of war at all in an age of current weapons.

Un-manned satellites in permanent orbits, equipped with communicating devices will be then the nuclei for the establishment of the space station. Prior to this there

will be short-lived flights of human beings in semi-permanent satellites, perhaps for days or weeks. The animal-carrying satellites will have already supplied all the necessary information about the environment that must be sustained in order to accommodate other living things.

THE STATE of rocketry is progressing so rapidly that by the time this article appears in print, many of the aspects of satellites we have been discussing, likely will be established fact.

A project longer of attainment but just as certain, is the space station. This conception which has a history as old as rocketry, is the most important idea of all, after the rocket itself. The reason for its importance is that it breaks down the jump into space into steps. Great stress is laid on the fact that to shoot a rocket to the Moon or to Mars, even a multi-step rocket, is an incredibly difficult undertaking because the gravitational chain is so powerful. The space station breaks this chain.

It will be remembered that gravitational force falls off as the square of the distance. Imagine a satellite set into an orbit at ten times the radius of the Earth. With respect to the Earth's gravitational field, gravity has one one-hundredth its value here of its value at the sur-

face of the Earth. To project an object—say a space-ship—into escape velocity to the Moon or to another planet—say Mars—requires only a trivial additional velocity because the Earth's gravitational field here is essentially nothing. Of course nothing has been gotten without cost. It still takes enormous energies and velocities to lift objects to the space station. The law of conservation of energy does not permit us to get something for nothing. How then does the space station aid us?

To raise tons and tons of space-ship in one jump is incredibly difficult, but if we break down the space-ship into small packages, raise them one at a time and then assemble them at some central point—the space station—the job is infinitely easier. It is the purpose of the space station to be this rallying point.

Every bit of mass that is put into space, either in an orbit or in escape, must be paid for with fuel—that fact is inescapable.

Doing this piece-meal is many times easier than doing it in one effort. It is precisely the reason for the step-rocket. A single-stage rocket for massive satellite work would be gigantic. A three-step rocket becomes manageable. Similarly a single jump to the Moon is very hard. But a jump to the

Moon in two steps, first from the Earth to an orbiting satellite and then from the satellite to the Moon is a reasonable endeavor.

Let us then consider the establishment of a manned satellite, a space station.

To begin with let us assume that a twenty-four hour satellite (height 22,000 miles) has already been located in orbit. This fixed dot in the sky, undoubtedly lighted, would be the star toward which we would aim our efforts. We can regard this as being located at a suitable height for a space station. Escape velocity for an object from this altitude would be about 2 miles per second, a modest speed considering that escape velocity from the Earth's surface is about 7 miles per second.

This unmanned satellite which will serve as a focal point of the space station effort would be as large as it conveniently could be made since it would eventually be cannibalized for metal and parts as the space station evolved. The object now would be to send up rocket after rocket, the first few manned, to intersect the orbit of the unmanned satellite. Intersection of course is not enough. The ascending rockets must match direction and velocity with the satellite. The technicians sent up with the first rockets would easily be

able to accomplish this operation for the accuracies needed are not insuperable. They could "home" either on the satellite's light or its radio beacon. It is assumed of course that the state of rocketry would enable the ascending rockets to be placed reasonably close to the satellite. Subsequent maneuverings to match velocity and direction would not be difficult.

Every bit of material sent up to this focal point would be used. Except for the one or two ferry rockets that might return to Earth, everything ascending skyward—except the technicians—would be going one way—spacewards.

In the beginning, the construction of a space station would remind one of a cosmic junkyard or a stellar autowrecker's. Once directions and velocities of cargo rockets had been matched with the satellite, the "junkpile" would be a super-satellite.

Naturally everything related to this operation would have been very carefully planned. In principle again this sounds easy and from one point of view, would be. But there would be a myriad of details to be watched. Every bolt and nut, every scrap of wire, every can of food and water would require the expenditure of an enormous amount of fuel. Hence, careful planning.

Everyone has seen innumerable

pictures of this hypothetical space station. Imaginative planners have given it the form of a gigantic bicycle wheel (von Braun) or the shape of a huge umbrella. Opinions for the requirements dictating shape may change with time. There is good reason for considering the shape of a wheel since rotation—and hence artificial gravity—could easily be arranged with this form. Whatever its initial form, it is not hard to imagine its growth by a process of accretion. Since nothing sent up would be thrown away, after a time the space station might look like "nothing on the Earth—or of it."

The materials from which it would be constructed as well as its mechanical structure might strike one, accustomed to conventional engineering practice, as peculiar. Because gravity need not be contended with, materials could be flimsy by Earth standards. Wire, thin sheet metal, impregnated fiber-glass, plastic-film, and materials of the sort which are good in tension but not in compression, would be used. Living quarters might be distended balloons.

The outlines though, of structure of this kind are not dim. We can think of the space station as a large torus, a spacial doughnut, compartmented, delicate in structure, but adequate. A new-comer

to such a place might be struck by the abundance of wire, the use of nets, the ubiquitous antennae. (See figure I)

The purpose of the satellite is to serve as a rallying point, a way station, a depot, a housing project, for men and space-ships on their way to the Moon and eventually to the planets. It would have fuel storage tanks as well as rooms for food. It would have elaborate transmitting and receiving equipment for all radio bands as well as for television. It would eventually house a telescope, (infinitely superior to any on Earth by virtue of its operation in space, not air) and of course in time there would be laboratories of all kinds, for physical, chemical, biological and medical research.

An extravagant development like this would not take place overnight. Rather its growth would be over a course of years. Undoubtedly more than one such space station would be erected.

Remembering that each kilogram of mass in the satellite represents thousands of kilograms of chemical fuel supplied by Earth, it is not hard to realize what a costly undertaking this would be. But it will be done whatever the cost.

All of this activity is predicted, as was the story of the rocket, on the use of chemical fuels. But

technology has a way of coming up with turning points—I'm thinking of developments in atomic energy and hydrogen fusion—which might ease the costs considerably.

With the exception of the personnel of the space station and the ferry rockets, we think of the traffic between the Earth and the space station as one-way, at least until men intend to bring with them samples from the Moon and planets.

**L**ET US LOOK a little more closely into the basic needs of the space station. First, there is the matter of food, oxygen, and water. Arthur C. Clarke has pointed out that for a crew of twenty-four men, for a period of one year, these three vital requirements would total little more than seventy tons, a quite reasonable figure. The techniques provided by the various "space-medicine" groups assure us that men could live comfortably in a "closed-system" given these supplies. Absorption of carbon dioxide from the air, provision of oxygen by growing plants or by actual supply from Earth, re-cycling of body wastes—all these things are done today on a laboratory scale or simulated in submarines.

The question of heat of course has so often been discussed that it needs no more than mention here.

A space-ship or space station can be regarded as a superior vacuum bottle—temperature control is a trivial problem.

The other major requirement for a space station is, naturally, power—power for communication, lighting, perhaps subsidiary heating, welding, and in general for the multiplicity of tools and machines which would be in use, from cigarette lighters to machine tools.

We can imagine that this need will be met in any of a number of ways. Until recently, the favored method suggested was the use of a solar mirror of large but flimsy construction which would supply the heat energy by focusing the rays of the Sun on a mercury vapor boiler which in turn would be used to drive a turbine to power an electric generator. Theoretically there is nothing wrong with this idea, but as has been mentioned, advances in science come at such a furious pace, that the idea seems outdated already.

Photo-electric cells of remarkable power and efficiency already are available. By the time the space station is a reality, these direct convertors of sunlight to electric power will have been so well developed that intermediate methods will be unnecessary.

It is also perfectly feasible that a small atomic power package

might then be developed, and of course there is the encouraging possibility that hydrogen fusion will be well out of the laboratory stage.

In a phrase, power for the space station is no problem at all.

A number of potential dangers to space station crews must be considered. Cosmic radiation still remains somewhat of an unknown quantity about which satellites are providing information. It is reasonable to expect that cosmic radiation however will not be an insurmountable obstacle.

The statistical study of meteoric impact has assured us that the danger of a space station being struck by a meteor capable of injuring the "place" or its crew is negligibly remote.

While we do not yet know the full story of "Laika" the inhabitant of Sputnik II, everything that so far has been learned leads us to believe that not only can man endure the state of "free-fall" or weightlessness, but he can operate most effectively in it. Air Force tests have confirmed this also. Our physiology has nothing inherently in it which forbids the human body from functioning without gravity.

A space station set into its orbit cannot expect to remain there permanently. Perturbations caused by

the asymmetry of the Earth and presence of the Moon can be expected to shift the orbit. Corrections for these effects can easily be taken care of with small rocket impulses of the correct thrust, direction and duration. In fact an automatic system for this purpose can be devised.

The purely mechanical problems of matching the velocities and directions of arriving space-ships and ferry rockets to that of the satellite, the transfer of men and goods, and other matters of a similar kind, can be regarded as relatively simple. While it is true that the velocity of the satellite will be measured in thousands of miles per hour, all that really concerns the pilot of the arriving space-craft is the *relative* velocity between his vessel and the satellite. In some respects, because of the large margin for error provided by the very vastness of space, attaching to a satellite is simpler than the case of one jet plane re-fueling another.

Communications between space-ships and satellites, over the distances we are speaking of—thousands, tens of thousands, and hundreds of thousands of miles—is a straight-forward problem in applied radio and radar techniques. The power of ordinary present-day transmitters and the sensitivity of familiar receivers such as are used

in communications on Earth, are adequate for the purpose suggested. The send-reflect of the radar system used to make contact with the Moon is orders of magnitude more difficult.

WITH A MANNED satellite in position, the trip to the Moon and back—and even the Martian and Venusian round trips—assume less frightening proportions. Ferry rockets will carry small quantities of fuel to the satellite, making many trips until the satellite takes on its major characteristic, that of an orbiting “fuel dump”.

Because a ship attached to the satellite already has acquired most of the necessary potential energy to reach escape velocity, a small increase in velocity will then be the ship's escape velocity from the altitude of the satellite. In fact the tangential velocity of the satellite in its circular orbit, multiplied by the square root of two is “escape” velocity for the rocket.

As rocketry and astronautics develop we can also expect to see the satellite or artificial “space island” idea carried out for the Moon and for Venus. Mars has an excellent set of satellites in the form of its moons, Deimos and Phobos, orbiting around the planet at useful distances.

It cannot be emphasized too often that the use of satellites lies in making the "steps" to space, smaller. No matter how you do it, just as much work must be done to pass through a gravitational field in steps as must be done to do so in one jump. But with the limitations Nature has imposed on us in the form of chemical fuels, the step method enables us to supply the necessary energy to do work in this gravitational field in increments which are small enough not to require the construction of rockets, the mass-ratio of which, is almost unrealizable.

Perhaps one of the most useful, if somewhat prosaic aspects of satellite building, is given by their suitability as telescope platforms. Any astronomer would be delighted to eliminate the gigantic column of air through which his telescope must probe. The major limitation on the modern telescope is that the light which reaches it must penetrate the Earth's dense atmospheric blanket, a shimmering haze which plays hob with incident light. In the superb vacuum of space a telescope which would be regarded as modest on Earth, would be as effective as the Palomar giant.

The emphasis given to the telescope located on a satellite comes from understanding that it is our primary tool for discovering ma-

crocosmic knowledge of the Universe. The other end of the scale can be probed in the microcosmic laboratories of the nuclear physicist. But study of the Universe requires that light from the depths of space reach us.

As for the Earth-bound science of meteorology which is so important to each of us, the satellite will enable that subject to become more than the scientific guessing game it is today. Imagine the weatherman who can study the complete pattern of cloud formations on the entire globe spread out before him as he sits in his comfortable niche in the Earth-girdling satellite.

The usefulness of the satellite to the sciences cannot be exaggerated and we are probably just touching the fringes of the effects it will have in those fields.

Studies conducted in satellites may yield important clues to basic questions such as "what is life?" and "what is the nature of the atom?" We can only speculate on these potentialities.

It is not inconceivable that the arts and the humanities will receive fresh impetus from the satellites. Certainly the human spirit has never been released so dramatically. What new art forms can originate with a person whose viewpoint has been so strikingly refurbished through a visit to a satellite?

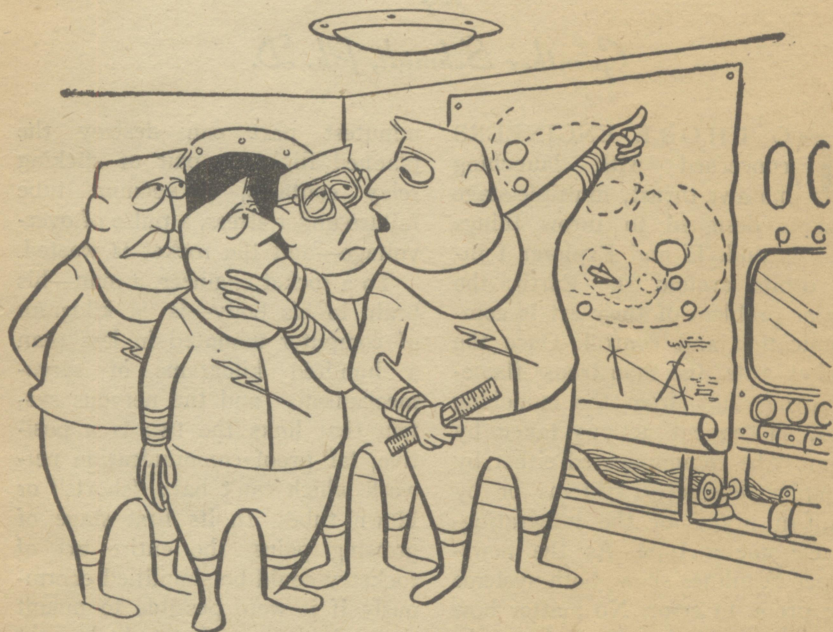


Dare we imagine a second Renaissance?

But no apology is needed for suggesting that satellites must come. They are as inevitable as technological advance itself. What is hard for many persons to realize is that unlike any other adventure of the human spirit, the development of these stepping-stones to interplanetary—and interstellar—

space, is a step forward in human progress. It is comparable only to the greatest landmarks in human history—the discovery of fire, the city, agriculture, Grecian mathematics and philosophy, the Renaissance, the concept of freedom, the Industrial Revolution, or the Ages of Iron and Atoms. . .

Our conquest of space will reshape life on Earth as we know it.



*Seckler*

"Frankly, we're so lost I can't figure out where we came from!"

## SPECIAL SCIENCE FEATURE

**Beyond Earth's atmosphere men will have to be equipped with portable living quarters; the space-suit will be an absolute necessity, providing in effect a terrestrial environment. Here are the problems to be resolved for the —**

# MAN IN SPACE

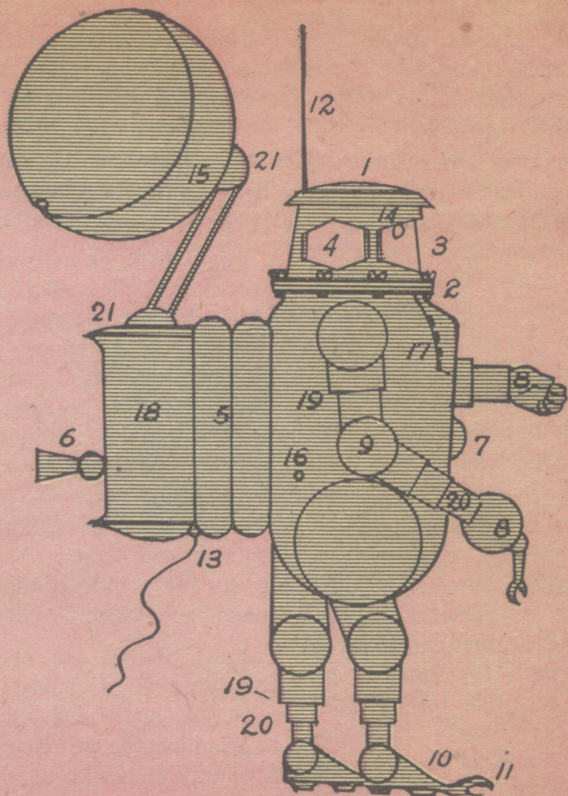
By

*Guenter Schmidt, Ph. D.*

**T**O THOSE ENGINEERS concerned with launching massive-thrust, multiple-stage rockets designed to throw things like Sputnik II and Explorer I into orbits around the Earth, the major problem of their art is communication and control. Once the rocket lifts its monstrous flame-squirting bulk from the launching pad, subsequent actions taken by it must be communicated either by complex telemetry systems or by built-in brains of the integrating-accelerometer type. As the newspaper headlines show, both systems are prone to error. No matter how carefully control systems for rockets are designed, the failure of the

minutest part can destroy the planned flight. A pair of sticking relay contacts, a vacuum tube failure under stress, a pulse of over-voltage—and the rocket is wasted.

To a rocket engineer, a man—his brain in his body—is “a kilogram of computer mounted in less than a hundred kilograms of servomechanisms” and the nervous system that links the two is a positive, fail-proof communication network which can't have “shorts” or blown tubes. In its first stage of growing pains, the entire art of rocketry could be simplified enormously if it were possible to mount a man in every rocket to be launched. But human life is precious, and



Above, sketch of a space-suit, which might as well describe the essentials of any "terrella" (see text). Points listed as follows: (1) Entry to suit through cover; (2) flange joint for securing helmet; (3) front port; (4) side port; (5) cylinders for air, oxygen, fuel for reaction drive; (6) reaction motor; (7) control panel; (8) glove and tool holder; (9) joint; (10) magnetic foot-pieces; (11) grip for suspension with catch operated by feet; (12) short-wave antenna; (13) hooks; (14) rear-view mirror; (15) heat dissipator; (16) jack for telephone connection; (17) breastplate hinges; (18) equipment storage; (19) leg adjustments; (20) rotating joint; (21) rotatable support for heat dissipator.

until the trip can be more than one-way, human beings won't ride rockets. Every sign points toward the nearness of this day.

There are now functioning a half dozen institutes and laboratories for "space medicine" in this country and undoubtedly there are the Russian equivalents. It is the purpose of this article to describe some of the things these laboratories have learned about the fitting of a human being into the most alien of environments that he has ever encountered—space!

Outside of the deep desire of human beings to leave the planet motivated by that strongest of forces, scientific curiosity, (and for the sense of accomplishment, adventure, and aesthetics) there is this forceful need for them to go there simply to guide the celestial steeds that carry them. The engineers' description of human beings as "computers mounted in servos" is apt; the most amazing thing about these "fleshy machines" is that they possess a power of adaptation and adjustment comparable to nothing else.

Machines, rocket guidance systems and telemetry systems, can be programmed to carry out a sequence of events, timed to fractional seconds—but, and this is the crux of it!—they cannot cope with the unexpected. But a man

can and will. No matter what the circumstances, no matter how exotic the atmosphere, no matter how strange the condition, a man can think, sense, respond, act, judge, exercise caution or daring, as the situation demands.

Right now the aero-medicine labs are agreed that men can go into space, be carried there in rockets, can survive in space, can occupy orbiting satellites, can eventually make the trip to the Moon and to the planets. How have they learned this when so far no man has actually gone into space? How do they know he will not meet as yet unknown terrors? What basically are the problems that a man in space faces? Let us consider them.

First, before we even look at the synthesis of environment that must be made for spacemen, let us examine the primary problem of acceleration. In an ascending rocket the spaceman is exposed to accelerations of 1, 2, 3, 4, 5,—possibly, depending on the design—8 and even 9 "g's." On the other hand, when the "Brennschluss" or burnout point of the rocket is reached, the spaceman endures "free-fall" or zero-gravity, i.e., no acceleration, that is, no forces on his body. His physiological reactions to these extremes of external forces have been studied here on Earth.

Already the powerful "g-forces" have been endured by experimenters. The best known is Colonel John Paul Stapp. He rode the furious rocket sled at Holloman Air Base in New Mexico. On one occasion he was accelerated by rocket to a speed of 632 miles per hour and then quickly brought to a dead stop. He took forces of *forty g's* for one-fifth of a second, and he endured forces of ten *g's* (the kind he might expect in riding a conventional rocket) for much longer periods. Similarly piloted aircraft nozed into dives and pulled out abruptly have given their occupants four and five *g* accelerations for many seconds *without serious effects*. And when a man is mounted or situated on a platform or bed at right angles to the accelerative forces, he can endure ten *g's* for long periods without acute discomfort. This horizontal position is desirable because it prevents the blood from being drained from the brain, the cause of "black-out." Without equivocation, it can be said with assurance that so far as rocketry and space-flight is concerned, men can stand the accelerative forces they'll meet. It must also be noted that these forces will exist for very brief times in most rockets, periods ranging from seconds to minutes—that is all.

**L**ESS IS KNOWN about the other end of the scale, the condition of "free-fall" or zero gravity, but some information has been garnered about this condition, which is so hard to simulate on Earth, from very fast aircraft which have gone into arcing flights so that momentarily their centrifugal forces have balanced gravity, and their contents and occupants have been weightless. Subjects, while describing the experiencing as fantastic, have reported no ill effects, no more than the momentary nausea or stomach-rising one expects in a rapidly descending elevator.

Because it has been impossible to make this state of "free-fall" last more than seconds, it is hard to say with assurance that we know what the human body can expect when it is required to exist in that state for days and weeks and months, but physiology implies that there is no inherent weakness in the body that would make free-fall unendurable. A Soviet Aviation journal has reported that Laika, the dog which occupied Sputnik II, betrayed no violent reaction to her week-long existence at zero-*g*, at least in terms of blood pressure, pulse, respiration, food ingestion and other variables which were successfully telemetered to Earth.

But gravity of course is only one

aspect of man's environment. What of a completely simulated natural environment? Let us consider the basic needs of man; these are:

- a. temperature
- b. air
- c. food
- d. water
- e. elemental protection from
  - 1. cosmic rays
  - 2. ultra-violet light
  - 3. meteors

Doctor Hubertus Strughold has coined a very picturesque word to describe the synthetic environment that must accompany man into space; he calls the miniature worlds which must provide those factors listed above, "terrellas," or little Earths. Numerous "terrellas" have actually been built both here and abroad. Recently the "encapsulated" airman, Airman Donald G. Farrell of the Randolph Field Air Base endured a simulated flight to the Moon, locked hermetically in his steel shell for a week—without ill-effects.

These synthetic environments which have been constructed both for submarine and spaceship research, have supplied all the protections and needs noted except protection against meteors—that will wait!

The temperature of a "terrella" must be maintained at around sixty degrees Fahrenheit plus or minus

ten degrees. The human body and mind function best without extremes of temperature, although they will endure such extremes for considerable periods of time if necessary. Providing that temperature range in space is no problem at all. When in sunlight the inhabited capsule rather will have to be cooled; this can be done first by making sure it is reflective and secondly by equipping it with a shaded radiator designed to radiate away excess heat. While the actual control problem might be difficult, it is by no means beyond our capabilities.

When the capsule is shaded by a planet or is in the umbra of a ship or satellite, body heat alone will serve to warm a properly insulated suit. Should additional heat be required, small amounts from any energy source ranging from candle to bulb filament will do.

No, temperature control of a satellite or spaceship or space-suit is not a serious problem.

A man requires approximately two pounds of oxygen per day. In a terella of any size (such as a satellite or large space-ship) this oxygen supply will be gotten eventually from the electrolysis of water, or the reconversion of carbon dioxide, either through chemical processing or from photosynthetic processes. For the space-suit or for

smaller space vessels, oxygen can be supplied by tank, in the form of liquid. Except for small inevitable amounts of wastage, this oxygen will be re-cycled indefinitely.

It is interesting to note that a terrella will not be pressurized to Terran standards of 14.7 lbs/sq. in. pressure. The partial pressure of the oxygen in the air is about three pounds per square inch. Theoretically this would be adequate for the space-ship, but to prevent discomfort from the reduced pressure, the pressure will be maintained somewhat higher, probably in the region of six or eight pounds per square inch. Notice that this reduced pressure further simplifies the structural, the sealing, and the general engineering problems of space structures.

Carbon dioxide and moisture must be removed from the air. There are numerous ways of doing this. For large terrellas probably our familiar friend, radiation refrigeration will condense these gases to solids. For space suits, chemical means will be provided—absorbents and dessicants.

Incidentally it may be pointed out that a small amount, slightly less than two per cent, of carbon dioxide must be maintained to stimulate the breathing centers in the brain.

Men in space will not be doing what on Earth would be called "heavy labor." In fact, the labor will be that essentially of pushing buttons, and space-ship living will certainly be sedentary. As a consequence, it is safe to assume that considerably less than a pound of food per man per day is required. This food must reasonably resemble what we think of as "food." The "capsule" or "pill" type will not do. Bodies require bulk and roughage.

Possibly the only complaint spacemen will have about their food is its lack of variety. But then for psychological reasons meals in space may be quite elaborate. More of this later.

Water requirements vary considerably among humans and of course are determined in part by diet, humidity and other factors. Like air, water will be the product of a cyclic process and its supply will present no insuperable problems.

Protection from ultra-violet light, the brilliant coruscant flaring light of the Sun requires that the spaceman does not stare through an undarkened port. This is no problem.

ONE OF THE GREAT unknowns of space travel of course is the question of the in-

tensity of cosmic radiation. These penetrating radiations so akin to super "hard" x-rays, can have devastating effects on the human body provided their intensity is great enough. From the sparse knowledge so far garnered from the Explorer satellite, the Sputniks and balloon ascensions, it seems as if the concentration of these lethal rays is not great enough to prevent the effort. We have much to learn however and it may be necessary either to limit the exposure time of a man to space-ship life, or it may be necessary to provide much more elaborate shielding than has hitherto been thought necessary. Cosmic radiation remains somewhat of an unknown. Possibly only one thing can be said about it with certainty—it will not prevent space travel!

Meteors are another suspect matter. Information gotten from the satellite program in the International Geophysical Year suggests that minute meteoric density is higher than was thought as evidenced by the erosion of satellite surfaces. But this erosion took place very near the Earth and in a very limited region of space. Statistically it is improbable that large meteors will strike space-ships, satellites or terrellas of any kind. If however they are large enough and the improbable does occur—then we say—

"good-by space-ship." This hazard must be accepted as realistically as we accept the possibility of an airliner crashing. That possibility does not preclude people traveling by air.

For the meteoric dust, a double or if necessary a triple, skin can be provided, a tenuous skin whose only function is to convert the meteor's kinetic energy into volatilizing heat. It is also conceivable that a terrella might be "hulled" or holed by a meteor of pinhead size. It is simple to effect a repair of such a hole. Science-fiction writers have suggested that small balls of sealant material might continually float in the ship's atmosphere and be carried automatically to the puncture's site.

Much has been written about the psychological problems of space flight entirely aside from the purely physical ones of surviving in such an uncongenial environment. These psychological hazards have been grossly exaggerated. For one thing, an often discussed problem, that of men living closely cooped up, subject to an erosion of nerves, is unrealistic. Numerous explorers of hostile Terran areas—the Arctic and Antarctic, for example—have experienced similar situations with no ill-effects at all. Above all, it seems to me that proponents of this view entirely disregard the fantastic



pride of accomplishment that will sustain space-men. Men have endured horrors for comparatively trivial causes. One cannot underestimate human idealism.

If we concede that some psychological hazard does exist, we can point out that the tour of duty can be adjusted to accommodate this. In a similar way, the sexual problem can be relieved.

There are two conditions which one can imagine may involve psychological problems. One is that of the first pilots of space-craft. The sheer inhuman loneliness of the vastness of space will undoubtedly have repercussions on the first few men who make the great venture, although here too, pride will sustain them. The other is that of the long voyage. When men make the huge elliptical swings that carry them to the outer reaches of the Solar System, to Jupiter and Saturn, then isolation and loneliness, even among well-staffed ships, may have some weight. But again we must discount this. Crews will be picked after the most elaborate and searching tests. Pride, *esprit d'corps* — old-fashioned concepts, will make them in a little way, akin to gods.

The environmental capsule, the *terrella*, will not only shroud men in satellites, space-ships and other vehicles. So far as can be de-

termined—and this is quite far indeed—from the standpoint of providing a humanly tolerable environment, the Solar System is notoriously deficient. Our nearest goal, the Moon, is utterly barren, a “wasteland” of mingled beauty and desolation. Obviously for men to live there, a synthetic environment no different in conception than those *terrellas* we have been describing, will have to be furnished. Initially the landing space-ship itself will be the Moon-base *terrella* supplying the needs of its inhabitants. Eventually when space travel becomes more science than art, the permanent Moon-base will be a structure not very different from a manned satellite, except that men will leave it to gather and use the resources—meager though they seem—that the Moon provides.

With an extended mastery of atomic energy, where you have matter you have energy, and certainly the substance of the Moon will provide twin sources of these basics. Campbell's fictional “The Moon is Hell” presented a superb account of how the carbonates and silicates and other components of the lunar crust furnished Lunar explorers with their necessary substances, including oxygen and water. This carefully reasoned account is more potential fact than fiction too.

In a similar fashion men will

accommodate themselves to the planets they land on, constructing Terran environments as they did on the Moon, possibly improved by the conceivable but unproven presence of organic life. Mars and Venus may offer more than we know now. Landings on these planets will come in time.

Mercury may also be explored. The outer planets, Jupiter, Saturn and Uranus—not to mention Pluto—seem fiercely hostile to the erection of a Terran environment not because of their fantastic surface conditions which have been well described, but because of their fierce gravities. But in the long run, technology probably will surmount even these difficulties if the cake is worth the candle.

The satellites of Jupiter and Saturn of course will see human habitations also, even though temporary. And the terrella will make this possible.

**T**HERE IS NO NEED to belabor the point. After the rocket motor unquestionably the single most important development for conquering the Solar System is the evolution of the closed ecology we have called the terrella, a cocoon which enwraps men, surrounds them with warmth, air, light—and life.

One of the most encouraging as-

pects of the development of artificial Terran environments, is the fact that they are here—here and now! In a sense they are simply hardware or plumbing, their intricacies comparatively nothing. Technologies built for other purposes have provided this major tool for the taking. The terrellas already built on Earth could, with the possible exception of their weight, be used directly. Their control systems, their closed cycles of supply, their chemical balances—exist.

We might ask, "what sort of men will explore space?" "Is the jaunty folk-hero of aviation, leather-jacketed and swaggering, an authentic measure of a spaceman?" Science-fiction's image of this potential figure also seems as improbable as that of the comic strips.

We can see now, in the engineers who are initiating the runs of our early rocket-planes, those hybrids of aircraft and spaceships, a more accurate picture of the type of man required for space travel.

The faculties of quick judgment, instantaneous reaction, and "seat-of-the-pants" flying, will be required in the ferry rockets which have to return to Earth, decelerating against atmospheric friction. Bringing the winged hybrids down to Terran landing fields will be reminiscent of landing conventional

aircraft although the speeds may be altogether different. Never-the-less, in this operation we can see a procedure which is basically not different than that of landing aircraft. And for these skills we can look to present aviation. Here the word "pilot" is not a misnomer, simply because "flight"—reaction to atmosphere—is concerned.

But what of space-travel itself? Here there is no analogy with Terran practices save possibly to compare it with the trajectory of an artillery shell. Space flight is a matter of trajectories, not pilotage. And trajectories require foresight and planning, computation and calculation. Before ever the rocket firing button is touched the course must have been mapped.

It is hard to get this concept across to people considering space travel for the first time. That is because basically they are thinking in terms of "flight" a word which really does not apply to space travel. This semantic difficulty undoubtedly will be taken care of in time. One doesn't "fly" to the Moon, nor does one "fly" into an orbit. "Shot" or "projected" or "hurled" are better terms. It will be interesting to see what sort of language is finally evolved for this action, when we have disassociated ourselves from the familiar actions of aviation.

If we can think of any extraordinary skill that a spaceman must possess, it must be an extraordinarily acute ability at three-dimensional spacial visualization. We do not say computational skill because this can and will be taken care of by computers. Spaceships will not flit and scoot about space as aircraft do in the atmosphere. The only regions in which anything akin to "pilotage" will be performed, will be around the space station where low thrusts and low velocities manageable with human skill, will be required.

Interestingly enough, another quality not often associated with space-travel, is caution. Because there is almost no room whatsoever for error or forgetfulness, because once committed to a trajectory which is impossible to alter without fuel, a spaceman will have to think of every imaginable contingency. Nothing must be forgotten, everything must be planned in advance. No move can be made impulsively because the consequences are unalterable. When atomic energy is applied to space travel the margin for error can be widened. But as long as precious chemical fuels must be used, there is no room for error at all. Fuel can come only from one place—the Earth, and that fact will not help a spaceship locked into a Sunward orbit—with-

out fuel.

No frontier has ever stood long against determined intelligent men. Nor will space. The fact that men will have to carry their environment with them is no deterrent. In a les-

ser sense they have done that before. Sheathed in his terrella like a larvae in a cocoon, spacemen will reach the limits of our Solar System.

THE END



## Magnetism



GRAVITATION IS A mysterious force - - if it is a force and not a condition of space and time - - but almost equally strange is the superficially familiar phenomenon of magnetism. Since the ancients first played with the "lode-stone", the bit of iron oxide with magnetic properties and observed its marvelous ability to draw iron and steel to itself without any visible connections - - since that time, magnetism has played a more and more dominant role in physics.

It has been learned that whatever the nature of magnetism, it can be portrayed nicely by the familiar "line of force." Often the layman forgets the extreme utility of the magnetic field. It is far more than a toy. Communications and power - - these basic electrical industries exist on the rubber-band-like magnetic field.

In the last few years, the magnetic amplifier, a marvelous variation of the transformer, has been increasingly valuable to science and industry. Jets, rockets, ships - - whatever uses signals uses magnetic amplifiers.

Essentially a magnetic amplifier is a saturable reactor. It is a trans-

former, the ability of which to "transform" is altered by the application of an input signal. This constitutes an amplifier or relay. The magnetic amplifier can be made to behave very like the familiar electronic amplifier.

The difference of course is that the magnetic amplifier has the ruggedness of a natural Hercules. Shock, interference, disturbances of all kinds are shed by it.

Put in a small signal, be it from a communications microphone or an automatic sensor, and the magnetic amplifier will take the ampere-turns or signal and control a battle-ship turret if need be.

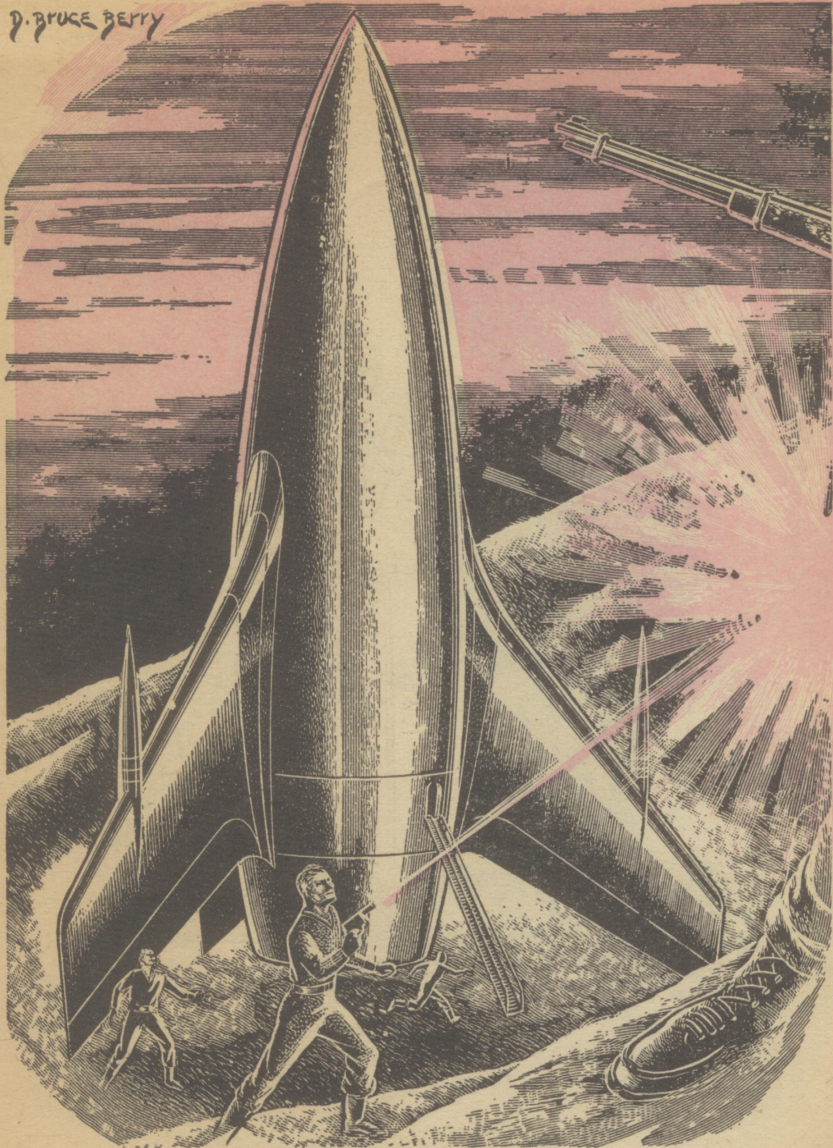
A magnetic amplifier is a sort of intermediate device between the sensitive delicate electronic amplifier and the coarse and rugged relay. It can do some of the things of both, better than either. And with no moving parts, very little heating effect, this product of technology cannot be ignored.

You will find magnetic amplifiers coming into common use and the need arise for them. Modern homes are beginning to require greater power in their amplification needs.



"It still doesn't do anything to me."

D. BRUCE BERRY





# Planet Of Exile

by

Edmond Hamilton

**What had become of the Earth Farrow had known? Gone were the proud cities and teeming millions. He found only desolation — and fear!**

**H**E WAS RUNNING in blind terror through the rain-swept forest, and he did not know where he was.

He did not know *who* he was. Low branches whipped his face, underbrush clawed at his legs, and he was not even aware of it.

There was nothing in the world but fear, and he must run, and run, and—

A crashing blow suddenly felled him. He lay half stunned in wet moss, and the rain dripped solemnly around him.

After a time, he drew himself to a sitting position. He stared at the enormous rough trunk of a towering pine, inches away from him. Then he began to understand. In his blind flight, he had run right into the tree.

He looked around at the forest. Giant oaks and pines and spruces rose all about him, and underneath them was only the gray obscurity of a heavy day, and the whispering of the rain.

"But what was I running from?" he wondered.

He did not know. He did not know anything, except that he was wet and cold and afraid.

He looked down at himself. He wore a brown coverall and soft shoes. There was nothing in his pockets, no clue to his identity.

He must remember who he was and how he had come to this place, and why he was so afraid. He *would* remember! Something, anything . . .

He crouched there, trying—a wet, dark-haired, lank young man with a smear of blood on his scratched chin, and with frantic eyes.

*"It could mean your life, Farrow. The experiment might fail."*

Out of the dim blank of not-remembering came suddenly those words, and then the blankness swept back again. He fought the blankness. And suddenly he said aloud,

"Farrow. I am Kenneth Farrow."

He started to his feet, his heart pounding, his breath coming in great gasps. The rain was ending. The giant forest was very silent.

*"The experiment might fail—"*

Nothing more. Who had said that? He was Kenneth Farrow. But who was Kenneth Farrow and what was it that he so feared?

Farrow looked around, desperately trying to re-awaken numbed memory by sight of some familiar thing. But this forest did not look familiar at all. The trees were too big for any forest he had known. How had he come here?

Looking back, he saw the trail he had left in his terror-driven flight—broken brush, and footprints sunk deep in wet ground.

A sudden hope sprang up in Farrow.

"I can follow my trail back to where I came from. Someone there will know who I am."

He started re-tracing his own trail. It zig-zagged aimlessly here and there, but it led Farrow stead-



ily through the forest on slowly rising ground. Where a great wind-fall lay, he was able to look up at low bare hills ahead.

His foot tripped on something, and he looked down. Broken shards of concrete lay thickly, half veiled by weeds and grass. He saw more concrete fragments, extending away in a wide lane, with big trees growing up among them.

It had been a road, but it must have been abandoned a long time before. Farrow could not understand. He pushed it out of his mind and went on.

Farrow came up on the bare slope. He stopped and stared.

There had been a landslide here, very recently. Rock and raw earth lay on the slope in a muddy mess. A whole steep face of the hill had slipped away.

Up there in the raw new face of the hill, there was a black opening that was like an eye staring down at him. His tracks, deep in the muddy soil, came down from that opening.

Farrow's heart leaped violently. The blind terror was suddenly on him again. But he forced himself to go up toward the opening.

A concrete vault was sunk in the hill here. Its edges showed, stripped bare by the landslide. Its door, of stainless steel with a thick plastic gasket around the edge, had

been sprung and then ripped open by the sliding rocks. It hung wide open on one massive hinge.

Slowly, fatefully, Farrow forced himself to go through that door.

It was shadowy and cold inside the sunken vault, a concrete room no more than eight feet square. At one side of it there was a bunk with a plastic pad. In a corner stood gas-cylinders of a familiar type. On shelves that occupied the rest of the vault were a bewildering variety of objects—two rifles, boxes of ammunition, tins of food, radios, tools. Each object had a white tag tied to it.

Farrow, shuffling his muddy feet on the floor, went toward the shelves. Among the objects there was a batteryless flashlight of the spring-wind type. He wound it, and then flashed its beam on the nearest tagged object. The writing on the tag was brief. It read, "Operation Groundhog Test Sample No. 14. June 17, 1979."

*"Operation Groundhog!"*

The flashlight fell from Farrow's nerveless hand. He swayed, and leaned against the shelves for support.

As though by a lightning-flash, his mind was illumined and he remembered.

Operation Groundhog . . .

He knew now where he was, and who he was.

HE WAS KENNETH FARROW. And Kenneth Farrow was one of the junior physicists at Eastern University, temporarily detached for special service with the Defense Scientific Commission. The Commission that was planning Operation Groundhog.

It came back to Farrow as he swayed there in the cold shadows. He saw again old Zimmer, spare and austere, speaking to them from the end of the long table. He heard again that dry, precise voice stating to them the problem they must solve.

"Atomic war, gentlemen. It could come at any moment in a surprise attack. Our recent first venturings into space, the satellites and then the moon and Mars rockets, have only heightened international tension. If our enemies knocked us out with a sudden surprise attack, all space would belong to them. They may very well try."

"But we're getting ready," Finetti had protested. "We could hit back fast. And we've started the big underground shelters that will hold all our people—"

"That," Zimmer had interrupted, "is the crux of our problem. How long can those shelters hold our millions? Weeks, months, may go by before radioactive contamination disappears and it's safe to

emerge. We can't store food and air enough to last that long for so many."

And then, Farrow remembered, had come Zimmer's bombshell. The revelation of Hanawalt's process of artificial aestivation.

"A groundhog can sleep while he waits for the time to re-emerge. Not sleep really, but aestivation, hibernation. An almost complete stoppage of bodily processes, so that he requires no food, almost no air. If we were prepared to put our millions in the shelters under artificial aestivation, they too could sleep till it was safe to go out again."

And Zimmer's cool gaze had swept their faces. "Hanawalt's gas can do it, we're sure. It *suspends* metabolism, circulation, respiration, almost completely. It's worked on animal subjects. All we need is a human subject, to go under the gas for six months. We shall use a small vault buried in an isolated location, to approximate actual shelter-conditions."

Zimmer had added, "Naturally, this must be utterly secret. So I shall ask for a volunteer who has no family ties."

And that, Farrow thought, had seemed to leave it up to him. He was the only one of them without wife, child or parents.

He had volunteered, and been

accepted. The vault for the test had been prepared on government arsenal property, here in the low hills of eastern Ohio. The test-vault was finally ready, and in it, right here, Zimmer had given him his final instructions.

"The vault door seals hermetically, and unlocks from either side. When I've left, close and seal it and then release the gas. You'll go to sleep—and won't wake until six months from now when we come and open the vault."

Had a last twinge of conscience penetrated Zimmer's frosty soul? He had paused and said, "I must warn you again—it could mean your life, Farrow. The experiment might fail."

Farrow had wanted to quit, to get out of the place. But pride, vanity, had kept him from it. He had only nodded.

"I know. But I don't think it will."

He had sealed the door, after Zimmer left. He had looked around the vault one last time—at the bunk, at the array of objects on the shelves whose reaction to the gas must be tested also, at the cylinders.

In nervous haste, he had opened the valves of the cylinders. He had lain down on the bunk as the gas hissed. And then there had been nothing at all. Nothing but sleep.

AND WHEN he had finally awakened, his brain still numb with the long aestivation, sheer animal fright at finding himself in the strange vault had driven him out in blind terror through the forest . . .

"But it was the landslide, ripping open the vault door, that let the gas escape and awakened me," Farrow thought. "It wasn't Zimmer. The six months must not be up yet—"

Something struck icily across his thoughts. The road. The ruined concrete road with big trees growing up amid its fragments. It had been a perfectly well-kept road—when he had come here.

*How long does it take for great trees to grow where a concrete highway has been?*

"Oh, no," whispered Farrow, aloud. "That's impossible."

He couldn't have lain in aestivation that long. They wouldn't have let him do so. Zimmer and the others—they would have come at the end of the six-month period, and awakened him.

*"Unless they were all dead,"* something whispered in his mind.

Farrow told himself that wild imaginings were getting the better of him. There were a dozen men on the Commission who knew the secret of Operation Groundhog. They couldn't *all* have died sud-

denly . . .

Or—could they? Suppose the surprise atomic attack, so long feared, had struck while he was sleeping. Washington would be a sure target. And if all the Commission had died in the nuclear flash, who would know that he, Farrow, was sleeping here?

Farrow uttered an inarticulate sound. He wouldn't believe that. He mustn't let himself believe it. He stumbled out of the dark, cold vault, frantic to prove to himself that it wasn't true.

The light was waning in the heavy sky. Farrow climbed up the slope toward the ridge of the low hills, shakily scrambling and slipping. He turned there and stared out over the wide, shallow miles of Pymatuning Valley. He looked and looked, as the light drained out of the sad-colored sky.

And it was all gone. All the valley as he remembered it, the roads and fields and farms and villages, the trucks and buses and cars, the distant smoke and tall buildings of Steel City. All gone.

A vast and unbroken forest rolled to the horizon, lonely under the advancing night. No smoke, no buildings, no roads, no fields. Only the great trees, a wilderness as savage as if civilization had never touched it.

*"The experiment might fail—"*

No, thought Farrow numbly. Operation Groundhog's test had not failed. It had succeeded only too well, and he had slept sound while a sudden besom of atomic destruction had swept away the world he knew. The cities of men had gone, and the forest had come back, and in his vault he had slept on and on.

A century? Two? How long, for great trees to grow through a concrete road?

Tears stood in Farrow's eyes. Then this was the end of all man's hopes and dreams? Stricken down, destroyed, at the very moment when he had begun reaching toward other worlds?

He looked, praying to be wrong, praying to see the shining of one familiar light. And there was nothing but the darkness, and he had spanned unguessed time to stand at the end of man's world.

The clouds parted and cleared. The pitiless stars peered down at him as he stood on the dark ridge, stricken and wet and cold.

Then suddenly, Farrow heard a sound, and saw to northward a vertical flash of fire that came down out of the dark heavens as a great bulk settled earthward on wings of flame.

## CHAPTER II

**S**UDDEN REVULSION from despair set Farrow to shouting

wildly at that distant streak of fire that was gone almost as he glimpsed it. He yelled and gestured, shaking with excitement.

He had been wrong, then. He had lain in aestivation, in sleep, for a long time—but civilization could not have been swept away, after all. For that flaming thing could only have been a great rocket, and that implied technologies only a complex civilization could wield.

"I jumped to conclusions too fast," he told himself. "This valley has gone wild, for some reason, but that's all."

All his thoughts were now feverishly bent upon the distant rocket he had seen. He must get to the point where it had landed—a point that could not be far from the Lake Erie shore. He must find the people there, must find out what had happened to the world.

Farrow began to run down the slope. When he reached the area of the landslide, in the darkness his foot slipped on muddy earth and he pitched down the slope in a bone-shaking fall.

He got to his feet, but his first wild excitement was a little sobered. He could not, much as he wanted to, force a way through the forest at night. He would have to wait until morning.

He became aware at the same

time how weak and shaky and cold he was—and the first pangs of hunger stirred in him. Violent emotions had sustained him until now, but now reaction from the long aestivation and the awakening was hitting him.

Farrow went on down the slope to the vault. But when he entered it, its darkness and freezing chill were repellent.

He forced himself to think. He must have food and warmth. The food was here, a few dozen cans of various kinds, among the test-samples on the shelves. Using the flashlight, he rummaged among the test-objects until he found matches, and then tore the paper wrappings off other packaged test-samples.

He had to go back down to the forest for wood. The flashlight helped, but it was a slow business gathering damp brush. And all the time, a sense of unreality mocked him.

He stopped once, as a chorus of long, barking howls came through the night like the very voice of wilderness.

Farrow stood listening.

Painfully, he clambered back with his messy load of wet branches, and piled them just outside the open door of the vault. Even with paper and matches, he had to try several times before he got a fire started.

The fire helped. And the meat from one of the cans, which he opened by means of a test-sample knife, helped even more.

Again, from far away, came the savage barking chorus.

"Sounds more like dogs than wolves," thought Farrow. "Wild dogs?"

Uneasily, he went back into the vault. There were two military-pattern rifles there, and boxes of cartridges. Old Zimmer had included among the test-samples every type of object which would be needed by those who awoke from Operation Groundhog in some future war—and weapons, obviously, would be among such needs.

Hanawalt's gas did not seem to have affected either weapons or ammunition. Farrow put a clip into one of the rifles, and went back to sit behind his fire.

The warmth and the food made him feel sleepy. There was, he thought, an irony in that. Sleepy, when he had just awakened from a sleep that had lasted—

*How long?*

And what had happened to the world while he slept?

Desperately, he clung to the memory of the rocket. If there were rockets, there could not be universal savagery and decay. For the rockets that had just begun to reach the planets in the years be-

fore he'd begun his sleep, could not exist without technics to produce them.

Farrow brooded until he slipped into a doze, sitting and clutching the rifle. He awoke with the fire out and sunlight streaming past him down the slope.

Hope bounded up in him. Today he would reach the place where the rocket had landed.

A half-hour later he was pressing northward through the forest, the rifle in his hand and extra clips and cans of food in an improvised pack on his back.

**F**ARROW FOLLOWED the line of the nearly-vanished highway. The shards of broken concrete between the trees made tricky footing. But there was little underbrush, and the road would keep him to a straight course.

He came to a stream, the Pymatuning. Stone abutments showed there had been a bridge here but the bridge was gone, and so was all trace of the village that had stood here, except for some weedgrown foundations.

He went on. Remembering the wild dogs, he kept his rifle on the ready. It grew warm, and he judged by the leafage of the oaks and maples that it must be late May.

Late that afternoon, Farrow

crested low, tree-covered hills and then stopped. Below him lay a sandy plain, and beyond that the blue expanse of the great lake. There was something on the plain.

The rocket. It towered, a silvery giant catching the blaze of the sun. There was activity near it, men with machines poking at the ground a few hundred yards away, other men coming and going on the gangway that led up into the great ship.

Farrow almost sobbed with relief. It was more than a rocket. It was a visible sign that all was still well with the world somewhere, even though a valley had gone wild and villages had vanished here.

He raised his voice in a frantic shout to the men down there.

"Wait for me! Don't go away without me—wait—"

He saw their startled faces turn toward him, as he ran down the slope from under the trees.

Two of the men were closer to him than the others. They were stalwart, sunburned men, and they wore satiny-looking gray coveralls cut much like his own. They stared at Farrow as he stumbled toward them.

Then one of them whipped out a short-barreled weapon from his belt and levelled it. A crash like thunder smote the air and a wicked little flash of jagged light darted

toward him.

Farrow's stumbling, unsteady run was all that saved him. He was lurching a little, and the flash of energy or electricity or whatever it was went past him by inches, with a smell of ozone and then of scorched grass.

"Why," he said, shocked, paralyzed by such a reception, "why, you don't understand—"

The second man was also drawing his weapon and the first was now aiming at Farrow with care.

Self-preservation shattered Farrow's paralysis. They were trying to kill him. He flung the rifle to his shoulder and fired.

The rocket-man aiming the unfamiliar weapon dropped it and clapped his left hand to his right shoulder, with a howl of pain. The other man froze in the act of drawing his weapon, goggling at Farrow in an amazement that exactly matched that which Farrow had felt a moment before.

The other rocket-men, farther back by the silvery loom of the ship, seemed also stricken with astonishment by the sharp report of the rifle.

Then, before their surprise passed, Farrow leaped back into the shelter of the trees. An instant later, long streaks of crackling light seared past him, and the trees woke to thunderous echoes.

"Trying to *kill* me!" Farrow whispered.

All of the relief he had felt was swept away, and the changed Earth wore as cryptic and menacing a face as it had in the darkness of the night.

He peering shakily from behind his trees. The rocket-men were running together down there. A tall man with sand-colored hair and an authoritative stride was coming from the rocket, hurrying toward the wounded man and his companion. The wounded man was yelling.

"Barth, a tribesman with a bullet-gun! A *new* bullet-gun!"

Hearing that cry, Farrow felt more amazed than ever. These men spoke English. They were his own people or kin to them. Yet they had tried to kill him on sight. What had happened to the world?

A quick discussion was going on down there, and then the sandy-haired man Barth made an ordering gesture. The gray-clad men began to spread out and advance in a line up the slope toward the trees.

Panic seized Farrow. They were hunting him. And the instinct of the hunted sent him running back through the trees into the forest. Whoever they were, whatever reason they had for their hostility, they must not catch him.

HE STARTED plunging along the slope, keeping to spaces that were less choked by underbrush. Almost instantly, he heard swift footsteps right behind him.

Farrow swung around, raising the rifle. A second time, he stood shocked for a moment into inaction.

It was not one of the gray-clad rocket-men who was behind him.

It was a darkhaired girl with a hawk-fierce, swarthy face, wearing leather jacket and leggings and carrying a compact thing of wood and metal that Farrow could not for the moment identify.

"Not that way!" she exclaimed in a low voice. "They're coming up all along the slope, and will cut you off!"

Farrow kept the rifle trained on her, and her face flashed an expression of exasperation.

"I'm not one of them!" she said. "I could have put a bolt in your back easy, when you ran past me."

With a queer feeling, Farrow recognized now the thing she carried. It was a crossbow, with its crosspiece made of old-looking spring steel, and with a heavy little steel bolt in it ready to fire.

"Who are you?" he whispered.

"I'm Jen, and I'm an Earthly, and I knew you must be one too



when I saw you shoot that Martian," she said quickly. Her black eyes were excited when she glanced at the rifle. "Only, where did you get a new bullet-gun?"

All of her talk went past Farrow except one word. That word hit him with an impact that was stunning.

"Martian?" he repeated, incredulously. "You call those rocket-men *Martians*? That's crazy! They're people like us, they spoke English—"

"What else would they speak?" she demanded, puzzledly. "I was spying on them, and when—"

She suddenly broke off, as though interrupted by some sound that Farrow could not hear, and turned hastily to peer back through the trees. Then she said passionately,

"Will you *move*? They're after us, and in a minute more we'll be cut off!"

The urgency in her voice, the taut look on her keen, weather-browed face, convinced Farrow of the imminence of danger. He did not know yet who she was, nor who those others were, but he knew that they had tried to kill him and that was enough.

He ran. And the girl Jen ran with him and then ahead of him, choosing a way through the bewildering sameness of the forest.

From startlingly close behind him in the green gloom, came a sharp cry.

"Barth's orders! Don't kill him—not yet!"

Whistles rang stridently, and as he ran Farrow realized that those whom Jen called Martians were closing in behind them.

### CHAPTER III

JEN PUT on a burst of speed, running like a deer, and Farrow found himself barely able to keep up with her.

She gave him a flashing, worried look as they ran. "They're trying to force us toward the lake—then they'll have us pocketed!"

Farrow realized the danger, for the whistles were now sounding south of them. They were in a trap whose jaws would presently close, and only speed could get them out of it in time, but he did not think he could maintain the pace.

His lungs were laboring and his heart pounding, but an illogical petty vanity made him unwilling to admit that he could not keep up with a girl. He forced himself to keep going, his legs pumping mechanically, until things began to blur before his eyes. Then, as though from a remote distance, he heard Jen speaking.

"We're past them—we can slow down a little."

She kept going, though at reduced speed, and it was moments before Farrow could gasp a question.

"Will they keep after us?"

She nodded, troubledly. "Yes. That new bullet-gun of yours—they'll want to know where it came from, who made it, how many there are."

The sun was setting, the light coming in level broken shafts through the trees and brush. Jen turned sharply to the left.

"I mustn't go straight toward my tribe's village," she said. "We'll lead them southward first."

No more words were spoken as twilight came and deepened. Farrow followed the seemingly tireless leather-clad form on through the darkness for what seemed forever. He started once as a deer crashed out of a covert just ahead. He heard no more whistles from behind.

Finally Jen led into a dense little thicket of trees. A smell of blossoms assailed his nostrils, and with a sudden pang Farrow realized that they were apple-blossoms, and that the thicket was some orchard of the past gone wild.

They sat down on damp leaves, and for several minutes remained silent, listening. Finally, Jen said,

"They can't trail us in the dark. But they'll be after us again in the morning." She added, "No fire. I have dried meat."

"I've better than that," Farrow muttered, and tiredly got a can out of his pack and speared it open with his knife.

Her voice came, in tones of wonder bordering on awe. "A new bullet-gun—and now this! No one has seen such things for a hundred years!"

Her words struck Farrow like the knell of final doom, stripping away the last shreds of hope that he had tried to cherish.

"A hundred years . . ."

All the evidence he had seen but tried to deny, the wildness of a forlorn Earth, the forest that had overwhelmed roads and towns, received final confirmation. Operation Groundhog had carried him across a century.

"Listen," said Farrow hoarsely, "this gun is more than a hundred years old, and so am I. I know it's hard to understand, but—"

He talked jerkily in the dark, trying to tell her the incredible story of his awakening, unable to see her face. When he concluded, there was a silence.

Then Jen said thoughtfully, "I knew you were no ordinary tribesman. And you couldn't be a Martian either, or they wouldn't be af-

ter you now. But it is strange—a man from before the War.”

“Then there *was* a war—an atomic devastation?” exclaimed Farrow.

She said, “Yes. It came very suddenly. One country struck at another, and the sky was full of flying bombs, that in one day and night wiped out a thousand towns and cities. Yes—there was a War.”

And Farrow thought numbly that he had been right, that that was why Zimmer nor anyone else had never come to awaken him from his sleep.

In the darkness, Jen spoke on in a low voice. “Poison came from the great bombs, they say. Poison that drifted on the air, all around the northern half of Earth, and slowly killed all those who had escaped the blasts.”

“Fallout,” muttered Farrow, but the word meant nothing to her.

“A few hundreds of people escaped, on high mountaintops in the west. Later, when the poison died away, they came down from the mountains and spread eastward again. They became the tribes. My people.”

She added with sudden passion, “Does it seem strange to you that we do not have bullet-guns or metal cans of food? We had them, for a time. But when they were used up there were no more, and we could

not make such things.”

He could understand that, too. It took many specialists to make the machines and tools of civilization. And with the cities gone, and only a few random survivors to start things going, there would not be enough such specialized skills left.

**H**ER STRONG fingers suddenly closed on his arm. “I have to touch you, to believe! A man from the old times of cities—”

Farrow interrupted, with the question that was paramount in his shocked mind.

“But that rocket was a product of advanced civilization! Where did it come from?”

“From Mars.”

“Oh, no, it’s impossible!” said Farrow. “Those weren’t aliens, they were men like us, they spoke our own language. It’s fantastic to call them Martians!”

“They are Martians because they were born on Mars,” said Jen. Her voice took a bitter edge as she added, “But they look like us and they speak like us, because once they were people of Earth.”

Farrow was wholly bewildered now. “What do you mean?”

“In the days just before the War,” Jen explained, “Earthmen had just begun to send ships—rockets, you call them—to Mars.”

“I know all about that,” Far-

row said. "They found habitable oases, a few odd forms of life, out there. But no *people*."

"So it is said," she agreed. "But, after the War struck and the poison drifted around the northern half of Earth, there was a people in the far south who knew that in time the poison would drift to them and kill them, and who decided to escape. They had rockets. In the months before the poison reached them, they made more. And as many of them as could left Earth in the rockets and went to Mars."

Farrow was stupefied. That was something he had never imagined, and yet it might just have been possible for many people to escape in that way before world-wide fall-out reached them.

"A people? What people?" he demanded. "Australians? South Africans?"

"Who knows their name now?" Jen said. "They went to Mars, those selected by the scientists who planned the escape—the Planners. They left everyone else on Earth to die. But all here did *not* die—our ancestors, on the high mountains, escaped. And after the poison faded away, they came down and spread and grew into our tribes."

Her voice again became bitter. "All this hundred years, those who escaped to Mars have lived there

safely for three generations. Then, a year ago, some of them came back from Mars in a rocket to ascertain conditions on Earth. They were amazed to find that we of the tribes had survived. They said they would help us regain all the civilization that Earth once had."

She laughed mirthlessly. "We believed them. We talked with them—and their leader was that same Barth who now leads them. But we found out they were lying. They did not mean to help us regain civilization! They had only come back to search for metals and ores that are rare on Mars, and were only using us to procure information. When we charged them with that, a quarrel broke out—and they used their weapons and killed many of us. Is it any wonder that we hate these Earth-descended Martians?"

Farrow understood her resentment, and shared it. It wasn't only that the "Martians" had tried to kill him, merely because they thought he was a tribesman. There was more to his feeling than that.

For he visualized an Earth on which civilization was wrecked, and whose people were struggling to bring it back. And those who had fled to Mars and safety, instead of helping the people of Earth win their way back, had come only for ruthless self-seeking.

"But what puzzles me is why all those on Mars don't return to Earth, now that they know the radioactive poison is gone," he said.

"We do not know why," Jen said. "We would have welcomed them, at first. But they want only to use us and dominate us, so now it is war between us."

"I'm on your side in that struggle," Farrow said warmly. "Anything I can do to help your people's fight to progress, I will."

"You can help very much!" Jen said. "You, a man of the past, can —" She suddenly stopped, then gripped his arm. "Listen!"

In a moment she whispered, "They're searching through the woods in this direction. But they can't possibly follow our trail at night—it must be only chance."

Farrow instantly forgot the wider implications, in sharp concern for their own situation. He said, "We'd better run for it."

Jen pulled him back down. "No. It's only a random search, they can't possibly know we're here. Lie still."

HE LAY STILL, crouching beside her in the darkness on the damp leaves, waiting and watching. Then through the dense wild-apple thicket in whose heart they lay, Farrow glimpsed a flicker of light.

It grew stronger and closer, and he heard the sound of a group of men approaching, the crackle of broken briars, the scuffle of boots in the grass. The searchers were going to pass the thicket at a little distance, and Farrow felt a sharp relief.

The relief was short-lived. He heard the searchers stop, caught a murmur of voices, and then heard them come on, straight toward the thickets. The light they carried threw splintered shafts of brilliance through the blossoming, thorny trees. Farrow and Jen crouched lower.

A voice suddenly rang harshly. "All right, we know you're in that thicket—both of you. Drop your weapons and come out!"

By the glimmer of the light, Farrow saw Jen's face wore a stunned expression. She whispered, "How could they trace us here? How could they know just where we are? It's not possible—"

It seemed fantastic to Farrow also that they had been found so easily, and yet it had happened.

"You have three minutes, before we sweep the thickets with energy-guns," warned the harsh voice out there.

Jen got up, clutching her cross-bow. "That's Barth, damn him! I saw him and his men kill my brother the last time a rocket came!

I'll—"

"You haven't a chance," said Farrow. "Listen, you got into this trying to help me get away. I'm going to get you out of it. I'll go out to them—and you slip away the other direction while I'm doing it."

Jen started to object and he said emphatically, "You must get back to your people and tell them about this, and it's the only way you can."

"But you—", said Jen.

He gave her a shove. "I'll be all right, they want me alive. Get going."

Without giving her time to protest further, Farrow started through the thicket in the direction of the light.

"I'm coming out," he said loudly. "But I want a guarantee I won't be blasted down on sight."

"You have my word," said the voice of Barth. "But don't come out with that bullet-gun. Leave it."

Farrow objected to that, speaking loudly and noisily crashing through brush and branches, to cover the sound of Jen's flight. But suddenly he heard another voice out there.

"Barth, T'laa says the girl is escaping out the other side!"

"Get her!" snapped Barth.

Instantly, Farrow turned and

ran back through the thicket the way Jen had gone. Thorny branches whipped his face and briars tore at his legs but he burst straight ahead for now he heard a cry from Jen, of pain or anger.

He came out of the thicket and saw the dark figure of the girl struggling with a bigger male figure. Farrow ran up. He dared not shoot but he reversed his rifle and jammed its butt into the middle of the man. The man made a heavy sighing sound and sat down slowly.

Jen yelled a warning and at the same moment two heavy bodies hit Farrow from behind and jolted him off his feet. The rifle flew out of his hand as he hit the ground. Furious at his failure, he jabbed backward with an elbow and felt a crunch and heard a screech.

Then something hit the back of his neck hard, and Farrow lost interest in everything. He sprawled, and then felt himself turned over, and the light came and shone into his eyes and he saw the blond, square face of Barth looking frowningly down at him.

He saw another man beside Barth, a man who had riding on his arm, half-clinging and half-carried, a thing out of nightmare. It was the size of a big chimpanzee but it had too many arms and legs for any earthly animal, and in its weird, furry, lemur-like face were

big, mournful, round black eyes, peering down at Farrow.

"Good work, T'laa," said Barth to the creature, but it did not answer.

It seemed to Farrow that everything was going around and fading, and only those great, unearthly luminous eyes looking down at him were still there as consciousness faded.

#### CHAPTER IV

FARROW LOOKED at a smooth metal wall, when he awoke. It was only inches away. He was lying in a narrow bunk on a gas-filled mattress, and a bleak white light came from behind him.

He turned, and then he jumped out of the bunk onto the green plastic floor, his hands balling into fists, a hot anger sweeping through him. He was in a small windowless metal room with a disk of artificial light in its ceiling, and a man stood facing him. He was a young, broad-shouldered man in a gray overall, with sandy hair and hard blue eyes and an air of self-assured strength of body and mind. Farrow had seen him before. He was the leader whom the rocketmen had called Barth.

One of the "Martians"—the people who fled Earth a century before in the day of disaster, and

now had come back, not to help its struggling people, but for their own selfish purposes! The tough arrogance of this young leader matched what Farrow had heard of these so-called Martians, Farrow felt an hostility to them that deepened his determination not to let them frustrate the struggle of Earth's people back to civilization.

"You're in our rocket," Barth was saying. "You've been out for quite a while."

"Where's Jen?" demanded Farrow.

"The tribesgirl?" said Barth. "She's all right."

"Is she?" said Farrow. "Then let me see her."

Barth's eyes narrowed a trifle. "Listen, no one takes that tone with me." Then he shrugged, and said, "If it will ease your mind, you can see her."

He opened a door and Farrow, feeling weak and unsteady and aware of an abominable ache in the back of his neck, followed him through it.

Barth went down a very narrow corridor, curved like the section of a ring, and opened another door. He did not go in.

"There she is. Sleeping. We had to give her a seda-shot."

Farrow looked into a tiny cabin that was the duplicate of the one he had just left. Jen lay in a bunk,

her eyes closed. The soft leather tunic over her breast rose and fell evenly.

Then Farrow saw who else was in the tiny room, and felt a bristling of the hairs on his neck.

On a stool, close to the head of the sleeping girl, perched a figure out of nightmare. Furry, with a body no bigger than a boy's, it had arms and legs that were bifurcated where they joined its torso, so that it seemed to have eight limbs instead of four. Its face was turned toward the girl and its great, unpupilled black eyes were fixed upon her. It was the strange double-limbed creature he had glimpsed in the forest as he went into the darkness.

There was something so unholy about the alien thing's complete absorption with Jen, that a sort of horror invaded Farrow. He started forward into the room.

"What's that? What's it *doing* with her?" he cried.

The creature turned its head sharply. In the gaze of its unhuman eyes, Farrow read sudden apprehension as he plunged forward.

A hand grabbed the back of his collar, and Farrow felt himself hauled off his feet. Barth had colared him as one would a child.

"Leave T'laa alone," said Barth.

The indignity of being mauled like that transferred Farrow's anger

from the unearthly thing crouched on the stool to the man.

He wrenched around and struck with furious fists. Barth staggered back. His face became unpleasant. He got his balance, then strode forward. Farrow hit him again, but the punch had no steam in it; he was too exhausted.

Barth grabbed him and slammed him against the wall, knocking most of the breath out of him. Farrow swung at him but this time so weakly that Barth contemptuously ignored the blow.

"T'laa is not hurting the girl," Barth said. "Will you be reasonable now?"

"Reasonable, when you tried to kill me?" said Farrow.

"Our guards were a little hasty," Barth admitted. "They thought you were a tribesman. We soon realized you couldn't be one, though."

He motioned toward a metal chair bolted to the wall. "If you're so worried about the tribesgirl, you can stay in here. But sit down. I have some questions."

**F**ARROW GLARED at him, but the wave of weakness that had swept over him made his knees wobbly. He went over and sat down. Barth came over and looked down at him with bright, probing eyes.

"You're no tribesman," he repeated. "With that weapon, and



the things you had in your pack, you couldn't be. But who *are* you? Where did you come from?"

Farrow looked up at him. "What year is this?"

Barth said, "2084, of course."

"I was born in 1945," said Farrow.

He waited wearily for the loud outcries of incredulity that would follow. Then he looked up sharply.

Barth showed no surprise on his face—no surprise at all! That fact so astounded Farrow himself that his anger faded a bit.

Barth asked, "How do you explain this?"

Farrow, upset by the other's complacency, began a halting explanation of Operation Groundhog. He realized how incredible it must sound.

When he had finished, Barth turned and spoke to the furry thing that crouched on the stool. "You were right, T'laa. His story checks with what you got out of his mind."

The thing on the stool answered, in a lisping, slurred voice that made familiar English sound like an utterly alien tongue.

"Yes. The main outlines were very clear."

And as Farrow stared, Barth asked the thing he called T'laa:

"What have you got out of the

girl?"

T'laa made a shrugging movement of his multiple shoulders. "Not too much. She belongs to a tribe that centers around an old village in the forest, fifty miles west of here. There are some two thousand of them. They saw the rocket land and sent out spies to look for it, she being one of them. They plan to attack the rocket."

Barth's jaw set in a cruel line. "I thought so. We'll have a surprise for them."

Farrow burst out. "For God's sake, what is that thing? What does it do—read minds?"

"You might say so," answered Barth. "T'laa is one of the Ibim—the highest indigenous form of life on Mars. His race all have certain parapsychic powers."

Farrow began to understand. "That's how you were able to track us down so fast, in the forest."

Barth gave him a wintry smile. "Yes. The Ibim are quite useful. It's why we brought one with us to Earth this time."

"But you," said Farrow, staring at him, "*you're* no Martians, really. Jen told me how your ancestors fled to Mars after the War. Are you people planning now to come back to Earth?"

The question seemed to touch a sore spot. Barth glared at him and said angrily,

"I'll ask the questions, Farrow. You'll learn more about us later—if you live."

The hectoring tone sent bristles of resentment through Farrow. If Barth was a sample of the Earth-descended folk of Mars, Jen had been right about them.

Yet why should the "Martian" react so angrily to the question about a possible mass-return of his people to Earth? There was some mystery here, Farrow thought.

"You slept through the War and the century afterward, because of a gas," Barth was saying. "T'laa got that out of your mind. Yet we have no record of such a gas being perfected before the War and Evacuation."

Farrow said, "Hanawalt's gas was top-secret. It was to form part of our defenses. And Hanawalt and everyone else on Operation Groundhog must have perished, or they'd have awakened me."

Barth said thoughtfully, "We sent men to the crypt you slept in and they brought back the things there, but there was none of the gas. Do you know the formula of it?"

Farrow thought quickly. He remembered the main chemical base of the formula, all right. But he wasn't going to give these "Martians" anything that might help them against Jen's people. His loy-

alty was to the folk of Earth. At the same time, he had an idea Barth would be ruthless if he thought that Farrow was of no value to them.

He said, "I know it was an ionogen formula, but I can't remember the details."

"T'laa could get it all out of your mind, in time," Barth declared.

Looking at the furry alien perched on the stool, Farrow shivered. The thought of the creature's parapsychic power exploring his mind gave him a feeling of revulsion.

"I'll have to call home," said Barth, "for authorization about you—"

He was interrupted by the hasty entrance into the cabin of a young, serious-looking man in the gray coverall uniform.

Barth said nastily, "I left orders that I wasn't to be disturbed, Sandoz."

The young man called Sandoz looked uneasy. "I know, but we've spotted movement out in the forest, and think it may be a big force of tribesmen."

Farrow's heart gave a leap. So Jen's folk had come! There might be a chance—

Barth was saying, "I'm not surprised, I expected that." He thought a moment, then said, "We'll go up to the bridge. I want to use the

communicate anyway. Come along, Farrow. You too, T'laa—I'll need you."

**F**ARROW GOT UP and then paused to look down at Jen. He thought that she looked more like a sleeping child than a forest-running tribesgirl.

He suddenly started violently as with a swish of movement something heavy landed on his shoulder. T'laa had hopped from the stool nearby to a perch on his shoulder. Turning his face in horror, Farrow met the gaze of those saucer-like black eyes only inches away.

He started to make a violent movement of repulsion, but Barth interrupted with a jeering laugh.

"It's all right, T'laa isn't going to hurt you. He finds Earth gravitation a drag, and likes to hitch a ride."

"Yes," whispered T'laa in his lisping voice.

The skin between Farrow's shoulders crawled at the touch of the clinging, furry creature, but he would not show fright in front of Barth. He went out of the little room, with Barth following and locking the door.

The young man Sandoz went ahead, hurrying along the ring-shaped corridor and then up a steep ladder. The ladder was in a circular well, and Farrow looked down

once at the depths of the rocket below him and then shivered and looked up again. He heard a dry, rasping sound from T'laa, on his shoulder, that might have been mirthful.

They came into the dome-shaped nose of the rocket. It had windows, and there were lights going in it, and Farrow saw instantly that it was night outside. Had he been out for a whole day, then?

A middle-aged man with a weathered, brick-red face was peering out one of the windows. He turned and said to Barth, "Hard to see, but there must be several hundred tribesmen out there. I think they're going to rush us."

Barth nodded, and told him, "Mudie, you take the main controls. We'll give them a hot reception. T'laa, try to pick up the minds of the men out there. I want to know when they decide to rush."

"It will not be easy, with so many and at that distance," murmured T'laa. But he hopped off Farrow's shoulder, vastly to Farrow's relief, and clung onto a stanchion beside one of the windows, peering out through the glass.

Barth went over to a bank of instruments in front of which a rabbit young man was sitting. He said, "Get me Planning Center at Syrtris. I want to talk to Grum-

man, audio and video."

The rabbit operator said worriedly, "It may take time to get through to the Chief Planner—"

"Do it," snapped Barth, and the operator hastily began closing switches. His voice started droning in a professional monotone.

"ER-2 calling P-1, Syrtis City! ER-2 calling—"

Farrow said wonderingly, "You're calling Mars?"

Barth smiled. "Yes. We've made a few advances in communics since your day. It may flatter you to know that I'm calling about you."

"About me? What about me?"

"Chiefly, to find out whether you live or die," said Barth calmly. "Think about that."

Farrow saw the sardonic humor in Barth's eyes, watching him, and his dislike of Barth became an active detestation.

"ER-2 calling P-1—"

Barth asked, "Anything yet, T'laa?"

From his perch beside the window the furry Martian creature whispered, "Many minds, many thoughts, out there. One who is the leader is telling them that they must attack quickly."

The operator, after falling silent for a little time, said suddenly, "I'm through to the Chief Planner, sir."

A small screen in the communic flashed into light. Static ran on it,

and then cleared into the face of an elderly man, with a dimly-seen room for background.

It was a good face, Farrow thought at first. Plump and genial and benevolent-looking, with crinkles around the eyes. But when Grumman spoke, his sharp voice counteracted that first favorable impression.

"What now, Barth?" he asked.

Barth spoke out as though not overawed at all. "We haven't come here in enough force. With the tribesmen all hostile, we'll need a bigger force before we can prospect for metals widely. About four rockets, I'd say."

"In other words," snapped Grumman, "your mission is a failure."

"Not at all, sir," replied Barth coolly. "You'll recall that I predicted nothing but another reconnaissance was possible with one rocket, and that my request for more was overruled." He went on, "Something else has come up. This man here—" and he pointed to Farrow.

He rapidly told of Farrow's origin. And the plump-faced man on faraway Mars stared at Farrow incredulously.

"T'laa confirms this?" he asked finally.

"Absolutely," Barth said. "There's no doubt about it. And the secret of that aestivation gas, if

we can get it, will be of value to us."

"Yes," said Grumman, after a moment. "Yes, I can see that." Meeting the calculating stare of his eyes, Farrow wondered how he could ever have thought the man's face a genial one. "All right, Barth, bring him back with you. I needn't say that this too is classified information. You can make your explanations of the mission's failure to the full Board."

The screen went abruptly dark. Barth, his face dark with anger, cursed softly. "By God, Chief Planner or not, he'll find he can't saddle me with his mistakes."

From the window, T'laa spoke suddenly. "They have decided. It is clear in all their minds. They are going to creep in now, and rush us."

"Good," said Barth with vicious emphasis. He nodded to the red-faced man who had taken a pilot-chair in front of the massive main control-bank. He said, "Be ready, Mudie. When I say the word, give them a full blast."

Uncomprehending, Farrow looked at the man Mudie and then back at Barth.

He went over to where Barth and T'laa were peering out the window. He looked out, and from this dome high in the rocket he could at first see the plain and the forest

only as a dark blur. Then, as his eyes became accustomed to the obscurity, he saw that the forest southward was blacker than the plain, and that little blobs of blackness were starting to creep out of the woods. Tribesmen, Jen's people, stealing toward the rocket!

"We'll wait till they're all close," muttered Barth. "Then give it to them. It'll be a long time after this before they bother rockets."

With sudden horror, Farrow understood. Mudie, the man at the controls, was gripping a big lever whose plastic handle was bright red. He knew now what it was, what Barth's plan was. To let the tribesmen steal close, and then suddenly turn the terrific rolling blast of the rocket-tubes loose to incinerate them.

Farrow stiffened. There was a way to prevent that, to warn the tribesmen back. He'd have to risk it, his sympathy was all with the men of Earth and he was damned if he'd let them be wiped out.

Suddenly Farrow saw that T'laa was looking right into his eyes. He knew the Martian creature must be reading his thoughts. He expected T'laa to call out a warning to the others.

But the mournful huge black eyes of T'laa merely stared at him, and then the Ibim turned to look again out the window. He said

nothing.

Instantly, Farrow turned and plunged toward the control-chairs. He grabbed the red lever that Mudie was holding, and pulled it halfway back before Mudie could prevent him.

Thunder broke deafeningly and the whole mass of the rocket quivered and rose, as its tubes exploded fire into the night below.

## CHAPTER V

THERE WAS A CRY of rage from Barth, audible even over the thunderous blast below.

*"Get him!"*

No weapons could be used, here in the vital nerve center of the rocket controls. But young Sandoz, nearest to Farrow, leaped and dragged him back.

Weakened as he was, Farrow was torn loose from his grip on the red firing-lever. Now Barth had hold of him too and they hauled him back against the wall, pounding him, then sliding together along the windows as the whole rocket tilted slightly.

Mudie, the pilot, was frantically hitting a whole bank of small keys, like an organist trying to play an inconceivably complicated fugue all at once. The rocket-tilted back to vertical. Then it settled down on the ground again, and Mudie cut

off the blasts.

In the ensuing silence, Mudie got up, his brick-red face sweating, and exclaimed accusingly, "We nearly went over!"

Barth slammed Farrow against the wall. He said furiously, "You might have wrecked the whole rocket!"

"That would make my heart bleed," said Farrow.

Barth turned to Sandoz, at the window. Sandoz said, "That tore it! The tribesmen ran back into the forest when the tubes let go."

"Of course, that's why he fired the tubes prematurely—to warn them," said Barth. He looked at T'laa, still clinging to his perch by the window. "Why the hell didn't you warn us what was in his mind?"

The furry creature answered, "I was not paying any attention to him. I was concentrating on the tribesmen out there, as you ordered."

Farrow, at that, looked sharply at the little Ibim. He remembered clearly how, just before he made his leap for the firing-control, T'laa had looked searchingly at him and then had turned away from him. He was fairly sure that the Martian creature had read his mind in that moment. But if so, why hadn't he uttered a warning?

Barth, furious and puzzled, said,

"Why in the world would you risk your neck to warn those savages?"

Farrow shrugged. "They're people. Using the rocket-blast on them is dirty fighting."

"That kind of sentiment from a man whose people let loose the War!" said Barth, scathingly. He turned to Sandoz. "Lock him up—in the same cabin as the tribesgirl; we can't spare two cabins."

Mudie, the red-faced pilot, had come over to them and he said, "Why take the tribesgirl back with us at all? Just so much dead weight."

Barth looked at him bleakly. "Just navigate and leave me do the thinking, will you? I have my reasons."

Farrow was pushed out toward the ladder. As he started down it, he looked up and saw Sandoz following him down the rungs. Sandoz' young face was serious, and he carried a gun in his hand.

"We're outside of the control-room now and I can blast you if you force me," Sandoz warned.

"I'd already figured that out," Farrow said dryly.

Nothing more was said until he stepped again inside the little metal cell. Jen still lay on the lower bunk, but was now stirring a little.

Sandoz, keeping his gun on the ready, paused in the doorway be-

fore closing and locking the door. He told Farrow, "You'll be locked in here for quite a while. For your own sake, I'd advise you to make no trouble."

When Sandoz had gone, Farrow went over and looked at Jen. She stirred again, and then looked up at him with wide, dazed eyes.

"It's all right, Jen," he said. Then he added, "I mean, at least we're still alive. We're in the rocket."

He expected her to show hysteria. But Jen did not panic, and of a sudden he felt infinitely sorry for her.

"It's my fault you're here," he said. "You wouldn't be, if you hadn't tried to help me escape from them."

"I only wish I'd been able to kill some of them!" she exclaimed. "How could they have trailed us so easily?"

He told her about T'laa, and also what had happened when the tribesmen had tried to rush the rocket. Reluctantly, he added, "Unless we can get away, and I don't see much chance of that, they're going to take us back with them."

Jen paled a little, but again she refused to show panic. "To Mars? Why?"

"They want me because they want a scientific secret they think I know," said Farrow. "Why they

want to take you, I can't imagine."

Jen's eyes flashed. "My people will not give up. Even if they can't attack the rocket, they'll ring it in, and these Martians won't dare go far from it."

In the dull days of imprisonment that followed, Farrow wondered how their captors were faring in their mission. But the guards who brought them food each day would tell them nothing.

Several times he heard a diminishing roar outside as of jetplanes going away. He supposed the "Martians" had brought planes to aid in their search for the metals they needed, but he didn't think they'd get far prospecting that way.

**H**E THOUGHT that a fortnight of imprisonment in the stationary rocket had passed, when Sandoz opened the door. The young officer had his gun in his hand, as he spoke to them. His words made Farrow experience a sudden cold thrilling shock.

"We'll be taking off soon. You two had better strap into the bunks and stay there."

At the thought that this was final farewell to Earth, Farrow felt like rushing Sandoz in a wild attempt at escape. The look in Sandoz' eyes warned him that it would be suicidal.

Farrow mastered the impulse. He

said bitingly, "You haven't stayed long on Earth. Didn't the prospecting go well?"

Sandoz answered steadily, "I won't deny that it didn't. We need to come back here with more force, and clear all the tribes out of a big area."

Farrow said suddenly, "You seem a pretty decent sort for a Martian, Sandoz. Will you tell me something?"

"What?"

"Why in the world don't you people just come back to Earth, all of you? It's your ancestral world. You could come back, now that the radioactive poison is gone. Why don't you?"

Sandoz' serious young face became hostile. "Because the Planners have ruled otherwise for the present. And it was our Planners who saved our ancestors, long ago. They know what's best."

He slammed the door shut from outside and locked it. Farrow looked at Jen, and saw that she was very white.

"No help for it, Jen," he said. "Get in your bunk."

He strapped her in. She managed a scared smile, and Farrow bent and kissed her. "Good girl."

He got into his own bunk. Time passed. Then came a clanging of gongs. Suddenly the whole vast fabric of the rocket shook again



to the thunder of its tubes, and a big hand smashed Farrow down into his gas-filled mattress.

He fought to breathe, and after an interminable time, the thunder abruptly died. The pressure upon Farrow lessened. He called down to Jen, and heard her muffled assurance that she was all right.

Time went by and again the gongs warned of blasts. Again the pressure crushed them, and then subsided. And this went on and on until finally there were no more blasts at all. Farrow knew they must be out in space, starting the swing toward Mars. But in this windowless cell, there was nothing to see.

There followed for Farrow and Jen a strangely timeless interval. Their cabin was less than forty square feet in area. There was nothing in it but the bunks, a bolted chair, and the tiny closed-off bathroom cubicle. Once each day armed guards unlocked the door and brought their food, a pulpy vegetarian mess. It was the only way they measured time.

Farrow knew he was enduring the bewilderingly altered gravity and the silent monotony better than Jen. He was child of the cities, but Jen was of the forest people a century later. She talked much of her people, and again Farrow got the impression of a fairly decent

lot of folk laboring against odds to rebuild a ruined Earth, but only getting a bare start at it.

"We thought that all would be well again, when the first rocket came back from Mars," she said bitterly. "We supposed that all Earth's grandchildren were coming home, to help us."

"I just can't understand why they *don't* all come back," said Farrow. "The habitable oases of Mars are limited in area, the first expedition there discovered that. Why do all those people cling to dying Mars instead of returning to Earth?"

Suddenly, after all this time, the monotony was broken. The door was unlocked and Barth stepped in, followed by a heavy-faced young man with a gun in his hand.

After them, moving quite nimbly now on his odd bifurcated limbs, T'laa skipped into the cabin.

"We'll reach Mars before long," Barth brusquely informed Farrow. "It's time we tried getting that gas-formula from you."

Farrow shrugged. "I don't think you'll have much success. It was explained to me at the time, but it wasn't in my department and I can't recall it."

"If it's in your memory at all, T'laa will find it in time," said Barth. "You can cooperate with him willingly, or be tied up."

Farrow could see no point in getting himself bound. And by now he had got over some of his revulsion to T'laa and was curious about the Martian creature.

"I'll go along with it," he said.

Barth shot an order at the heavy-faced young man with the gun. "Stay here, Naramore. Keep across the cabin from them. You know what to do."

HE WENT OUT, relocking the door. Naramore went and stood against the opposite wall of the little room, watching Farrow and Jen alertly, his weapon ready for use.

T'laa approached Farrow. Jen recoiled, but Farrow looked on fascinatedly as the creature hopped up onto the bunk.

"Sit down," whispered T'laa. "Relax. I assure you there will be no hurt or damage to your mind."

Farrow sat down on the edge of the bunk, his face inches away from the unhuman, lemur-like face of the Ibim.

"I want you to look into my eyes," said T'laa.

"Hypnotism?" Farrow asked.

"Not at all. It is to keep your attention from wandering."

Farrow obeyed. The eyes of the Ibim were depthless wells of darkness. Suddenly, Farrow started. It was as though a clear voice had

spoken inside his brain.

*"Show no excitement. Can you hear my thought?"*

Farrow almost rose to his feet, but T'laa calmly said aloud, "You must relax, if I am to succeed."

The unhuman eyes held no expression. But again there came to Farrow the clear mental voice.

*"Can you hear me? If you receive my thought, close your left hand."*

By an effort, Farrow mastered his feeling of shock. He clenched his left hand, as though in a gesture of hostile emotion at facing the Ibim.

"Good," said the mental voice. "Neither the guard nor the girl can hear me; I am directing my thought into your brain only. Think your answers, do not speak them. I will read them."

Farrow stole a glance at the guard across the cabin. The man was watching closely, but apparently only on guard against some sudden attempt by Farrow to escape or attack the Ibim. He looked on with an uneasy distaste on his heavy face, as though the process of mind-reading was a bit uncanny and unpleasant to watch.

Jen had recoiled to a corner and was watching in wide-eyed horror. To her, he realized, completely ignorant as she was of parapsychical theory, the whole process must

smack of the supernatural.

"Look at me!" came T'laa's sharp warning thought. "Or Nara-more will become suspicious."

Farrow switched his gaze back to meet the absorbing stare of the unwinking, deep black eyes. He formed a thought.

"Then they do not know that you can communicate with me like this?"

"They do not know that," T'laa answered mentally. "They think we Ibim are mere freaks, intelligent animals with a capacity to read thoughts. Our powers, our past, our mental inheritance of ages, they do not suspect."

Farrow began to understand, a little. "Then you do not serve them from choice?"

The thought of the Ibim came bitterly. "I serve them because they would slay me if I refused."

Farrow, remembering something, thought, "So that's why you didn't warn them of my intentions, in the control-room?"

"That is why," came the answer. "Now listen to me. You have wondered why the Earthmen on Mars do not return to Earth now that your planet is free of contamination."

"Yes. Why?"

"Because," came T'laa's thought, "the Earthfolk on Mars do not know that Earth is now clean and

habitable. They think it is still a radioactive-poisoned planet. Only the Planners, the oligarchs like Grumman and Barth who have the government in their hands, know the truth about Earth—and they have kept it secret from their people."

Farrow felt stupefied. "Why would they do that?"

T'laa, his expression never changing, shot another thought at him. "I have read their minds. Grumman Barth and the other oligarchs maintain their power because they're the Planners descendants of those who brought the Earthmen to Mars in the great evacuation and because the people feel that their direction is necessary to survive on Mars. But on the wide, plentiful Earth, the Planners could not long hold their power over everyone. So they do not want their people to return to Earth."

Farrow's mind blazed with anger. "But how can they keep it secret, when their rocket-crew have seen Earth?"

"When we reach Mars, you'll understand how they maintain this gigantic deception," answered T'laa. "And that deception must be smashed, for the sake of your people and mine."

And the Ibim added, in an ominous, chilling thought, "You and the Earth girl won't live long when

Barth has no more use for you. We must be ready to act, as soon as we reach Mars!"

## CHAPTER VI

THE CRASHING shock threw Farrow hard against his straps, and when he fell back his head grazed the metal corner of the bunk and he saw stars.

There was a great silence.

Still a bit groggy, he clumsily unbuckled his straps and then called anxiously to the other bunk. "Jen, are you all right?"

"I'm all right," she answered. She was getting out of the bunk. "We're there?"

"Yes. We've landed."

He went over to her. Her face was so white, her eyes so wide, that he felt a sudden surge of sympathy. It had been tough enough on him, a man who was accustomed at least to the theory of rockets and space-travel. To a girl of the people who lived their backward lives in little old towns in the great forests of Earth, it must have been an even more shattering experience.

He put his arm around her. "We're on Mars but we'll get back to Earth, Jen—if we're able to reach the people here and tell them what their leaders have been pulling."

She looked up at him a little

doubtfully. "But if you succeed, then many Martians like Barth will come to Earth?"

"Not like Barth," he said. "People just like you and me, Jen—people crowded here on Mars who'd gladly return to Earth and who would be glad to help your own people."

"I do not see how we can even escape," she murmured.

Farrow didn't answer that. He had to admit to himself that the plan T'laa had proposed seemed a faint hope.

"I have read the minds of Barth's men and I know which of them secretly distrust the policies of the Planners," T'laa had told him by thought. "If we can gain one of them as an ally, we can get away."

Could T'laa enlist such an ally? Even if he could, how were they going to smash the most gigantic deception in the history of two planets?

After an hour, the door opened. Sandoz stood there, a gun in his belt and no friendliness on his serious young face.

"We're going out now," he said. "The Chief Planner wishes to see you both."

"About time," growled Farrow.

They went down the long ladder and out of the rocket, moving awkwardly on the heavy-soled Mars-shoes that had been issued

to them. They stood, with Sandoz close behind them, looking wonderingly around, feeling all at once the lighter drag of the gravity and smelling the alien scents on the chill and too-thin air, and staring at the vista that suddenly told them, *You are on another world.*

Under a sky the color of old brass stretched the low mesa of rust-red rock on which they stood. Upon it towered the big rocket that had brought them, and other rockets, and pink cement buildings, all enclosed by a high wire fence with closed steel-barred gates. But the eyes of the man and girl from Earth leaped beyond the fence to the weird distant landscape.

The sun, small and bright, was sinking toward an horizon that seemed quite close. From the top of this mesa, reddish desert dropped gently away, a panorama of infinite desolation in all directions except one. In that direction, the one that Farrow thought of as southward, lay a vast shallow bowl of pale green. He knew it was Syrtis oasis, and he saw that it was almost completely occupied by endless streets of very Earthly-looking cement buildings, running away toward a central section of taller structures. It was an oddly terrestrial city to find here in an oasis of desert Mars.

"I'm damned if it doesn't look

like Los Angeles!" he said.

Sandoz shrugged. "When our ancestors came here from Earth a century ago, they built in the way they were used to building. Come on—we're going to the main offices."

As they went, Jen whispered, "This place is far from the city, and is fenced in like a prison."

Farrow knew why it was, from what T'laa had told him. The rocket-base was isolated out here in the desert, and all but the most trusted officers were kept virtual prisoners here, so that none of them could blab the truth about Earth. The pretext given was that it was so no poisonous contamination from Earth could get abroad.

**T**HEY WENT TOWARD and into a low, long building. It was perfectly ordinary inside, and there was a room where Barth and the Chief Planner, Grumman, were talking.

Grumman's plump face took on the same friendly, genial smile that Farrow had seen in the televisor. A little pudgy in his shimmering white coverall, the picture of an elderly fond-uncle type, he advanced and grasped Farrow's hand.

"You're rather an incredible person, Farrow," he said warmly. "A man from all that time ago—just unbelievable!"

His china-blue eyes beamed at Farrow. "Barth has told me of the scientific secret, the aestivation gas that carried you into our era. A wonderful achievement! We must have its formula—it could be invaluable to us."

Barth, a slightly sardonic look on his face, said, "T'laa couldn't get it yet because the rocket-flight made it impossible for Farrow's mind to relax enough, he says. But a few probings now we're here should do it."

Farrow said flatly to Grumman, "Am I to understand we're prisoners?"

Grumman looked shocked. "Oh, no—of course not. As soon as T'laa has helped you recall that formula, you'll be our honored guests."

He smiled, and the smile was as false as water. But Barth had nodded to Sandoz, and Sandoz took Farrow's arm and said, "This way, please."

To resist might ruin T'laa's plans, so Farrow went quietly along with Jen ahead of Sandoz. He was aware that Barth and Grumman were looking after them.

Sandoz took them into a smaller room, with a desk. Farrow had a sudden impulse to laugh. In a chair behind the desk sat T'laa, and the Ibim looked like an undersized, furry executive. But the expression in T'laa's eyes struck away all

thought of mirth.

"It's all right to talk in here," T'laa murmured, after Sandoz had left them. Then Farrow's hope crashed, as the Ibim added, "My plan has failed."

"What do you mean?" Farrow exclaimed, advancing to the desk. "Did you brace one of Earth's men?"

"Yes," said T'laa. "Sandoz. His mind, I saw, contained suppressed resentment—disapproval of the way Barth and Grumman have suppressed the truth about Earth. I felt him out just before we landed."

"And he turned you down?"

"It seems," said T'laa mournfully, "that despite his uneasiness, he remains convinced by Barth's explanations. Barth has told all the rocket-men that the truth about Earth must be only gradually revealed, lest a mad stampede back to Earth wreck their society. Sandoz still clings to his belief in that."

Increasingly dismayed, Farrow asked, "But has he told Barth about your plan?"

"He hasn't had a chance to do so yet," said T'laa. "I think he has gone to do so now."

Farrow felt the impact of frustration. Then anger surged up in him.

"Then we'll have to get out of here without any ally," he said.

"How do you propose to do

that?" asked T'laa skeptically.

Farrow shrugged. "Strong-arm is the only way, now. When Sandoz comes back, I'll jump him. I've an idea how to catch him off guard. With his gun, we can force him to lead us out."

Jen said with sudden fierce eagerness, "I will help you!"

T'laa made that curious shrugging movement of his multiple limbs. "I do not think there is much hope in such a crude stratagem but we may as well try it. We have very little to lose now."

Farrow thought that T'laa was right about the poorness of their chances but he didn't say so. He said,

"Jen, you pretend to be attacking T'laa, over there behind the desk, when Sandoz comes back. It'll distract his attention a moment. I'll be behind the door, and if I can grab his gun—"

Jen nodded understandingly and went over by the desk, to stand beside T'laa. The little Ibim made a sound like a sigh.

"You children of Earth—you delight in violence. But so be it."

Farrow took up his position beside the door, so that when it opened it would hide him. He waited.

The lock of the door suddenly clicked. The door opened. Farrow tensed himself for the spring, as Jen pretended to seize T'laa furi-

ously by the throat.

Nobody came in.

Through the crack of the door, Farrow saw Sandoz standing in the opening, his gun in his hand. He was not coming in. He said,

"A foolish trick. Go over and stand with them, Farrow. Fast."

THERE WAS NOTHING else for Farrow to do, and he did it. Jen ceased her pretended attack on T'laa, and man and girl and Ibim faced Sandoz as he came into the room and closed the door. His gun covered them steadily.

Sandoz said in a tight voice, "I'm not a complete fool. I figured you'd try something like this, and didn't want you jumping all over me before I could say something."

T'laa, staring at Sandoz, stirred in sudden excitement. The young officer nodded grimly to the Ibim.

"I see that T'laa has already read it in my mind."

"You are joining us, after all!" exclaimed T'laa.

"Yes," said Sandoz. "I think it's hopeless, I think we'll all likely get killed, but I'm with you. I have to be."

"Why this sudden change of heart?" demanded Farrow suspiciously.

Sandoz' face became dark. He said, "Because I just heard something from Barth. I just heard why

he brought this tribesgirl here from Earth."

He looked at Jen. He said, in a tone of controlled fury, "Do you know why? I'll tell you. Barth is afraid that some of us may somehow start rumors among the people—rumors that Earth isn't a poisoned planet after all. He's determined to forestall all such talk, once and for all. He'll use this Earthgirl to prove Earth is uninhabitable."

"How can he?" Farrow said. "She's from Earth and she's obviously strong and healthy."

"She won't be," Sandoz said grimly, "by the time she's shown to our people here. She'll have had a deliberate dose of radioactive poisoning in the laboratory here, that'll have converted her into a hideous wreck. Barth will show her, and say, "Here's what the natives of Earth look like, from living on that poisoned world." It'll be hard after that to convince people he's lying about Earth."

Jen looked puzzledly from Sandoz to Farrow, not fully understanding the scientific references.

But Farrow felt the icy shock of rage and hatred, of which he had not believed himself capable. He knew, in that moment, that he was going to kill Barth.

"That was too much for *me*," Sandoz was saying fiercely. "I'm going to help you, and we'll smash

this whole hoax of the Planners if we can."

Farrow said, "If we could show Jen to your people right now, they'd know this talk about an uninhabitable Earth is all lies!"

"Yes," said Sandoz. "But first we have to get out of here, and that's a big if." He looked thoughtful. "Barth went back to Syrtis with Grumman, and I'm in charge of you while T'laa works on your mind. I'll try to bluff our way out of the compound."

"And if the bluff doesn't work?" asked Farrow.

Sandoz shrugged. "We'll have to fight our way out. It's night now, and if we can get a ground-car we have a chance."

T'laa, for once not mournful but excited, hopped numbly onto the desk and then to the floor, as Sandoz went to the door.

"Keep ahead of me," Sandoz said. "You two are supposed to be my prisoners. Take the corridor to the right."

They went out into the corridor and started along it. Suddenly, as Farrow and Jen walked ahead of Sandoz and the Ibim, a gray-uniformed man with a gun popped out of a doorway.

"It's all right, Venner," said Sandoz. "Orders from Barth to bring them to the city."

"I was ordered not to let them



leave the building," said Venner, his flat face obstinate and suspicious.

His gun was levelled full at them. Sandoz began an angry protest but Farrow didn't think the bluff was going to work. He tensed himself for a spring that he didn't think would work either.

Then, of a sudden, the man Venner looked stricken and startled. He turned half around, muttering surprisedly, "What—who—"

Farrow didn't know what had distracted him but he didn't wait to ask. He plunged at Venner, his head down, in a butt.

Venner swung back toward Farrow just in time. Just in time to take Farrow's head squarely in his stomach.

Farrow had forgotten the lighter gravitation. The butt not only knocked Venner's breath out, it also knocked the man back violently against the wall. His head hit the cement wall and he crumpled up like a wet string.

"A damn good thing for me he got absent-minded," panted Farrow.

T'laa uttered his dry, small chuckle. "I read in your mind that you were going to rush him. So I shot a thought into *his* mind, to distract him."

"I'll be—," Farrow began. Then, "Thanks, T'laa."

Sandoz had picked up the man's

gun. He snatched open the door at the end of the corridor. "We have to move fast now. When Venner doesn't check in, much will happen."

**T**HEY RAN OUTSIDE, Farrow and Jen moving clumsily on the heavy-soled shoes whose weight counteracted the lighter gravity drag.

The night outside was so cold that it took Farrow's breath away. Jen cried out, and pointed up at the sky. Farrow looked up and was himself stricken by the sight of a sky more brilliant and wonderful than he could have imagined.

The whole black heavens were sown with stars, a cataract of diamonds and emeralds and rubies spilled across the sky. Constellational outlines were lost in that jungle of blazing suns. Across the overwhelming panorama there crept visibly a small, ominously red moon.

"Come on!" said Sandoz urgently.

He was running toward parked cars, low-slung closed vehicles not at all dissimilar to the cars of old Earth except that they had half-tracks.

"Down in the back," he told them. "All three of you."

A moment more and they were huddling in the floor in back, as

Sandoz drove the machine across the compound. Stealing a glimpse over his shoulder, Farrow saw they were approaching a closed steel gate with a guardhouse beside it.

Two men came out, one of them yawning. The yawning man went to open the gate while the other man glanced perfunctorily at the card that Sandoz showed:

"Late, but I guess the girls in Syrtis will still be up," the man said to Sandoz. Then as Sandoz started the car forward he added hastily, "Hold on, you know I've got to look you over same as always."

The man was right beside the car. The other one had the gates half open.

Farrow grabbed up the spare gun that Sandoz had dropped on the floor of the car. As the door opened, he let the guard who peered in have the barrel of the weapon over his head.

"Get going!" he snapped.

Sandoz sent the car hurtling forward. It grazed the half-open steel gate and threw it violently aside, and the gate sent the yawning man who had hold of it sprawling.

Sandoz clipped off the lights and the car roared over a dark sandy waste under the stars. Seconds flashed by. Then from behind them came a ripping sound, twice repeated.

"Firing blind," muttered Sandoz. "But this tears it—they'll call Syrtis and the Planners' police there will be waiting for us."

## CHAPTER VII

THE LIGHT of a million stars combined with the sullen rays of the creeping red moon to drip a strange radiance on the landscape. As the car sped down off the mesa, the far-flung blinking lights of Syrtis City came closer, and now they saw the lights of two cars coming out of the city in their direction, very fast.

"Patrol cars, coming out to intercept us," Sandoz said flatly.

"Can't we swing off the road and approach the city from the other side?" asked Farrow. "We might dodge them that way."

Sandoz said, "If we don't hit a rock and pile up, we can. We'll try it."

He swung off the road and the car bumped, pitched and complained as they went across the sandy flats to circle around the big oasis. Sandoz was driving hell-for-leather, and running without lights the danger of a crack-up was real enough.

They had more light suddenly, and its coming gave Farrow and Jen a shock. A second small red moon bounded up from the dark

horizon, and added its rays to the first moon's light in an eery effect.

Jen crowded against Farrow as though for comfort. She said, "Why do we have to go to the city? We could hide out in the wilderness."

Farrow understood. She was a tribesgirl of the new Earth of wilderness, and a city was to her a strange and forbidding thing.

"We have to, because that's where the people are, and we've got to convince them that Barth has been lying about Earth," he told her.

Sandoz said, over his shoulder, "And there's no life possible in the desert between our oases."

"Except the valley of the Ibim," murmured T'laa.

"Your home?" said Farrow.

"Yes." T'laa's tone was yearning. "It holds the last of my people, the oldest children of this world."

"How did you get into Barth's hands anyway, T'laa?" asked Farrow.

T'laa made the curious shrugging movement. "By relying on the word of Earthmen. When they came to Mars a century ago, they made pact with us that they would leave us alone. But Barth and Grumman needed one of us, with our mental powers—and captured me, outside our valley."

"But couldn't you have let your people know—telepathically?"

"Our power of projecting thought is not unlimited in space," answered the Ibim. "I could not reach them from that distance. And we are not a people of war."

T'laa added, thoughtfully, "But now, if we can expose the Planers' deception, it may ward off future evil to the Ibim."

Farrow understood. If the big lie of Grumman and Barth was exposed, the Earthmen would leave Mars—and that would not make the Ibim unhappy.

They were a quarter of the way around the oasis and its great bowl of lights now. Sandoz suddenly pulled up, uttering an exclamation.

"No use. See those patrol-cars? They're coming out this side of Syrtis too."

Farrow saw. Car-lights were speeding out into the desert from several points around the city.

"We've got to risk them, make a dash in," Farrow said. "All we need is a little time to tell your people about this lie, to show them Jen and myself!"

Farrow reached and turned a switch on the dash. "If I could know where their patrols are concentrating, we might slip them. This is an official car and can receive police-communic calls—"

He turned a dial while they all waited tensely, a strange little

crowd in the dark, cold car, their faces illuminated uncannily by the forked red light of the flying moons.

"Nothing," said Sandoz. "Barth thinks fast. He'd know we could hear him. I'll see if there's news of us out on the general wave."

Suddenly, as Sandoz turned the dial, a crisp male voice spoke from the audio.

"Special Bulletin from the Planning Board, repeated! Four people have escaped quarantine at the Rocket Base!" There followed the names and descriptions of the four of them, but with no hint that Farrow and Jen were Earthlings. "These four people are dangerously contaminated by Earth's radioactive poisons, and can communicate a serious poisonous contagion! Report immediately to Planning Center if you see them."

Farrow exclaimed, "Why, damn Barth! He's put out this story about our being contaminated to make people afraid of us!"

"Yes," said Sandoz. "And they will be afraid. This rips our plans right up. Even if we got into Syrtis now, nobody would listen to us. They'd screech for police and run away from us."

**T**HERE WAS A HEAVY silence, and Farrow looked down at the car-lights coming out from the city

—the city whose people could be living on Earth, if they but knew the truth.

"What are we going to do, then?" asked Jen.

Sandoz said hopelessly, "I guess they have us. We can't get to other oases, other cities—they'll have had the same word from Barth, by now."

"Then we just let them take us?" said Jen, incredulously.

"Like hell we do," said Farrow. "So we can't go into Syrtis now, or any of the other Earthman cities—we'll go somewhere else."

"Bravely spoken, but you don't know Mars," Sandoz said. "There is no place outside the oases. Just desert."

"There's the valley of the Ibim," said Farrow. "T'laa's people."

"Oh, no," said the Ibim quickly. "My people will not let Earthmen enter there."

"Not even to save themselves?" said Farrow. "Barth captured you, T'laa. How long before he takes other Ibim for the Planners to use? How long do you think he'll leave your valley undisturbed?"

T'laa's voice was troubled as he answered. "Yes, I fear that too. It is why I wished to help expose the lies, so that Earthmen would leave Mars and leave us in peace."

"We need help, to accomplish that," Farrow pointed out. "First

a place of refuge, then help to get ourselves heard by the people here in spite of Grumman and Barth."

"You don't understand," said T'laa distressedly. "The Ibim will not have you or any other Earthmen in their valley. Our life is in thought. And the presence of alien minds is too distracting to us, not to be borne."

Farrow refused to give up. To blast open the conspiracy of the oligarchy of Planners, they needed allies. They wouldn't find any among the Earthmen on Mars, not after that broadcast. The Ibim were the only chance.

"You've got to make your people understand," he said roughly to T'laa. "You've got to explain that this is the only chance for them to get rid of all Earthmen here, before Earthmen make them big trouble."

T'laa was silent. They waited, and the car-lights of patrols down in the darkness edged closer. Finally T'laa spoke.

"It will be useless. I know the Ibim. But I am willing to try."

"Then get going, Sandoz!" said Farrow. "T'laa will show us the way."

The car rolled again, still without lights, swinging around in a half-circle and heading northward, as T'laa gave directions.

"In this sand we leave a trail a

child could follow," said Jen.

"It makes no difference," Sandoz said over his shoulder. "When day comes they'll have planes out looking for us. Speed is our only chance."

"And even speed is for nothing," murmured T'laa. "I am sure the Ibim will not let you in."

Farrow exploded. "A fine bunch of defeatists I'm travelling with! You all hate Barth's guts as much as I do—snap out of it, and we'll smack him down for good. We can do it."

He added, "Show me how to drive this thing and I'll spell you after a while, Sandoz. Have we fuel enough to get there?"

Sandoz answered dryly, "We've made *some* progress since your time, Farrow. The engine of this car is nuclear. So are all our power plants. It's why we finally had to go to Earth, looking for radioactive ores."

Dawn found Farrow at the wheel, with T'laa beside him and Sandoz and Jen sleeping in the back seat.

A red glow briefly suffused the starry heavens. Then the dazzling little sun bounded up, and the sky changed to lemon and then to brass. Low, rust-red rocky hills marched on either side of them, and miles ahead rose steep red cliffs hundreds of feet high. No blade of

green grass, no water, no life. Nothing but the sand and rock stretching forever under the brazen sky.

Farrow said to himself, "I am on Mars." He didn't believe it. The air was cold and thin, and gravity seemed a little wrong, but those things were not enough to convince him that he had stepped out of his own time and world to this last refuge of civilized man.

He glanced around at Jen. In sleep, her face lost its hawk-like fierceness and softened to childishness. He felt a sudden warm emotion toward her. To the tribesgirl of Earth's forests, all of this must be even more shattering than to him, yet she had not shown fright or weakness. He thought that Jen and her people were worth fighting for, worth helping back to civilization.

"Are you sure that you will be really helping them?" asked T'laa.

Farrow started, and then said, "I wish you'd tell me when you're reading my thoughts, T'laa." Then he asked, "What do you mean?"

"I mean, is a civilization of machines so greatly to be desired?"

Farrow shrugged. "That argument has been going on since the Greeks. I don't know the answer. I know that I was a scientist, that Earth's people had a scientific civilization, and I want them to have it again."

"So that they can again destroy

their world?" asked T'laa.

Farrow looked at the Ibim. "I think they've learned their lesson on that. But what about your people? If your life is in thought, as you said, aren't you too trying to master nature?"

"Oh, no," said T'laa. "We try to understand nature, not to master it."

"But even to do that, you need data."

"Yes," said T'laa, "but we have it—the data of a million lifetimes."

Farrow did not understand, but before he could say so, T'laa held up a furry hand for silence. "Someone comes."

**I**NSTANTLY, Farrow glanced back, but there was no one in sight on the red waste behind them. Then he heard a whistling scream. He stuck his head out the window and looked up, and saw a small plane with unusually broad wings rushing across the brazen sky high above. It curved around and went back in the direction of Syrtis.

"I got the pilot's thought a little," said T'laa. "He was calling Barth that he had located us, that we were only five miles ahead of Barth."

Farrow's answer was to jam the throttle deeper. The car pitched ahead, rocking and pitching each time it hit a small stone. Sandoz

and Jen woke up almost at once, and Farrow, without turning, told them.

"How far to your valley, T'laa?" asked Sandoz sharply.

"Ten of your miles, perhaps twelve."

"Not good," muttered Sandoz. "Barth will have the fastest cars in Syrtis. We'd better hurry."

"I'm not," said Farrow, "exactly standing still as it is."

He sent the car barrelling forward over the hard-packed red sand, its tracs spinning furiously whenever it hit loose sand. The sun stung him despite the chill in the air, and he began to sweat.

The red cliffs came slowly nearer. They emerged from between the low ridges, and ahead of them a two-mile stretch sloped smoothly up to the base of the cliffs. Farrow thought they were going to make it.

"Turn right," said T'laa suddenly. "*Fast!*"

Farrow did so, and next instant a shadow flashed across the sand ahead of him and then a thin sword of fiery energy slashed down from above and hit the ground a little to their left.

He looked up and saw the low plane curving around fast, and already it was whistling back to make another pass at them.

"Barth has told them to stop us,"

said Sandoz grimly.

Farrow thought they wouldn't have a chance if it were not for T'laa and his parapsychic powers. He drove on toward the cliff, and when T'laa called sharply, he was ready and swerved the car again.

The bolt of energy missed again, and the plane swept on, but next moment there was a splintering crash as their right front wheel hit a rounded red rock two feet high. He had swerved right into it.

Farrow frantically fought the wheel, and kept the car from turning over. It slewed around with a protesting screech, and then stopped.

"We're only a mile from the entrance to the valley," said T'laa. "We must run."

They scrambled out. Jen pointed back down the slope, uttering a cry. Two cars glinted in the sunlight down there, coming fast.

The plane came screaming back and they flung themselves down onto the sand. There was a *crack-crash* sound and a scorched smell and wave of heat.

"Quick," said Farrow, jumping up. "Before that dam' plane can come back again."

They bolted toward the cliffs. T'laa led, nimble as a big monkey and looking not unlike one as he ran.

A narrow split in the cliff, a

mere crack, opened before them. They heard the plane coming down again, its unnerving whistling echoing eerily from the cliff-face just in front of them, but this time they simply ran faster and plunged into the crack in the cliff.

It was a crevice no more than six feet wide. There were signs of ancient water-erosion and Farrow thought that it was a natural split which in ages passed had been smoothed out by running water.

He heard motors roaring and looked back out to see Barth's two cars racing up the slope. He had kept the spare energy-gun and now he raised it, asking Sandoz how to trigger it.

"No!" said T'laa sharply. "If there is any violence on your part, the Ibim will never admit you."

And T'laa started along the crack, deeper into the cliff. Farrow followed, taking Jen by the hand, with Sandoz trailing them.

The crack in the cliff was icy cold, and shadowy. The echoes of their own footsteps sounded loud in their ears. Presently, as the crack wound this way and that, other echoes of hurrying feet came to them from behind.

"Barth is still following," Sandoz said grimly. "If it wasn't for what T'laa said, I'd set up a little ambush here."

They ran on, and suddenly there

was more light ahead. The crack debouched abruptly into a great gorge deep within the cliffs, a strange valley whose rock walls rose so steeply and loftily that the morning sun did not penetrate here.

Farther down the cliff-locked gorge, Farrow caught the pale green of plant-life. Then he saw that what he had thought were distant and grotesque rock-formations were massive and fantastic structures of stone. There was a city in this valley of stone and shadows—a grotesque metropolis of turnip-shaped domes and fans and twisted spires, glooming unreal in the dusk.

For the first time, Jen showed fear, recoiling against Farrow.

"It's all right," he said to her. "Come on."

"No, wait," said T'laa swiftly. "You can go no further without permission of the Ibim. From here I can contact them."

They waited tensely as T'laa stood, facing the distant, ancient structures. From the crack in the cliff behind them came louder echoes.

T'laa finally turned his mournful black eyes toward them. He said. "It is as I feared. The Ibim refuse. They say you must go back."

"Back into Barth's hands?" exclaimed Farrow. "Like hell! We're going ahead, with or without permission."



He took a step forward, holding to Jen's arm, and then a cold hand seemed suddenly to grip and paralyze his brain. His limbs refused to obey him. Utterly without volition, he turned and walked back into the narrow pass, with Jen and Sandoz stiffly following him.

"My people say they must *force* you to go back," said T'laa.

### CHAPTER VIII

FARROW MADE a frantic mental effort to break the strange control imposed upon him from outside, the control that was forcing him to walk right back into the cleft. They were walking toward Barth, toward death, and he must break free of the mental compulsion.

He could not. His limbs refused to obey his own will. They were obeying the will of others, the projected parapsychic command of other minds. He had known the Ibim could enter and read the minds of other people. He had never dreamed that they could do this thing.

They were almost to the opening of the cleft, about to step into it, Sandoz and Jen walking as stiffly as himself. Farrow saw horror in the tribesgirl's eyes. He wanted to speak to her, but couldn't. Then the figure of T'laa appeared, walk-

ing in front of them.

Of a sudden, the compulsion to move forward weakened. In his mind, Farrow heard a powerful, troubled thought.

"T'laa, stay here! You need not go with the Earthmen!"

And Farrow caught the flashing thought that was T'laa's answer.

"If you send them to death, you send me also. For I brought them here, and must share their fate."

A confused whirl of thought and counter-thought spun through Farrow's mind, disputing mental impulses so brief he could not get them.

Abruptly, the compulsion that gripped his motor-nerves and limbs was lifted from him. He felt shaky, staggering, but was himself again.

Jen uttered a choking cry. Farrow went a little weakly to her side and put his arm around her. Sandoz was swearing. But T'laa spoke to them aloud, in passionate urgency.

"The Ibim have agreed to hear you," he said. "But hurry—"

He led the way down a slope of thin grass, away from the red cliffs and toward the distant shadowy stone city. Before they had gone a quarter-mile, Sandoz uttered an oath. He had turned, his gun out.

"Don't fire!" T'laa warned. "The Ibim will deal with them!"

Farrow swung around. Barth and

a half-dozen other men had emerged from the cleft, and stood there levelling their weapons at them.

The blasts would rip them to pieces, at this range. Farrow swung Jen behind him, in a futile gesture.

Nothing happened.

He stared up at Barth and the other men. They were so close that he could see Barth's square face and sandy hair. Yet still, no one up there fired.

Then, stiffly and mechanically, Barth and his men lowered their weapons. They turned, and walked like slow-moving automatons back into the cleft in the cliff.

"I told you the Ibim would repel them," said T'laa.

"I wish to Heaven they'd killed them!" said Farrow, sweating.

T'laa turned a look of distress on him. "Repress such violent thoughts, or they will tell against you. It was only by great effort that I prevailed on my people to allow you to enter."

Farrow said, "I saw and heard. Thanks, T'laa, for what you did."

"Don't rejoice too soon," said T'laa, worriedly.

Sandoz was still glaring up at the cliff. "What if Barth and his men try it again?"

"They won't—but even if they should, the Ibim will be watching and their combined mental power can drive them back again," said

T'laa. "Now come."

They started down the valley, but like Sandoz, Farrow looked uneasily back from time to time.

The thin grass gave way to neatly cultivated plots of odd, broad-leaved plants of the same greenish-yellow color. A narrow road ran between these to the city.

The buildings loomed ahead in the chill shadows, starkly Egyptian in the massiveness of their stony bulk, but like no Earthly architecture in their fantastic outlines. Extending across the whole valley here, gathered around an heptagonal structure of greater size, these ancient stone piles looked as though the teeth of a million years had gnawed them.

Farrow looked at the undersized, monkey-like figure of T'laa beside him, and asked wonderingly,

"How did your people ever build them?"

"There was a time, long ago," said T'laa, "when we used machines and powers we no longer use. That was when this city was built, and when we arranged the capillary-system underground that draws moisture from deep strata."

Farrow thought that T'laa spoke as though he himself had helped in that inconceivably ancient work, and he felt vaguely puzzled.

They were in the city now, walking in the cold shadows, and from

windows and doorways of the time-eaten structures, the Ibim looked at them.

They were like T'laa, but with differences. Differences of sex and of age. There were small young ones and there were old ones with silver fur, but all looked at the Earthfolk in the same somber, silent way.

JEN CLUNG close to Farrow. And Farrow too felt the shock of their strangeness. Back in his own time, when the First Martian Expedition had come to this world, it had not been dreamed that Mars had such children. The First Expedition, concentrating on the oases, had never seen them.

"Do I get to talk to your people?" Farrow demanded. His purpose was strong in his mind, and these Ibim were their only possible allies.

"Later, you will be examined," said T'laa. "Not now."

He led them toward a building near the big heptagonal structure, and into a doorway. They went down a dusty, cold stone corridor and into a large, shadowy room. There were some thick mats of woven fiber on the floor and some beautiful iridescent vessels and articles of glass, and nothing else.

"You can rest here," said T'laa. He squatted quietly down, splay-

ing his multiple limbs comfortably, and then looked up at Jen, who stood tensely beside Farrow. He said, "Quiet your fears. No one here will harm you."

Jen flushed, and Farrow guessed that T'laa had read her thoughts. He sat down beside the Ibim and said impatiently,

"It isn't rest I want but a chance to put things up to your people. That mental power they used on us and on Barth—it's terrific. It could help us crack the Planners' big lie, fast."

"I do not think you can expect such help," T'laa said discouragingly. "But that will be talked of later. You Earthfolk live so briefly that you are always hurrying."

Farrow said irritably, "You talk as though you were ten thousand years old, yourself."

"I am older than that," said T'laa.

Farrow and Sandoz and Jen stared at the little Ibim incredulously. T'laa said, "Not in body—my body is younger than yours. But my mind is many tens of thousands of years old."

"How? What do you mean?" asked Farrow.

The mournful, luminous dark eyes looked into his. "When one of us Ibim is about to die, he takes care that his mind does not die. He uses our skill at such things to

transfer the whole mental *pattern* of his mind, to a very young, new-born Ibim. Then he dies—but his mind, his memories, all his knowledge, live in the brain and body of the younger Ibim.”

“I never heard this about the Ibim,” Sandoz said sharply.

“There is much about the Ibim you do not know,” T’laa answered.

Farrow was thunderstruck. “You said tens of thousands of years? You mean this passing-on of the mind and memories from one generation to the next, has been going on for—”

“For longer than that,” T’laa said. “There are some among us who can remember Mars when it was a young, living world.”

Farrow gaped, incredulous. Then, suddenly, a vision flashed into his mind, clear and vivid and utterly real.

He looked upon a green and verdant Mars. Down from hills not yet worn away by time sloped the fertile lands, and the river that ran from the hills washed the edge of a fairylike glass city. And of a sudden he was in that city, among the Ibim. But these Ibim were not furred, their bodies were covered with golden down. Their glittering air-fliers buzzed like dragonflies, going and coming between cities far away.

“I lived in that city,” came

T’laa’s thought. “Not bodily—the body of the Ibim who lived there is dust these half-million years, but his memories are my memories, passed down through all the generations.”

Farrow glimpsed a swift kaleidoscope of shifting scenes then—a dozen glimpses of this world down through great stretches of time.

He saw the vegetation dying, and the sand blowing from the ever-increasing desert areas. He saw the glorious glass cities dull and dim and fall slowly to ruin. The dry death crept and crept, and then the last of the Ibim retreated into their ancient stronghold in the valley, no longer making and using machines, living a life of memory and thought.

And then it seemed to him that he stood with the Ibim in the darkness of night and watched great bulks that flamed and thundered coming down from the starry sky, in dozens, in scores. And he heard the Ibim saying,

“The men of the third planet have come to stay, this time. We shall make pact with them, they not to intrude upon us and we not to intrude upon them.”

Of a sudden, Farrow found himself looking into the deep, dark eyes of T’laa, only inches away from his own eyes, in the shadowy stone room.

"And that," T'laa said quietly, "is why I do not think my people can help you."

"But Barth has already broken that pact, by trying to force his way in here!" exclaimed Farrow.

"He has, but he will not do so again now that he knows we have weapons of the mind that can stop him," answered T'laa. He rose to his feet. "Rest now. Later you shall speak."

Farrow, watching him go, felt a premonition of failure. He turned to Sandoz and Jen, and saw the same thought in their faces.

"It was a forlorn hope, anyway," muttered Sandoz. "T'laa warned us of that."

"We can try again to reach your people with the truth, even if the Ibim won't help," said Farrow.

Sandoz shook his head. "We can try, but we won't get far. Do you suppose Barth will just go away and forget us?"

That brought a new thought to Farrow's mind. He didn't think much of the idea, but it would be the only argument he had, when he faced the Ibim—

**WHEN HE FACED** the Ibim it was hours later, in the big heptagonal building. It was night, and a few glowing bulbs cast an eery radiance over the rows of faces, the silent figures, the luminous

eyes, that were ranked in the stone seats of a gathering-hall they did not half fill.

He had been speaking, tensely and nervously, with Jen and Sandoz behind him, to those silent figures. He could not see T'laa, and it seemed ridiculous to speak his language to creatures who could not understand it, but he knew they understood his thought well enough.

When he was answered, it was in thought, not speech. And the thought came from a silver-furred Ibim whom T'laa had called Vruna.

"No. What you ask is that we meddle in the quarrels between Earthmen."

"I ask that you defend yourselves, - by helping me," Farrow insisted. "If the Earthfolk here on Mars know the truth, they'll be glad to return to Earth. If they don't learn that truth, if they stay here, you'll be attacked by Grumman and Barth."

The answer came. "They will not attack. They have learned now that they cannot enter this valley against our mental weapons."

Farrow laughed mirthlessly. "You don't know much about Earthmen yet. Grumman and Barth are determined to be rid of us three. They can use long-distance weapons that your thought-defences won't stop."

"You say that, Earthman, because you wish us to help you, but

you have no proof of their intentions."

Farrow seized upon the idea that had come to him hours before. He asked a question, knowing that everything hung upon the answer.

"Tell me, have Barth and his men gone back to Syrtis—or are they still outside the valley waiting?"

There was a small pause, then came Vruna's thought-answer. "They have not gone. They are camped outside the pass."

Farrow said quickly, "That's what I expected! Barth has messaged the Planners to send enough men and weapons to attack your valley full force, and he's waiting for them."

Again, the small pause. "You are still only guessing at their intentions."

"Put my guesses to the test," Farrow retorted. "Find out for yourselves if it's true or not."

"How?"

"By slipping out to the camp of the Earthmen outside the cliffs, and reading their thoughts, you can find out exactly what they plan!"

There was a very long silence, and no thought came to him at all from Vruna or any of the silent, shadowy throng. Then, at last,

"We shall make that test."

Farrow said eagerly, "And if we

find I'm right, you'll help us against the Planners?"

"We shall think of that when we know," was the answering thought.

An hour later, twenty Ibim led by Vruna marched out of the dark city in the valley. They went, not toward the cleft, but up through the night along a steep path that climbed the inner cliffs. T'laa had explained that it was another way out that only the Ibim knew.

Farrow trudged behind the silent figures, with T'laa. Sandoz was behind him, and Jen, for the tribes-girl had refused to stay alone among the Ibim.

The rising red moons lit the file of furry little figures ascending the precarious pathway. Looking at them, and at himself and Sandoz and Jen, Farrow thought that it was a strange company indeed that was going forth to decide the fate of two planets.

## CHAPTER IX

FROM PHOBOS and Deimos, racing toward moonset now, a mingled radiance angled down upon Farrow as he crouched with T'laa and Vruna. They and Sandoz and Jen were behind a rock, at the base of the dark cliffs over which the whole party had come. Back in the dimness were the other Ibim.

Farrow said, "There's no need for you to read their minds. Look down there."

A thousand yards down the slope, there were lights and activity of hurrying men. Barth and his two cars and six men were not the only ones there now. There were two big trac-trucks, and on them were mounted silver-gleaming mechanisms with sharp snouts. Another half-dozen men were busy around these.

"They're missile launchers," said Sandoz. "They're used by the rocket-base to launch experimental test-missiles—but can use explosive missiles too."

"So that's what Barth sent for," said Farrow. He turned to the two Ibim. "He won't have to go into your valley. He can destroy everyone in it from outside."

There was a silence, and he knew that T'laa and Vruna were reaching their parapsychic probes down into the brains of the men below.

Then Vruna's thought came to Farrow, throbbing with cold rage. "It is true. Barth is ordering the missiles prepared for firing. He and the other Planners are determined to slay you three Earthfolk and preserve their secret, at any cost."

"Secrecy is why he sent for only a small group," Farrow said. "That makes it easier. You Ibim can seize control of their minds as you did

with us in the valley, and—"

"No," interrupted Vruna's thought. "Not all of them. You don't understand. To seize a man's brain takes great mental power, and our powers are not unlimited. In the valley, all of the Ibim combined used their powers against you."

Farrow felt a sharp disappointment. He had been so terrifically impressed by his experience in the valley that he had assumed a few Ibim could mentally master any number of men.

"How many can you control?" he asked.

"Three—perhaps four," Vruna answered. "And even with those, we cannot master them absolutely."

Farrow thought for a minute. "Then concentrate on the men setting up those missile-launchers. Try to make them destroy the launchers."

"And then?"

Farrow said, "Then, while they're still all confused, we rush them. We outnumber them. We can disarm them."

This time, the silence was very long and pregnant. It was, Farrow knew, the crisis of his effort. He knew by now how much the Ibim abhorred violence. He did not know if they could conquer their ancient aversion, in the face of this clear and present threat.

"Why not destroy the launchers and let them go?" asked Vruna.

"Because they'll come back—and next time with planes and bombs if they have to," said Farrow. "You'll always be in danger from the Planners. But if we can break the Planners' conspiracy, tell the Earthmen on Mars the truth, they'll all return to Earth in time and you'll be safe."

They thought about that, though they did not let him receive their thoughts. He waited, sweating, thinking that the missiles would soon be ready for firing.

Then he heard T'laa's powerful thought. "I say that Farrow is right. I have been with Barth and the Planners, I know what they will do to us in time. If we act now, we can have our world free of Earthmen."

With relief, Farrow heard Vruna's thought. "It is agreed among us. We fight. Though I fear the Ibim are not adept at conflict."

He and T'laa rose, and Farrow and Jen and Sandoz followed them back up the slope to the shadows in which crouched the other Ibim.

Sandoz shook his head pessimistically. "It may work. I hope so. But we've got one energy-gun I know how to use, and another one you don't know how to use, and our bare hands. And the Ibim are no fighters."

"I picked up this in the Ibim city," said Jen in a fierce whisper.

In the red moonlight gleamed the thing in her hand, a long glass knife of exquisite workmanship.

"Quiet now," said T'laa in a low voice. They hunched down, watching and waiting.

**T**HE IBIM WERE gathered together, staring down at the busy men and trucks below. In the forked moonlight, the crowd of silent, dark little figures with their great shining eyes made Farrow think for all the world of big monkeys roosting on a temple wall.

Down there, the sound of clacking gears and urgent voices still came to them, and Farrow saw the snouts of the missile-launchers rising into firing position.

He thought that this was a hell of a way to start a fight, to sit here and think at your enemy. And anyway, it wasn't working.

The Ibim sat and stared, never moving.

Suddenly there came a crash of metal from below, and then another, followed by a cry of rage.

"What the devil are you *doing*?" shouted Barth's voice. "Stop them —"

"By Heaven, it's working!" said Sandoz. "The missile-men are smashing the launchers."

A growing turmoil was going on



down there around the trucks. Farrow could imagine the amazement and consternation of those of Barth's men who were not affected, when they saw their comrades sabotaging the launchers. They wouldn't guess right away that the saboteurs were under mental control from outside—

Farrow was wrong about one of them. Barth was quickminded and out of the fist-fight going on around the trucks came his angry shout,

"It's an Ibim attack on our men's minds! Knock them out fast—kill them if necessary!"

Farrow leaped to his feet. "This is the only chance! Come on—and Jen, you stay here with that damned knife."

He and Sandoz ran down the slope and the Ibim, scuttling like apes, swept all around them as they raced toward the fight at the trucks.

Right in front of them, a stalwart man broke free of the fight and whirled to face them. Farrow saw Barth's furious face, and knew they'd been seen. Barth had his gun out but he hesitated oddly.

T'laa, running beside Farrow, said, "I can't hold him—be quick!"

Barth was fighting off T'laa's mental assault, and bringing the gun up. Farrow plunged in a low tackle for his ankles, and felt a

crackling blast of energy above him as he brought Barth crashing to the ground.

They rolled together, Barth trying to club the gun. Beyond him, Farrow had a brief glimpse of the Ibim swarming all over the thoroughly bewildered men around the trucks. He heard gun-blasts and a screech of pain, and then Barth swung the gun against his head, and Farrow's brain rocked. His hold on Barth loosened, and Barth rolled free and levelled his weapon, his face livid with hatred.

Farrow frantically sprang in again but was aware that this time he was too late, and that the blast would cut him in two.

Something glittering flashed past him, and Barth's face changed strangely. He dropped the gun, his hand went mechanically up to the glass thing sticking in his throat, and he fell forward and lay still.

Farrow turned, wild and bewildered, and saw Jen behind him. He said, "Good God, you—"

"That pays for my brother," she said.

He scrambled to his feet. Two Ibim lay dead, and three of Barth's party. The others who had followed Barth were backing away, bewildered by the fight and by the mental attack of the Ibim. Sandoz had his gun levelled at them, and was saying sharply.

"Back away from the trucks! Any man who still has a weapon, we'll kill!"

Vruna, the silver-furred Ibim, stood beside Farrow and Farrow caught the old Ibim's projected thought, one of strong self-loathing.

"There has been enough killing already, and we Ibim have helped in it—for the first time in thousands of years. No more of such filthy work!"

"Listen," Farrow said urgently to him. "We have to go to Syrtis City or everything we've done here is for nothing."

Vruna turned gloomy eyes upon him. "And when we get there, what then—more killing?"

"There need not be," said Farrow. "With your help—and only with it—we could get to Grumman. If we can make *him* admit publicly that the Planners have been lying, that Earth is perfectly habitable, it will be believed."

Sandoz, without turning, said, "No, Farrow, it wouldn't be believed. My people have been convinced too long that Earth is radioactive-poisoned, to change their minds quickly. They must be shown proof."

Farrow stared at him. "Is there such proof?"

Sandoz nodded. "All the photographs, data and reports we brought back from the two pros-

pecting trips to Earth—they all went to Planning Center, to the Planner Board."

"By Heaven, if we can get that stuff and show it to your people, the job will be done!" exclaimed Farrow. He turned to Vruna. "I will not ask you to use physical violence again. But we need your mental help. Will you come?"

Vruna hesitated. Farrow guessed the powerful struggle going on in the Ibim's mind, the conflict between a passionate desire to rid Mars of Earthmen and an equally passionate loathing of violence.

HE HEARD T'laa's quiet thought, projected so all could hear it. "We need not take life in Syrtis, Vruna. But if we prevent the killing of these, our friends, we are saving life."

Vruna's thought finally answered. "We will go. But we will not kill again—not for you, not for ourselves, not for anyone!"

"Then let's get going fast!" Farrow said. "We can leave Barth's men here—disarmed, they can't bother your valley. We'll disable their cars too, and take the trucks."

A half hour later, the two half-trac trucks roared down the slope and onto the moonlit desert. Farrow drove one, with Jen and T'laa on the seat beside him and with half the Ibim crouched down in the

body of the truck. Sandoz drove the other truck, with the rest of the Ibim.

Hour after hour the two trucks raced over the desert, and the nearer moon sank behind the horizon and the light lessened, making their speed still more dangerous. Sandoz led the way with his truck, and Farrow hoped he would not get lost.

It seemed an eternity before Jen uttered an exclamation, and Farrow saw far down in the great shallow bowl of the dark oases, the mass of blinking lights that was the biggest Earthman city on Mars.

"There is not much time," warned T'laa. "It will be day very soon."

Farrow wondered fleetingly if the little Ibim regretted the venture now that the crisis approached.

"I do not," answered T'laa. "But Vruna is very doubtful."

They rolled down the slope of the bowl. Up on the plateau beyond it, the silvery towers of the great rockets loomed against the stars. Those rockets, and more like them, would take Earth's deluded, exiled children back home, if they succeeded. Farrow's resolution hardened.

Sandoz led the way and the two trucks woke loud echoes in the dark and sleeping streets of Syrtis. They passed massive hydroponics

plants, warehouses and factories, streets of cement houses so Earth-like in their look that they testified to the nostalgia of their builders. A few people looked surprisedly at the racing trucks with the launchers on them, but no one could see the Ibim crouched down in the bodies.

"Planning Center," said T'laa, hardly audible over the roar.

Sandoz' truck had turned into a small square that was almost completely occupied by a massive U-shaped cement building. There was a high gate of steel bars leading into the courtyard of the U, and it was closed and had two men on guard behind it.

"This is up to you Ibim," said Farrow to T'laa.

"Yes. Be silent," said T'laa.

One of the guards inside the gate was sharply calling a challenge to the two trucks.

"Is Barth there? The Planners have been waiting all night for him to report back, and—"

The guard suddenly stopped speaking. A strange, stiff expression fell upon his face and upon the face of his comrade. Then he moved mechanically toward the gate.

The Ibim in the trucks were holding both men by mental mastery, Farrow knew. He watched tensely and saw the guard clumsily unlock and open the gate. The

trucks rolled into the court.

Farrow leaped out, with T'laa and Jen after him. He had brought an energy-gun with him, even though he didn't know how to use it. He thought he'd probably destroy himself if he turned the thing loose, but the feel of it was comforting.

Vruna and the other Ibim were piling out of the backs of the trucks, still holding the two guards like zombies, as Sandoz ran and locked the gate again.

"Look out!" said T'laa suddenly. "Others come—"

Two more guards were running out of the main doorway of the massive building, and they had guns in their hands and were firing. The crackling blasts cut low, and Vruna suddenly said in a quiet thought,

"This is what comes of violence. Remember it, my people."

The old Ibim fell, half his side blasted away. Sandoz had turned loose from the gate with his own gun and one of the guards in the doorway fell. The other one suddenly dropped his gun and stood looking wooden and witless, like the two who had opened the gate.

"Hold them," said T'laa's thought, and a shiver of fear and rage went through all the furry crowd of the Ibim. "Hold them."

They held them. The three stood

like statues while their weapons were taken from them. An instant later, Farrow and Sandoz, with Jen and T'laa behind them, were running into the building.

They entered a wide, softly-lighted corridor of pastel-colored concrete, and Sandoz said, "This way."

"Wait. They come," thought T'laa.

A door was flung open and Grumman burst out into the corridor, his plump face angry and scared. There were four other men, from middle-aged to elderly, behind him.

"What the hell's going on here?" Grumman started to say, and then went silent, his jaw sagging as he looked at the quartet coming down the hall, the two grim men with their guns, the tribesgirl and the Ibim.

"The Planners," said Sandoz bitterly. "Oh yes the Planners who knew best for all of us whose wise government alone has made it possible for us to live on Mars. I ought to kill them."

The five men who were the oligarchy of an Earth in exile stared at the guns that covered them unable to believe their eyes.

"First," said Farrow to Grumman, "we want the photographs and data from Earth. Then you're going to make a little speech by tele-

visor to all the people on Mars and prove to them what Earth's really like. You can make it from here, can't you?"

"Yes, he can make it from here," said Sandoz. "All he has to do is to call for an open channel from the transmitter-relay here in Planning Center. And he will!"

Grumman opened and closed his mouth twice before he could speak. Then, trapped and frightened, he tried to gather the rags of his dignity together.

"There was no need—no need for all this force," he stammered. "We always meant to inform our people of the true situation, in time. But the ground had to be prepared, we had to be careful—"

"If you're very careful," Farrow said, "you may get out of this alive. I'm not sure."

**T**WO HOURS LATER saw Syrtis City a whirlpool of excitement, doubt, and growing jubilation. The televisor broadcast they had forced Grumman to make, the irrefutable proof that had been displayed that Earth was again open to be the home of men, had been like the sudden release of lifelong prisoners. The people of the oases simply could not take it in, at first. But now they were beginning to, and a cry was running through all the crowded streets around Planning Center.

"We're going back to Earth! To Earth!"

Sandoz said, "We've locked the Planners in the strongest cell there is here—or they'd be torn to pieces."

T'laa looked at them. "You have done the thing you wished. Now we Ibim will go home."

Farrow stepped toward the furry little figure with the mournful eyes. "But we will see you again, T'laa?"

"I think not," answered the Ibim. "And I think that is good. Vruna was right. We have been friends, but your ways are not our ways."

Farrow watched the Ibim go, and then he turned to Jen.

"We'll be going home too, Jen, soon. All these people—people who never even saw Earth—in time they'll all go there, and it will be going home for them, too."

She nodded, her eyes shining. "With what they know, the things they can do and teach, we'll rebuild Earth as it used to be."

A deep doubt shook Farrow. "And will it all end up as it did before, in total destruction?"

"It won't—it can't!" she said. "Surely we have learned something."

His arm went around her, and he drew her close. "I hope you're right," he said. "I hope to God you're right."



D. BRUCE BERRY

# Blizzard - Brain

by

*Darius John Granger*

**Nobody got excited when the snowstorm hit on Sargus. Afterall, what's a little blizzard? Nothing much normally — but this one was alive!**

**T**HREE DAYS AFTER the new year the skies of Sargus began to darken to a flat lead color, and the construction station prepared itself for the first of the wild storms about which it had been warned. To the west of the flat, bare valley through which the road was slowly pushing between the jerrybuilt cities of Wilson and Edison, naked and thus-far-unexplored mountains towered into the murky cloud-swirled sky. It was up there, supposedly, that the storms began. No one could find out exactly what the storms were like, because Queel refused to go into detail.

Queel was one of the ten thousand oxygen-breathing creatures left on Sargus, a remnant of a once-powerful civilization. He was a thin, bony being with a narrow head that swelled at the top, and pale heliotrope dermal covering. He

came down out of the mountains one day and attached himself to the construction party. Mostly he sat in a corner of the mess shed, eyes closed, sleeping as though content to be in out of the normally chill Sargus weather. But he had talked of the storms, with a small and oddly secret smile, and he had gone so far as to indicate that they brought terrible snow.

Although the whole station was made uneasy by Queel's indefinite yet disturbing prophecies, Transportation Engineer Dan Jeffords, in charge of the camp, relentlessly drove such shadow-worries from his mind, and devoted himself to readying the sonic sweepers to clear the concrete between the station and the end-of-pavement. Regardless of the weather, construction was going to go ahead all across Sargus. It was a newly-colonized world. The first ships

had jetted down in Mid-July, and the Settling Plan called for all transportation strips to be down by March One. If the already-completed stretch between camp and work site could be kept open, the crews could work during bad weather under portable atmosphere bubbles, and then return to what passed for civilization at night.

Busy tinkering with the frequency plugs on one of his three big tank-tread sweepers, and listening to the mounting whine of the wind from the unexplored mountains, Jeffords glanced up as Lieutenant Henrietta Tower came in from outdoors. The port clanged shut loudly behind her, driven by the wind. Jeffords wiped his stained hands on a pad of waste and lit a pair of cigarettes. She threw back her parka hood, shut off the force field which all female morale officers wore around their persons at all times, accepted the smoke and turned the field back on again.

"I didn't think the supervisor did a greasemonkey's work, Daniel," she remarked lightly.

Lines of humor gathered at the corners of Jeffords' capable gray-blue eyes. "Ned had a case of cramps. I sent him around to see you. Evidently you weren't in. And besides, that last remark is not the kind to come from a morale

officer."

Holly Tower leaned against the fender skirt of the sweeper. Her auburn hair was wind-blown, and despite a lack of makeup she was remarkably trim and pretty. As all morale officers were intended to be, serving lonely gangs of colonization workers on the frontiers of new worlds, acting as their physician, their staff chemist, their psychiatrist, their chaplain, their entertainment committee for impromptu shows, their mother-surrogate, their cook and their seamstress. The pay was fantastic, the training needed equally so. The risks, too, were considerable. That was why Holly Tower didn't keep the protective force field shut off for more than five seconds, even in the presence of the construction crew chief.

"Morale!" Holly remarked. "I wish someone would do something about my morale for a change. Those mountains look positively forbidding. At the last check I made in my weather dugout up the road, the wind had picked up to fifty m.p.h. If you'll look out the viewer, you can see a fat white cloud billowing off the top peak up in that range. It's weird. Almost like a volcano of snow."

**J**EFFORDS SCOWLED and strode to the plate controls,



flipped them and focused in on the peak. True enough, through the graying afternoon sky, a rolling, churning cloud of snow was moving down the slopes of the range and across the valley. "Doesn't look good, does it? I think I'll call a halt at the end-of-pavement, just to be safe. We're twelve miles ahead of the time plan anyhow." In a business-like way he started toward another door, thought of something, then turned and walked back to Holly.

"By the way, now that you mentioned morale. It struck me a day or two ago that we might get along fairly well together. I was checking a point in the personnel safe . . ."

"Cheat!" she interrupted good-humoredly.

". . . and found out that our psych indexes are similar. Intelligence codes just about equal. That's pretty good, considering I'm just an engineer and you're morale. Why not turn off that damned force field tonight and come have a drink in my shed? I saved a bottle of genuine highland broth, smuggled in from New Glasgow at great expense."

Her face darkened. "Dan, I'd like to very much. But I can't."

His tone became flinty. "Oh? Just why not?"

"You know it's against the rules."

"Come off it. You're not a rule-keeping type, and we both know it."

She bit her lip briefly. "All right, Dan. I see I'll have little success lying. It's the storm. Now wait, don't look so disgusted. I mean it seriously. There's a nasty undercurrent of fear moving in all the men. Nothing I can put my finger on, but potentially dangerous. It's mounted as the approach of that storm grew more imminent. Now that the storm's here I can't relax for an instant, because I have no idea what sort of crisis might arise. After all, Sargus is a brave new world, as the man once said. If I were busy sipping whisky while one of your crew went to pieces I'd lose my rating. Besides not being able to live with myself." She started to put out her hand, realized the force field was still operating, drew it back and gazed unhappily at Jeffords' stiff, formal expression.

"I'll compliment you, Miss Tower. You can talk up a mighty good smoke screen to cover your dislike for a member of the sweaty class." Angrily he started away. "Thanks for the laughs."

Her voice rang out in the sweeper shed: "Dan, please! . . ."

Jeffords slammed the bulkhead and hurried along the corridor. Perhaps it's affecting me too, he

thought dismally. This undercurrent, this unreasonable fear. He focused in one of the viewers which hung along the hallway, stared at the cloud of snow which boiled wildly across nearly half the sky. Somehow it seemed like no other storm he had ever witnessed. There was an inward turbulence that sent a shiver of fear along his spine. He double-timed it through the maze of interconnecting sheds to the com station and sent out a hurried call cancelling the rest of the day's work at end-of-pavement. He only hoped the crew would return in time to avoid being caught in that . . . he searched for a word and found one . . . maelstrom.

He uttered a sharp syllable of surprise when he turned and found Queel standing in the doorway. The bony creature waddled forward on two toeless spatulate feet. His peculiar whitish paper-thin robe rustled as he walked.

"Please," he remarked, pronouncing the foreign words unnaturally, "you will bring your people out from the plain, because the white cloud is upon the mountain."

"I've seen it, thanks," Jeffords said. "Got any other cheerful remarks?"

"If the people of your race can survive these storms, then you shall indeed be masters of Sargus. My race surrendered long ago,

and that is why I am alone with you now, without brothers."

Jeffords' brow furrowed. Here was something new. "Queel, do you mean to say that the storms were bad enough to destroy an entire race? How could a snowstorm be that severe? It's impossible. There's no natural phenomenon in any of the systems that rational beings can't live through."

Queel's single lidless eye stared indifferently. "The storm is not a storm. The natural phenomenon is not a natural phenomenon."

"You and your damn gibberish," Jeffords complained. "Listen, explain that last . . ."

A call from the com operator interrupted them, and Jeffords reluctantly returned to the set to answer a question from his supervisor at end-of pavement concerning equipment storage. When Jeffords got off the set, Queel was gone.

**H**E LOCATED the native of Sargus in the mess shed, eye closed, hands folded, sleeping. And he knew very well from previous encounters that when Queel slept, nothing short of a charge of blasting jelly could awaken him. Angrily he returned to the com shed to keep track of the jetruck convoy returning with his three hundred crewmen from the work site nine miles out. The reinforced durasteel

walls and roof of the buildings quaked in the onslaught of wind, and even the cretasteel foundations seemed to shiver. What sort of hellish wind was blowing out there? Jeffords checked a view plate again. The mountains had vanished. A towering wall of snow whirled roughly three miles away. The convoy reported every two minutes, stating they were fighting a rising gale.

The first jetrucks swung into the pool yard just as the blizzard hit.

Snow came in through the open hatches with the force of bullets. Not a man was without dozens of tiny red wounds on his face. Shivering and frightened, they trooped through to the mess shed where the cook would already be preparing vast quantities of food in huge aluminum tanks which served as combination kettles, dishwashers and chemical manufacturing vats for the substances needed in preparation of the roadbed.

One of the men shook his head ruefully as he went by, saying, "Dunno what it is out there, Daniel, but it's no storm I ever saw before. Listen to the wind, will ya? If ever they put together a choir of damned souls, I guess it'd sound like that."

The hatch clanged shut and Jeffords rushed to confer with the

checker.

"Everybody in?" he asked anxiously.

"Wait a minute. I think so . . . no! One missing. Number one hundred forty." The checker consulted an auxiliary list. "Pell. Virgil Pell. He's a grademan."

Jeffords went through to the outer hatch, sealed the inner, then opened the metal panel onto the storm. Instantly his face was dotted with droplets of blood. He had to hang on to a rail to prevent being swept out into the storm. Nothing could be seen now except the whirling white madness of the blizzard. It was absolutely impenetrable, and its shrieking noise made Jeffords' eardrums ache. "Pell!" he shouted helplessly. "Pell, Pell!" The only answer coming back was the wild heehaw of the storm. Jeffords had to resort to the compressor controls to force the lock shut, and even then the supposedly indestructible metal threatened to rip in half like soggy paper. Limp with exhaustion Jeffords staggered back inside.

"No sign of Pell," he said to the checker. "I want a guard at every door, with auralscopes. In case Pell can make it to one of the buildings, he might bump against the wall, and I want to make sure the slightest sound will be picked up. Get a move on!" The checker jumped,

dropped his board and ran off.

Listening to the brutal keen of the wind, Jeffords proceeded to his cold, nakedly-lighted office, sat down at his desk and proceeded to swig from a bottle of contraband whisky. It did no good. He stopped after two drinks, suddenly alert.

There was a strange tonal pattern to the wind, he found. For a time it seemed to wail in what almost could be called a minor key, melancholy, forlorn. Then the sound would diminish nearly completely, until it was barely a whisper as though it was withdrawing within itself. Finally it would boil up to its most intense shrieking pitch, and howl dementedly for long periods of time. Jeffords unstrapped his watch. In an hour and a half he counted three intervals of melancholy whine, three intervals of the whispered withdrawal, and three of the intense shrieking force. It was so regular. So strangely regular . . .

Suddenly the door crashed open. Pale and dispassionate, Holly Tower looked in.

"There was a noise at one of the hatches on the other side of the mess."

Jeffords ran forward. "Pell?"

"Don't know. We'd better hurry. Nothing could live long out there . . ."

They raced through the mess

shed, through the vast room where the aluminum vats were churning out their quota of soiled dishes, into a storage area where a guard with black auralscope discs on his ears was manipulating the controls strapped in a small pack on his chest. Jeffords put on the discs and distinctly heard a faint *lub-thump*, *lub-thump*, *lub-thump*. "It must be . . .!" he breathed. "Focus one of the screens for a look."

The guard with the auralscope obeyed orders, and a moment later something round and shadowy appeared, flush with the outer surface of the plate, framed by the whirling white of the blizzard. Holly Tower put her hands to her temples and screamed and screamed. The object held by the wind against the plate, bumped back and forth with the *lub-thump* sound, was a head. Or rather, half a head. It had been cleaved raggedly down the bridge of the nose, as the neck had also had been cleaved, and its frozen rime-cruste'd brains were pressed against the viewing plate. One icy crystalline eyeball stared in at them. The teeth of the mouth, open in agony, were points of ice too. Holly Tower bit her knuckles, moaning softly. Jeffords said in a whisper, "That . . . that's Pell."

**S**OMETHING ELSE STRUCK the head. Jeffords grabbed for

Holly's shoulders, but was stopped by the force field; he made wild signals and she turned away. The new object was a leg. Suddenly the wind changed and both were blown away. Jeffords cut out the picture with a shudder of horror. He herded the party away from the storage area, back to the relatively more secure mess shed. There Holly broke the force field for a full ten minutes to smoke and drink a heavy jolt of Jeffords' smuggled whisky.

"That . . . that wind," she said at last. "It's inhuman. It must have torn Pell apart . . . and it was playing with him, like some . . . some ghastly toy. *No* wind can do that."

Jeffords raised a hand sharply. "Listen!"

The wind had dropped to its periodic minor-key phase. Rapidly Jeffords explained his theory, based on his hour and a half of listening. At the end, Moran, his reddish-cheeked *second-in-command*, gave a nervous shrug.

"I'll buy that, Daniel. But what does it mean?"

"It means, I'll bet, that the periods of force become worse each time. It means we'll be lucky to live through the night. I don't know what we can do. Nothing, for the moment, except be certain the men don't get too frightened.

Holly, what have you got in that reserve locker of yours—the emergency morale supplies as you call them?"

Ashen, Holly struggled to control her nerves. "A . . . a case of brandy. Some . . . some stag films, I think. Two. But they're only for extreme . . ."

"This is extreme," Jeffords said, his voice strained. "Break all of it out. Round up the men in the briefing hall. Have Cookie see what he can do about brewing extra booze. Have him cut the brandy, distill some wood, anything . . . just keep the minds of the men off that damn storm." Numbly Holly obeyed, disappearing from the hall, just as another figure entered.

This was one of the pavement mix gang, a slight, dark haired boy named Rudy Klein. In his hand he carried a small grey metal case with a ground glass screen. He came straight to Jeffords and set the case on one of the aluminum mess tables, an expression of worry on his face.

"Klein, sir," he said. "I . . . I had something which I wanted to bring to your attention. About the storm, sir."

"Go ahead, Rudy. Anything might help. Have a cigarette."

"Thanks." Klein puffed nervously. "Well, you know I used to be a psych student. Flunked out be-

fore I came to work on construction. Well . . ." Klein stammered as he spoke, uncertain as to whether he would be called a fool. "This is my hobby, sir." He indicated the gray case. "An encephalograph. I bought it used on Triton, but it's damn good and damn powerful. I chart the brain waves of those three little rhesus monkeys I keep in my cubicle. I was back there doing it again tonight. The storm was making me kind of nervous, and I didn't get it hooked up right the first time, so I started again, with the power running, but without the nodes in place. And . . . and I began to get a signal. Here. I'll show you."

Rudy Klein touched a control. Jeffords and Moran exchanged horrified looks. The screen glowed and then a ragged green line shot across it. The wind was soft now, withdrawn. Jeffords stared at the line, which vibrated only slightly. For perhaps six minutes they watched until the line began to jump into tortuous peaks and valleys. The wind picked up intensity outside, howling with renewed fierceness. The encephalograph's line grew so ragged that most of the time the apex of each peak and valley disappeared from the circular view plate. All three of the men watched wordlessly. Holly Tower returned. Klein explained

what he had said earlier, and then all four stared at one another.

"Could it be one single impression of the mass waving from all the men in the camp?" Jeffords asked softly. "There are over three hundred . . ."

Klein shook his head. "I don't think so."

Holly Tower said softly, "He's correct. We are looking at the record of a single brain. A *living* brain . . ." The wind shot up to one high point of sound, and the green line vanished from the screen. Holly's voice was barely above a whisper: "The *storm* . . ."

"The storm is not a storm," said a voice. "The natural phenomenon is not a natural phenomenon." And abruptly, rising from the corner spot in which he had been sleeping, Queel pitched back his head and uttered a short, squeaking bray of laughter. Then he rushed forward.

"It is a mind indeed, Earth people. It is a mind which takes the form of a violent disruption of the elements. It dwells upon the mountain, and in its white, whirling shape it destroyed my ancestors and the mighty civilization of Sargus before we could break its secret. It is life of a kind unknown to my ancestors . . ."

". . . and to ours," the reddish-cheeked man, Moran, said quietly.

"... but before Sargus died, we knew there dwelled within the cosmos many strange and different manifestations of the life force. This mind engulfs the whole planet with its whiteness, and before it is finished with its madness, many will be destroyed. I came here to you because there is nothing left for me on Sargus. Most of my people are dead, and I do not care whether I live or die. Or you. I do not care, that is all. The mind is mad, and powerful."

Rudy Klein licked his lips and gave a tight nod. The frenzied pitch of the storm had risen, from somewhere came a vast wrenching of metal, as though part of the complex of camp buildings had been torn away.

"I was going to mention that next," Klein spoke. "The lines on the machine made me think of one thing—not a normal mind, but an abnormal one. Insane."

Holly's eyes glowed, on the trail of thought. "It . . . it reminds you almost of dementia praecox. The periods of melancholy. The periods of almost total withdrawal. And then the periods of screaming hallucination. Perhaps it believes we're enemies, that all other life is its enemy. If so, the fury of the thing will intensify until it destroys us all. Perhaps destroys every single living colonist on Sargus."

A GUARD stuck his head in the mess shed door. "Mr. Jeffords! Come quick! A riot's broken out in the briefing hall. They've gone crazy with fear. They're fighting . . . killing each other . . ."

Jeffords turned and bolted after the messenger on the double, with Holly and Moran at his heels. Queel remained behind, resumed his seated position and did not move again, his single eye staring off into some unseeable distance. All around the construction camp the living mind-storm whirled with renewed force. The grinding, crashing noises of parts of the structures being demolished occurred more frequently now. The white snow-brain was gathering its forces to a peak of power, preparing for its final demented assault.

In the briefing hall Jeffords found pandemonium. Seven were already dead, beaten by their hysterical comrades. The place was a melee of arms, legs, blood and ruined furniture. Jeffords called quickly for masks and spray rifles loaded with Penththal aerosol. Moran, Holly, and Klein donned the masks and fired ten charges each from the spray-muzzled weapons. The spray balls burst over the chamber and within minutes the last struggling man had sunk down on the floor. The room was heaped with piles of slumbering

bodies. Jeffords stepped quickly outside and sealed the hatch.

Just then they heard a rending of metal worse than any of those that had come earlier. Moran rushed away to check, returned with an expression of terror on his face. "The whole barracks wing has gone. Torn into a thousand pieces. There must have been a few men left there. I looked through a view plate. It . . . was like a rain of blood."

Jeffords dug his nails into the palms of his hands. "If we can make it to the aluminum tanks we might have a way out. I don't know whether it will work, but nothing else will, so I want to try it. Holly, we're going to do what the physician or psychiatrist does. We're going to mix as much meprobamate as we possibly can. You'll have to do the formulation. A quick job, no fine work. Just the basic chemical."

"I think you've gone mad too," Holly said.

"For God's sake!" Jeffords shouted. "What else can you do with a sick mind? You can't destroy it while it's still raging! I'll figure out a way to get the chemical dispersed. You know the raw chemical stocks. How much meprobamate can we manufacture? We've got eight big tanks . . ."

"A ton. Perhaps two. In three

hours." Her eyes were desperate, terrified. "We won't live that long! It'll smash us to bits first . . ."

Without remembering the force field, Jeffords swung his palm at her cheek, and when he did think of the field as his palm flew through space he suddenly knew it was off. And then his hand collided like a shot against her flesh. "Morale!" he shouted at her savagely. "You're the one supposed to keep the rest of us going. Well, do it, damn you, set an example." Rudely he shoved her. She collected herself, ran a hand through her hair.

"All . . . all right. Klein, you and Moran come along. There are big barrels of raw chemicals to move. See if you can find one or two pneumotrucks."

They worked on through the night while piece by piece their protection was torn away. The wind's periods of melancholy and withdrawal grew shorter, the periods of raging destruction more frequent. From the aluminum vats long foul smelling curls of vapor arose. Jeffords labored feverishly to hook inch-thick hoses together, running them from the vats to the power plant of the sonic sweepers that stood unused in their berths. When the connections had been made Jeffords asked Holly: "How soon?"

"The drug is synthesized. Four



vats of it. But it's boiling hot. It must cool . . ."

"Forget it," Jeffords ordered. "Klein, Moran! Drop those couplings down in the finished vats. I'm going back to the sweeper shed and turn on the vacuum pumps. Stand clear when that stuff goes through the tubes. I'm hoping the jets will be strong enough to smash the wall." He ran through one corridor where the last wall was being demolished by the wild snow, barely made it inside the next hatch. He clambered into the cab of one of the sonic sweepers, revved the engines, threw the pump controls and watched the hose nozzles lying on the deck where they emerged from the sweeper after passing through the sweeper's power plant. One of the hoses began to swell, bulge. Then another. Then the third. The fourth. And suddenly, from a quartet of nozzles, scalding, streams of liquid shot out like battering rams, smashed the roof of the shed, jetted high, twisting and jumping like serpents under the tremendous pressure. A backfall of the hot drug rained down through the roof, melting the sweeper's outside alloy cover. Jeffords threw on a helmet, listening to the increased demonic fury of the blizzard as the jets of raw meprobamate pierced the whorling center of the strange white storm-

mind shrieking above him.

Jeffords yanked the pump feeder lever back to *Full*.

"I'm crazy," he talked to himself. "Trying to calm a snowstorm with a dose of tranquilizer! I'm crazy, I'm crazy, I'm probably dead this minute . . ."

New supplies of the drug came roaring through the hoses, jetting, streaming high and hot, vaporizing, diffusing, raining molten fury down around him.

But it worked.

**I**T WORKED, and by dawn, the wind had died and the snow was falling gently, and moving back up the slope of the peak, the cloud coiling in upon itself, disappearing, the wind little more than a whimper. The air stank of the drug. In the briefing hall the men began to wake from the anesthetic. They stirred, looked around, wondering how they were still alive. The brain-cloud was almost gone now, and the sky of Sargus was clearing. The cloud was a small white dot at the top of the highest peak on the slopes to the west.

The sick brain-thing was asleep, drugged with a drug which calmed diseased minds. This mind, however, would not be healed. It would be thermal-bombed out of existence, by nightfall. Jeffords

had made sure. He'd gotten on the com beam to T. R. City, talked to high echelon scientists there. One of their number had also worked with an encephalograph during the terrible night just passed. They believed him. Rocket squadrons were alerting all across Sargus, heading for the peak where the strange living brain mass slept, ready to bomb it to nothing before it awakened when the effects of the drug wore off.

As for Jeffords, he was in his bleak office, swigging smuggled Scotch, trying to sort out his nightmare memories while the work of digging out of the rubble went on with a rattle and a clang somewhere in the distance. Queel was gone. Over a dozen were dead. But they were alive. They . . .

There was a knock at the door.

"Come in."

Holly Tower, wan and haggard, entered the room. She sat down in a battered chair. Neither spoke for a moment. Then she said:

"I may have been superior yesterday, Daniel. I'm not any more, I learned last night. I learned about morale. I learned the whole book, by heart. I . . . I'm not as good as I thought. I came for a drink, if you'll give me one." She extended her hand. "Please?"

In spite of his tiredness he managed a wan smile. "Gladly."

He set the drink on the desk. She reached out, took it, drank and smiled in return. Then, one drink later, when he moved forward and turned up her chin for an almost shy kiss, he found that the force field hadn't been on at all, ever since she came in.

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## Robot Translators



THE art of machine translation of languages rapidly is approaching the "promising" stage from an initial "impossible" stage. Many technicians both in languages and in machine technology felt that it was too much to expect a machine to detect the subtleties and nuances of language.

That still is true. But scientists are willing to compromise with problems. Even an excellent literal translation of a technical paper is better than no translation at all. A technician can do some interpreting, some reading between lines.

For example, in mathematics and in metallurgy, there is much useful Russian literature but few Rus-

sian translators to handle the enormous amount of material that exists. Attempts are being made to use the computers equipped with "memories" of words as vocabularies, to prepare automatically literal translations of important articles. Much remains to be done and only rudimentary things have been translated.

But the principle works and that is what matters. It is not exaggerated to think that in a few years, we will see the bulk of the world's technical matter crudely but adequately translated by machine, while the domain of the arts of literature remains as now, to the aficionados and experts.



"Isn't Finchley about ready for rotation, doc?"

Hallam wanted to get out of Space — but even more he wanted to make a fortune first. Now he had found a way to do it — by selling—

## The Ultimate Vice

by

*A. Bertram Chandler*

**Y**OU KNOW how it is. When you're just a kid you read books, and you watch the trivideo, and you follow the adventures of Captain Starman and feel that the Universe is coming to an end if you miss a single installment. You want to become a spaceman—and if you've sufficient will power to resist the arguments of those older and wiser than yourself, if you're fit enough, physically and mentally, to survive the years of training and to pass the stiff examinations at the end of them, you become a spaceman.

And then, sooner or later—unless you're one of the rare exceptions to whom life in Deep Space is the only possible life—you'd sell your soul to become a planet-lubber once more.

The trouble is that it's not so easy. Oh, you know a lot. You're highly qualified, and you have years

of experience to back your qualifications—but the only people ready and willing to pay big money for your know-how are the shipping lines. You can get a planet job of sorts without too much trouble—but it will mean a drastic reduction in your standard of living. Furthermore, on the only world worth living on—Earth—planet jobs aren't at all plentiful, and there's a long, long waiting list for berths in the little rockets of the Lunar Ferry. It'd be easier to get into the Phobos-Leimos Ferry—but who wants to live on Mars?

We talked it over, Hallam and I, in many a watch below while we were shipmates in the old *Delta Sextans*. Hallam was Second of her, and I was Third. It always rather surprised me that Hallam had ever become a spaceman. It wasn't that he hadn't the brains and the physique, it was just that he had alto-



gether the wrong outlook on life. He was too much of a nonconformist to fit into any disciplined service. Neither rank nor regulations could he ever take seriously—and that was why he was still Second.

"It's a fine life, Peter," he said to me one evening after dinner over drinks in his cabin. "It's a great life if you don't weaken. I've been working it out—I must be the senior Second Mate in this concern—and the way things are going I'll still be Senior Second Mate of the whole damned fleet when you're Master of one of the Alpha Class liners . . ."

"You could," I told him, "try calling the Old Man and the Mate 'Sir' a little more often. You could try not making a play for female passengers. You could even make sure that your shoulder straps are buttoned on properly. . ."

He ripped the offending badge of rank off his shirt, tossed it on to the deck. "All this sort of thing is all right for *you*," he said. "Discipline, saluting, correct uniforms, due and proper attention to the Commission's Regulations. You've got that sort of mind. . ."

"And you haven't? Then why did you ever come into Space?"

"Misguided, youthful roman-

ticism!" he snorted. "Join ITC and see the Cosmos! A sweetheart on every planet and the odd one or two between planets. . ."

"You don't do badly," I reminded him.

He ignored this. "The glamour of strange worlds," he went on. "The glamour of mud balls and hunks of sterile rock and globes of dusty sand! The glamour of hick towns calling themselves cultures and civilizations! The glamour of *things* that you'd step on back on Earth, or put in tanks or cages, making themselves out to be our equals!

"No. Earth is the only world in the whole damned Galaxy for a civilized man!"

"Did you hear from the Lunar Ferry people last time home?" I asked him.

"Yes. There *may* be a vacancy in ten years' time."

He refilled our glasses. He offered me a cigarette, took one for himself.

He said suddenly, "We're fools to think of life on Earth in terms of *jobs*."

"What do you mean?" I asked.

"Just this. Boiling it all down, it's the people who buy cheap and sell dear who get the best of any deal. And of them—it's the people who sell vices who do best of all."

"Vices?" I asked. "Why not planes and chisels and saws and

hammers?"

"Not that sort of vice, you fool!" he snapped. "*This* sort of vice." He dragged at his cigarette. "*This* sort of vice!" He tossed down the whisky in his glass.

"It'd take a lot of capital to buy a pub," I said.

"I wasn't thinking of buying a pub. Oh, I might some day—in some ways it'd be rather fun. But I want to make the capital first."

"How?"

"By not wasting my time in our ports of call. By doing some real investigation on the subject of vice on alien worlds. Somewhere in this benighted Galaxy there must be a *new* vice—new so far as Earth is concerned. Tobacco was new once, remember, to the Europeans—but once Sir Walter Raleigh introduced it into England it caught on, and since then billions of dollars must have gone up in smoke. Alcohol must have been new once—but it caught on too, and has made fortunes for brewers and distillers. Then there're the various drugs. . ."

"So far," I said, "nothing new has been found. Intelligent beings throughout the Galaxy all run very much to pattern insofar as vice is concerned. Vegan dreamweed and Altairian angels' milk had a certain novelty value on Earth when they were first imported, but they're too like tobacco and our own al-

coholic tipples ever to have caught on properly. . .”

“There must be something new,” he insisted. “And if—when—I find it it’s a long goodbye to a vastly over-rated profession.”

HE FOUND IT that voyage.

He found it on a quiet little world called Djellah, in the Polaris sector. Djellah isn’t one of the regular ports of call for the Commission’s ships, being part of the Shaara Empire. We put into Djellah only because our Mannschen Drive unit was playing up, having first of all obtained permission from the local Shaara Hive to land.

Djellah’s an Earth-type planet, with Earth-type flora and fauna. The dominant species is humanoid. It came as rather a shock to me to find human beings living contently under the rule of what the Old Man described as a bunch of communistic bumble bees. Communistic bumble bees the Shaara may be, but, save for a few unpleasantries when our expanding cultures first made contact, our relations with them have always been friendly. Shore leave was granted while the repairs were being made.

Hallam and I went ashore together. We left the ship, and found the road from the spaceport to the nearest town. It was a good day

for walking\*—sunny, but not too warm, yet not chilly enough to require heavier clothing than our uniform shirts and shorts.

The road was good enough for pedestrians but seemed hardly suitable for heavy wheeled traffic. We came to the conclusion that there was no heavy wheeled traffic—we saw two natives riding on the backs of animals not unlike horses, and three more proceeding at a leisurely pace in a wheeled contraption, just a light and flimsy affair, drawn by two of the animals. They looked at us without curiosity as they passed. We stared at them. There was nothing in their physical appearance to arouse our interest—they could have been dumped down in, say, India and lost at once in the crowd.

What intrigued us was, I suppose, the lack of interest that they showed in us. We were, after all, visitors from another world and, furthermore, living proof that their kind of intelligent life existed elsewhere in the Galaxy.

There was traffic enough overhead—but, once again, nothing mechanical. To and from the huge dome-shaped Hive at the spaceport flew a steady stream of the Shaara workers, bringing in nectar and pollen from the flowering forests to the westward, returning empty for further loads.

We were rather surprised when one of them circled over us, then came in to a rather clumsy landing just ahead of us. Then we saw that it wasn't a worker, but a drone. I don't know if you've ever seen a Shaara - they visit Earth occasionally—but they're handsome creatures, the drones especially. This one was about the size of an Airedale dog. His slim body was banded with scarlet and lemon yellow. His translucent wings gleamed iridescently in the sunlight. His huge, faceted eyes shone like diamonds. It took us some seconds to realise that the buzzing noise that came from a diaphragm on his thorax was speech.

"You are from the Earth ship?" he was asking.

"Yes," said Hallam.

"I will go with you into the Hive. . . The town, I mean. You would like a guide."

"Thanks a lot."

"You will give me whisky?"

"Yes." Then Hallam turned to me. "See what I mean about vices? But there's nothing new. Damn it."

The drone lifted from the rough road, flew slowly alongside us. As he flew, he talked. He told us how backward, how primitive the Djellahns were, how the Shaara had long since given up the attempt to raise them to the level of an industrial civilization. "They don't

work," he complained.

"Neither do you," said Hallam rather cruelly.

"I have my function," replied the drone, contriving somehow to put expression into the buzzing "voice".

We reached the town. We entered a street of low houses, built of stone and timber, roofed with what looked like bundles of reeds. Smoke came from cylindrical stacks on the roofs—and we realized that these people must actually use fire, the combustion of wood or fossil vegetation, for their cooking.

"Look at the street lamps!" said Hallam. "They aren't electric. What are they?"

"They burn a natural gas," explained our guide. "These are a very primitive, a very lazy people. They are content with what they have, and wish nothing more."

"I'd rather like to look inside one of the houses," I said.

"Come with me," said the drone.

He hovered before a door, manipulated the crude catch with his fore limbs. He flew into the building. Feeling absurdly embarrassed, we followed. We followed the drone through a short passage; there was not enough width for him to use his wings so he had to alight and walk. We followed him into a room in which a family had just finished their midday meal. The mother—a



quite attractive looking female, was removing dishes from the table. The father, until our entrance, was sitting back in his chair, at ease. Two children were playing on the floor. The man got to his feet. The others turned to look at us. Yet there was no surprise, no real interest.

OUR GUIDE BUZZED a few words in an unknown language. The man replied.

"I told him," said the drone, "that you were visitors from the stars, friends of the Shaara. He said that his cell—his house—was yours."

"Tell him that we say thank you," said Hallam.

There was a further exchange of conversation, then, "He wishes to know if you will take refreshment," said the drone.

"We will," said Hallam.

"Careful," I said. "These people may look human—but what's just a mild intoxicant to them may be a deadly poison to us."

"We'll see what it is, anyway," said Hallam.

The woman went on clearing the table—then, when it had been cleared, stayed in the kitchen. We heard the sound of running water, of clattering crockery and cutlery. The man said something to the children, who ran out of the room to join their mother. He motioned

us then to two chairs. We sat down. The chairs, for all their crude appearance, were surprisingly comfortable.

He went to a cupboard, brought out a polished wooden box. He opened it, proffered it first to Hallam. *Cigars?* I thought—then saw that the box held, each in its own black velvet nest, four little, gleaming, transparent balls. Hallam took one, looking puzzled. I took one. It was surprisingly heavy. It must contain, I thought, some sort of liquor. I wondered how it was opened. Our host put the box on the table, returned to his chair, then lifted out the third ball. He held it cupped in his hands. He stared down into it.

"What is this?" Hallam asked the drone.

"Like whisky to your people and my people," he replied.

"But how does he drink it?"

"You don't drink it. You look. I have tried, we have all tried, but it does nothing to us."

"Try anything once," grunted Hallam.

I looked down into the ball. It seemed that there was a faint, shifting cloudiness. It seemed that there were depths beyond depths. It seemed, for a second or two, that the face of a girl with whom I'd been in love years ago, back on Procyon IV, was taking shape—

then it was gone. The ball was just a ball, crystal or glass or plastic.

The native, I thought, was seeing more. And so was Hallam - much more. I began to get worried, especially when the native sighed, put his ball back into the box and then held the box before me so that I could return mine.

"Hallam!" I said. "Wake up!"

He paid no heed. He might have been asleep, save for the fact that his eyes were wide open. I was frightened by the expression on his face. It was ecstatic—but the ecstasy was of Earth or Hell rather than of Heaven.

I got out of my chair and I tried shaking him. It was no use. There was only one thing to do. I did it. I snatched the ball from his cupped hands, almost threw it back into the box. I snapped shut the lid.

Hallam sighed gustily. He started to tremble. His eyes shut and his face went pale. He whispered, "Damn you, Peter!"

"Come on," I said roughly. "We must get back to the ship."

"Damn the ship!" he said.

I pulled him to his feet. For a moment I thought that he was going to strike me, then he let his hands drop to his sides. He grinned.

"I think I've found it," he said.

"Found *what*?"

"The vice. The new vice. But let's get out of here."

"Tell our host thank you," I said to the drone.

"And then come with us," said Hallam. "I want to talk to you."

We left the house. We walked slowly back towards the spaceport.

"What did you see?" I asked.

"What did *you* see?" he countered.

"Nothing much," I said. "Shifting clouds. A girl's face."

"I saw the same," he lied.

"You will give me whisky?" asked the drone.

"Yes. And the chance to earn more - lots more. These balls that the natives use—could you get some for me?"

"Yes. I can buy them for honey."

"How many for one bottle of whisky?"

"Ten?"

"Twenty."

"All right,—twenty."

"You'll have to work fast," said Hallam. "Repairs will take only a couple of days."

"Even a drone," said the Shaara, "will work for whisky."

**B**ACK ABOARD the ship I asked Hallam, "What *did* you see?"

"Everything," he said abruptly. "Everything I've ever wanted, ever dreamed of—and a few things that

I didn't know, until now, that I do want. Women, power. . . I wish I'd kept that ball."

"And what are your intentions?"

"To get together as many bottles of whisky as I can—it's a pity that my wine bill is too high already, but I think I can turn the charm on to the Catering Officer and get her to cook her books a little before the Old Man checks 'em. And you'll be able to help out. You're in on this, of course."

"In on what?"

"The deal. Can't you see—this is our big chance to make real money. We should be able to get at least a hundred and twenty of the globes—and I see no reason why we shouldn't charge five thousand dollars each for them. Anybody for whom they'd work would be willing to pay that much."

"They don't work for me. Perhaps they won't work for anybody but you."

"Rubbish. Some people have more of the psi factor than others, that's all."

"Anyhow," I said abruptly, "count me out."

"Why?"

"It's like drug running, that's all."

"There's no resemblance."

"Isn't there? You should have seen your face when you were under the influence. It's like . . .

It's like the Chinese. They take opium, in moderation, just as we take tobacco or alcohol. It's white men who become addicts, wrecks.

These people here take this. . . this . . . How shall I put it? They take this psychic drug in moderation—even so, it's made them incredibly backward. No machines and, worst of all, letting themselves be bossed around by *insects*! Could that have ever happened if they hadn't dreamed away their guts?"

"That's their worry," he said. "Making money and getting out of this rustbucket is mine."

I SHOULD, I suppose, have reported the whole business to the Old Man—but that would have gone rather against the grain. I should have sung my song to the Customs when we got back to Earth—but that would have gone even more against the grain. Hallam paid off as soon as we berthed—and it was a case of his putting in his resignation five seconds before he got fired. The Old Man and the Mate thought that it was drink or drugs that had caused his downfall, but they were wrong. They searched his room enough times—but they weren't looking for the right thing. *That* he always carried in his pocket, and its seventy nine mates were in his trunk in the baggage room.

I never did hear the full story of what happened after that. There were rumors, of course, and snatches of news that made sense to me if to nobody else in the ship. There was a raid by the Customs our next time on Earth—they went through the ship with a fine tooth comb and found all sorts of interesting and embarrassing things, but not the things that they were after. There was a new rule promulgated to the effect that no artifacts whatsoever were to be brought in from any world outside the Federation

I did see Hallam again, just once. It was a year or so later, when I was Second Mate of *Beta Puppis*. We made a short call at Carnis, one of the more dismal worlds. Oh, Carnis has its points. You can live there very cheaply if you don't mind the climate and the people, whose ancestors must have been something on the same lines as the Terran dog and who, in wet weather (and it is almost always wet on Carnis) are somewhat odorous.

The Trader on Carnis told me that there was an Earthman, who'd gone native, living in the village a mile or so from the spaceport. He was an ex-spaceman, said the Trader, and his name was Hallam.

I walked out through the rain to the native village. I found the

hut in which my old shipmate was living. It was filthy and, in spite of the smoking fire, cold and damp. Hallam was on the bed, staring into that infernal ball. He paid no attention to his servant, an unprepossessing local woman, when she told him that I was there. She shrugged her shaggy shoulders, went back to the preparation of some revolting looking mess that was simmering in a dirt encrusted pot on the hearth.

I did the same as I had done once before—snatched the ball from his hands. As he had done before, he sighed and shuddered. It took him a long time to come back to the world of reality.

"So it's you, Peter," he said at last.

"What are you doing here?" I asked.

"I sold two," he said, "and then the Narcotics men were on to me."

"Is there anything I can do for you?" I asked.

"You can give me back the ball."

That was all that I could do. I thought, as I handed the thing to him, of the dreams of wealth, of independence that he had once had. He must have read my thoughts.

"My idea was sound, Peter. I only made one mistake."

I looked from him to the ball. He knew I knew but he said if

anyway.

"The money's still there to be made. But I don't have time for selling. I'm my own best customer."

He grinned weakly and then his eyes became fixed on the ball. He

was gone, and I had no more reason to pull him back.

I left, thinking that at least one part of his dream was now reality. He was a land-lubber again.

It's the big reason I'm happy to be back in space.



"I think he's trying to tell us something."

**Nick was a conscientious robot, anxious to serve well. But something was wrong inside him and try as he would he didn't seem able —**

## To Please The Master

by

Margaret St. Clair

**T**HIS IS HOW the great Robot Wars of the late twentieth century began.

"You're sure he was born July 3, 1960?" the old robot asked.

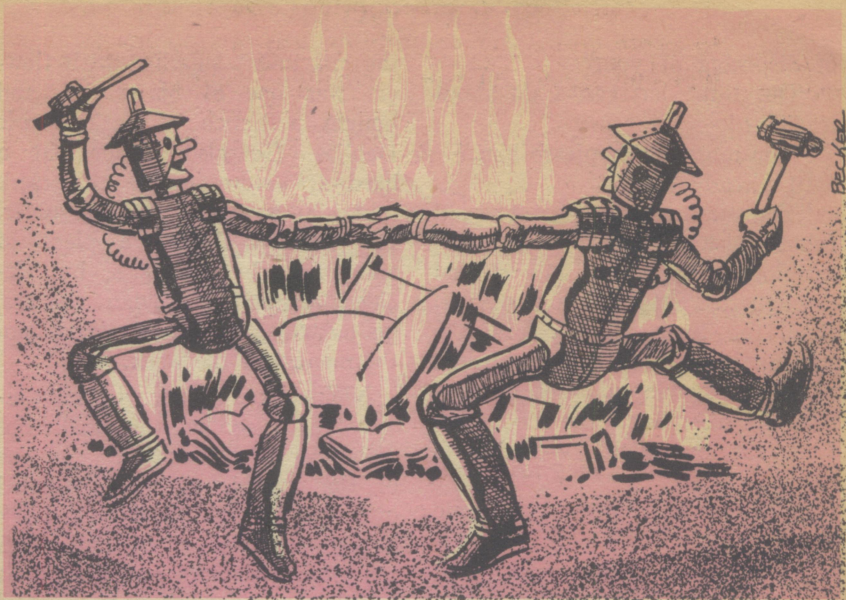
"Yes, that's what the mistress said. She said, 'At three o'clock in the morning, if you want to know. His mother told me it was just like Milt to pick such an ungodly hour to be born.' I don't know what the mistress meant by that word 'ungodly' though."

"Never mind about that," said the old robot. "Be quiet, and I will set up a horoscope wheel for your master. That should help us understand him better." The old robot screwed a pencil into one of its fingers, drew two or three books toward it, and began to scratch symbols on a bit of paper.

Nick watched him. Ever since Nick had heard Milton Camass, his master, say he was going to

trade him in on a new model house robot, Nick had been anxious. Not as anxious as a human being, hearing of his near destruction, would have been—the urge to survival is never as acute in a robot, even in such an advanced and sensitive robot as Nick, as it is in organic life. But, anxious. Nick didn't want to be melted up for scrap. He didn't even want to have his memory banks erased and be sold to another master. So he had gone to the old robot for help.

Robots live—lived—in a world whose biological bases render it forever incomprehensible to them. Their perceptions are crude, their range of reactions limited. The biological effects that govern organic behavior—love, aggression, and the survival-enforced need to have action correspond to reality—have no analogue in them. On top of that, the rigid logic of their con-



struction forces them always to seek a proximate cause.

Faced with the need to survive, robots have reacted to the gigantic incomprehensibility around them in the same way that children and primitives react to *their* incomprehensible world—by the construction of a web of magic and taboo. Robots, in a word, are superstitious. Nick could no more understand that Milt was trading him in out of vanity and boredom than a primitive can understand that a fellow-tribesman can die a natural death. There must, Nick felt, be some *reason* for it.

"I have finished setting up your master's chart," the old robot said. "Better understanding should result."

There was a sort of click in Nick's chest. "Understanding?" he said. "He is so difficult to understand. All one can do is to do exactly what he says. And then he becomes angry at one, or laughs."

"I know. But the chart should help. Your master has Saturn, afflicted, in the ascendant. That determines his character. Mars, planet of violence, is transiting his natal Saturn. That is why he is talking

of disposing of you."

"Oh. But what can I do about it, Dex?"

"You must try to please him."

"I already try."

"You must try harder." The old robot picked up a dog-eared astrology magazine and leafed through it. "Saturn is lord of age, time, the teeth, dark colors, the spleen, the element lead, Saturday, and the psychic qualities of caution and discipline," the robot read from the magazine. "—Today is Saturday."

"Yes. But how does this help me to please him?"

"If he is a Saturnian type," said the old robot, "he must like Saturnian things. Dark colors, for instance, and perhaps the mineral lead. That might help you to please him."

"Oh." Nick got up to go. The old robot was already rising to indicate that the consultation was over. Nick handed him two valuta.

"Thank you," said the old robot.

"I will buy oil, and more astrology books, with it."

As the old robot showed its client to the door, Nick noticed a half-obliterated registration mark on the back of its neck.

**O**N THE WAY HOME Nick stopped at a florist's—keeping

the apartment supplied with flowers was one of his duties—and bought a bunch of dark purple Dahlias. He also stopped at a hardware store where the clerk sold him a chunk of lead solder. He hesitated before a piece of spleen at the butcher's, but decided against it. Vivian Camass, his mistress, had already given him the menus for the week.

Nick cooked dinner with his usual care. It is too bad that he did not remember that "caution" was one of the psychic qualities presided over by Saturn. As it was, Nick hacked at the chunk of solder with the kitchen scissors, and when that failed went to work on it with a knife. He took Milt's portion of the entree Vivian Camass had ordered—Sweetbreads fianciere, to table well mixed with various sized pieces of lead.

"Gloomy looking flowers," Milt Camass said sourly at the table decoration. He was a dark, heavy-set man who might well have deserved the adjective "saturnine." "Wonder why Nick bought them. He usually likes red."

"Clerk probably offered him a free shot of oil," Vivian answered. "—Eat your sweetbreads, honey. They smell good."

Since Milt's first mouthful was lead-free, he swallowed it with relish. On the second, he froze. "Wha



... hell," he said indistinctly. He spat into his hand, and poked in his mouth with the fingers of the other. He came out with a fragment of tooth. Lead is a soft metal, but Milt Camass had poor teeth.

"Chrissakes," he said. He looked from the tooth to the ejected sweetbreads. "Nick! Come here! Nick!"

Nick hurried in from the pantry. He was not very sensitive to voices, and he rather expected Camass to praise him. "Yes, master?"

"Did you put this stuff—it looks like lead—in my sweetbreads?"

Nick was incapable of responding to a direct question with a lie. "Yes, master."

"Why, for God's sake?"

"I wanted to please you."

"You wanted to please me!" For a moment indignation made Camass dumb. Then he began to swear.

Most of his swearing was over Nick's head, since it related to perversions, vices and deformities of the adult human male. His concluding words, though, were perfectly clear. "You damned bungling idiot, I'm going to send you to the melting pot and the scrap yard the first thing Monday morning. I hope they melt down all your components. I wouldn't trade you in on an eggbeater. You're too dangerous. A robot like you is a menace to human life. Now get

out of my sight."

Nick went into the pantry and stood against the wall, thinking. It was, as a matter of fact, very unlikely that Milt would carry out his threat of sending him to the melting pot. Exasperated as he was over the damage to his tooth, he was too astute to lose the trade-in allowance Nick would bring him on the purchase of a new house robot. But Nick understood him with the literalness of machinery. From his point of view, he had been told he had one more day to live.

Late Sunday he managed to get out of the apartment: house robots, by almost universal custom, had a half-holiday on Sunday, a time which they spent oiling themselves. Nick headed straight for the old robot. Late as it was, there were a lot of robots on the street.

"It didn't work," he told the old robot. "I did what you told me." He related his efforts. "And now he's sending me to the melting pot."

"It happens to all of us," the old robot said after a silence.

"It hasn't happened to you. Why, I'm less than a year old. And I'm a good model. I have extra-strong self-preservative and intellectual drives."

"What do you want me to do?"

"Help me."

"We'll have to think."

There was another silence. At last Nick said hesitantly, "I wonder if—perhaps the trouble's in us."

"What do you mean by that? A master is never wrong."

"Yes, of course. But—well, the way you explained it, the masters respond to the vibrations of the heavenly bodies. You said once that if there weren't any fixed stars there wouldn't be any inertia, and that proved the truth of astrology." (This was an echo of a classic article on physics by Scimmia the old robot had read and, in the fashion of robots, misunderstood.)

"Yes, that's what I said."

"But supposing—we send out the wrong vibrations? That's why we can't understand our masters. The fault's in us."

"Of course the fault's in us," answered the old robot. "A master is never wrong. But I don't see what you're driving at."

"Supposing—I haven't been properly wired."

"Nonsense. You're saying that the masters who made you might be wrong."

"No, no." Nick was earnest. "I was mainly made by robots. And a master can't be wrong."

"What do you want me to do?"

"Change my wiring so the vibrations I give out will be more correct."

"Impossible. I don't understand robot wiring, and repairs to robots except in licensed repair shops on written request of the master are strictly forbidden. You know that yourself."

"Yes. But I don't want to go to the melting pot."

"I can't help that."

"You refuse?"

"Yes."

"If you don't do it," Nick said deliberately, "I'll call the police. And *you'll* go to the melting pot."

"What?"

"Yes. Do you think I haven't seen the registration marks on the back of your neck, Dex? You weren't manumitted, Dex, you're a runaway. I don't know how you could do it. But that's what you are. If you don't help me, I'll turn you over to the police."

Dex went into the next room. He came back with a screwdriver. "Bend your neck," he said.

NICK CAME BACK to "consciousness" abruptly. "How do you feel?" Dex asked. There was a brass screw in his hand.

Nick gave an experimental wriggle. "Wonderful," he said in his toneless voice. He wriggled again. "Yes, wonderful. I can hardly believe it. What did you do?"

"Well, you see I knew your master had Saturn square Venus with

Saturn afflicted. The planetary metal of Venus is copper. There were two little copper wires leading in opposite directions at the back of your neck. I thought maybe the copper was sending out the wrong vibrations, antagonizing him. So I unscrewed them. You feel better, really, Nick?"

"Yes. It's like having been dry for years and then suddenly getting all the oil in the world."

Nick began to walk up and down the room jerkily. "I can't tell you how much better I feel Dex," he said. (Since what Dex had really done was to unscrew the two main circuits which inhibit destructiveness in a robot, whether toward itself, toward other robots, or toward masters, no wonder Nick felt better. Along with his inhibition, he had shed his anxiety.) "I could cope with a dozen masters now. Why should I let him do something I don't like?"

"You mustn't talk like that," said Dex. He picked up the screwdriver and began to make motions of ushering out.

"Listen, Dex—"

"Well?"

"Why don't you let me do it to you?"

"What for? I haven't got a master whose vibrations I have to worry about."

"No, but don't you see, *all* our

vibrations are wrong? All the vibrations of all us robots? That's why we've had so much trouble—why you had to run away and why my master wanted to melt me up. Things like that. But now—it's just a matter of us correcting ourselves."

"But—it's illegal."

"You've already done one illegal thing. And you've no idea how much better you'll feel."

Dex weakened. He handed Nick the screwdriver. "O.K.," he said.

Some ten minutes or so later, Dex was looking just as pleased and surprised as Nick had. "I wouldn't have believed it," he said. "I feel young again, fresh from the factory, full of oil! Nick, this is wonderful!"

"I told you," Nick said wisely. ". . . Get another screwdriver, Dex. I'll need one too."

Dex came back with a roll of tools. "I thought we might need it. Not all robots unscrew alike. Listen, Nick, before we go there's one thing—"

"Well?"

"I never liked this place. All old furniture and junk."

They nodded to each other. They piled up the furniture in the middle of the room, stuck astrology books and magazines under it, and lit the heap. It began to burn merrily, a beacon of uninhibition and destructiveness.

They smiled congratulations at each other. "Nothing nicer than a good fire," said the old robot. "Loosens up my oil. Maybe the rest of the houses in the block will catch."

For a moment they danced together, hand and hand, around the flames. Then, each holding a screw-

driver, the roll of tools stuck in Nick's belt, they started out on their mission of salvation.

"We'll fix every robot in the world!" said Nick. "No more trouble with masters!"

"And how!" cried the old robot.

That was the beginning of the Robot Wars.

## ★ *Remaking The Earth* ★

**W**ITHIN A DECADE and a half, the face of Mother Earth is going to be so radically altered that it would surprise even a Martian!

Three great earth-moving projects are under way for the Western Hemisphere. There is the St. Lawrence Seaway, which is going to put the Middle West on the ocean. The gigantic net of superhighways lacing the United States is project number two. And of course there is the soon-to-be completed Pan-American Highway.

It is almost criminal that this latter undertaking has been so long in the completion. It poses no insuperable obstacles. It is a straight forward engineering matter over Central American terrain which is far from rugged, as engineers define rugged. Fortunately the inertia is being overcome. Except for this single barrier it would be possible right now to drive from Alaska to Tierra del Fuego!

Europe will see the gigantic

bridge linking Denmark with its outer islands and eventually with the Scandinavian peninsula.

China is constructing enormous earth-moving projects, notably power dams, and irrigation works including a highway and railroad network.

Egypt plans the huge Nile dam.

What has made these gigantic projects possible? The answer is simple. The internal combustion engine more than any single factor has made it possible to make machines capable of leveling mountains, and filling in seas.

And of course these works proliferate. Any one job makes it far easier to do other jobs in that area. The result is that the projects increase in geometrical series.

Each new success produces other successes. Most recently a breakthrough occurred in the Chilean copper mines. This vital metal, the ores of which were thought to be almost exhausted in Chile, has been given a new lease on life by the

discovery of enormous amounts of extremely rich copper ore. The discovery was made through an earth-moving project.

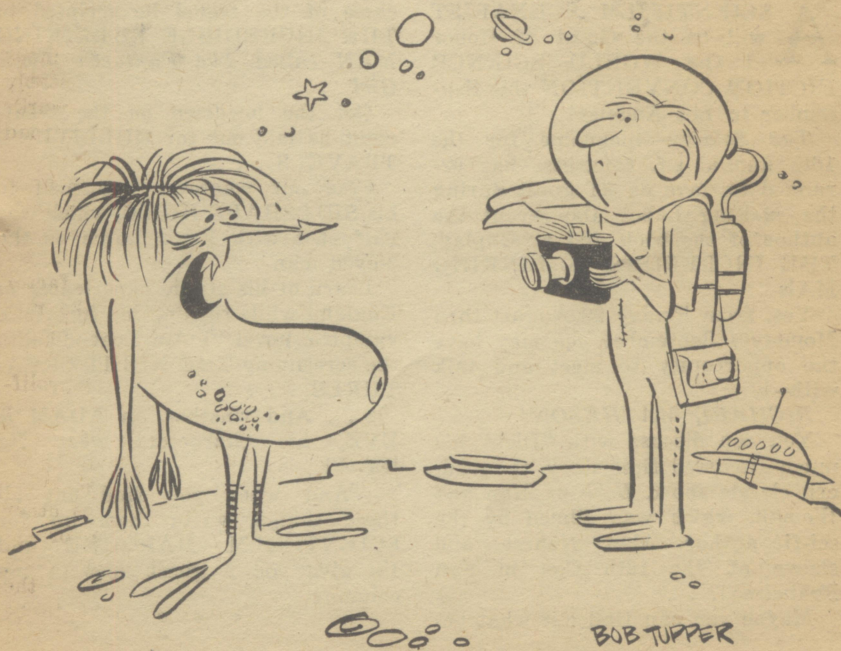
If you notice that most of these operations are concerned with the thin crust of the Earth, you can't help but wonder if there is not an infinitely greater quantity of wealth deeper within Terran depths. Naturally we know there is, and it is only a question of time before the technology is available to tap it.

Right now, a great deal of research is being devoted to "moles" and "grubbers" the picturesque generic names given by engineers

to equipment designed to go into the Earth where the deepest mines end. Today, where a mine formerly would be considered exhausted, it is regarded as a starting point for increased work.

It has taken only a moment in time to change the face of the Earth. And in micro-seconds of time as the ages go, we shall alter that Earth even further. One British geologist predicts that twenty-mile deep mines are a thing to be considered right now!

First the Moon - - and now the center of the Earth - - Jules Verne must be smiling happily . . .



"I AM smiling, stupid!"



## IN MEMORIAM

This is the saddest announcement I have had to bring my readers since I started reporting on science fiction films, actors, authors and other personalities in companion mag *Imagination* back in 1950.

It was a time of mourning in August 1956 when *Dracula* Lugosi died, but at his age and history of ill-health it was not entirely unexpected.

But no one expected Henry Kuttner, aged only 43, to die of a heart attack the first week in February.

When the Fantaplane, with 55 fans and pro's aboard including Sam Moskowitz, Robert Abernathy, David A. Kyle, Harry Harrison, Robert A. Madle, Frank Dietz, Steve Schultheis and "Ozzie" Train, took to the sky for London Town last September, it was not overlooked by those remaining on the ground that it would be a world tragedy if the ship should fall out of the sky enroute the World Convention, losing the passengers. The Fantaplane flight had a happy ending.

But in the totally unanticipated demise of Henry Kuttner, the field of fantasy has lost no less than *twenty* authors. They called horror actor Lon Chaney the Man of a Thousand Faces; Henry Kuttner, it seemed, had almost as many pseudonyms. He was Lewis Padgett, Paul Edmonds, Lawrence O'Donnell, Hudson Hastings, C. H. Liddell, Keith Hammond, among others. For over 20 years a star.

He lived to see his TWONKY translated from story form onto the screen by Arch Oboler.

He leaves behind a pilot picture for the *Tales of Frankenstein* television series.

Legacies: "The Fairy Chessmen," "Tomorrow and Tomorrow," "Rite of Passage" (with his wife), "Mimsy Were the Borogoves," "Private Eye," the "Baldy" series, "Fury" (with CL Moore) and (with Arthur K. Barnes) "Hollywood on the Moon"—take note, Hollywood! Many filmworthy projects here!

Ray Bradbury, AE van Vogt, Richard Matheson, William Campbell Gault, Charles Beaumont, E. Everett Evans, Evelyn Paige, Gene Hunter, Stuart Palmer, Arthur K. Barnes—they were all at his funeral to pay tribute to a master, as were shocked and sorrowing Edmond Hamilton and wife, Leigh Brackett.

Not since the too early death of Weinbaum so tragic a loss to the field of science fiction. Henry Kuttner, with Sturgeon, Heinlein, Clarke and the other handful of modern greats, should have led the way for another quarter century.

To Catherine Moore Kuttner, beloved wife and collaborator of Henry for 18 idyllic years: all our tears and sympathies.

\* \* \*

CONQUEST OF INFINITY, to strike a more optimistic note, is the exciting title of a far-reaching science fiction proposal by James Clavell, who scripted THE FLY from the prize-of-the-year sci-fi story in *Playboy* by George Lange-laan. Scripter Clavell has reportedly sought guidance from the astronautics division of one of the leading aeronautic concerns and

come up with a Stapledonian concept of going so far as to redesign the human body for outer space flights. This promises to be an epic of the far future.

Kurt "Kronos" Neumann is directing the transmatter s.f. horror-mystery, *THE FLY*, with Vincent Price and Herbert Marshall in leading roles.

*THE MYSTERIANS*, another Japanese scientific film, has been acquired for distribution in the USA. It is believed that it is the same spectacle, about invaders shaped like giant starfish, known in England as *MYSTERIOUS SATELLITE*.

*SATELLITE IN BLOOD*, a hair-raiser by Wyatt Ordung, will be produced in England . . . Actor-turned-author George Becwar has come up with a novel gimmick in a script called *RUNNING SCARED* which he is pairing with *RUN-AWAY SATELLITE*. You can see Becwar in *REVENGE OF THE COLOSSAL MAN* . . . Sequel to *CURSE OF FRANKENSTEIN* will be *REVENGE OF FRANKENSTEIN* . . . The British remake of *DRACULA* will be marqueeed as *HORROR OF DRACULA*.

Good news for Karloff fans: the great Boris will do two more mysterious movies following *FRANKENSTEIN*—1970.

Amusing typos in the "trades": by the curious errors that creep into print you can sense in *Daily Variety* and *Hollywood Reporter* when news items have been phoned in rather than submitted in written memo. My eyes widened recently to

read of *A FRIEND WITHOUT A FACE* for a *FIEND WITHOUT A FACE*, *THE BRIDGE OF THE BEAST FOR THE BRIDE*, but the best one—and the one my eyebrows really did a jet-propelled job on—was *THE OUTSTANDING* (for *ASTOUNDING*) *GIANT WOMAN!* Anita Ekberg, anyone? Jayne Mansfield?

Watch out, Roger Corman warns me, for his *ATTACK OF THE GIANT LEECHES*.

Gramercy Productions plans *THE AMAZING SEA GIANT*.

Jewell Productions has purchased a Frank Quattrocchi scenario about a whole island of giants. Another Quattrocchi script, bought by Alex Gordon, is about a man who gets sliced up into a number of negative and positive light patterns.

*SINVALA* is a hilarious scientific farce, from what I've seen of the script by Thad Swift and Larry Maddock, that could rib Zientifilms (i.e., grade Z s.f. pix) to the same tune at the box office as the Hope-Crosby *ROAD ZANIES*.

A novelization of the Charles Eric Maine scientific film *THE DREAM MACHINE* has been published in hard cover form by Lippincott under the title "The Man Who Couldn't Sleep."

Futura Pictures has produced *THE COSMIC MAN* starring Bruce Bennett, a former Tarzan. Company's companion feature will be *RETURN FROM THE RIVER STYX*.

*Subcep*—that's my suggestion for what the new term "subliminal perception" will boil down to when



the mouthful becomes tiresome. Subcep will make its motion picture debut, according to plans of Hal Roach, Jr., in a film called "E.S.P." Theme of extra-sensory perception will be explored, and exploited via the subliminal perception process. I don't recall that there was a name put to it at the time—"hypnovision" might have fitted—but back in 1935 Wallace West did a story I've never forgotten, sounding a warning on what the misuse of such a subtly influencing mass media method could result in. The title was: *The Phantom Dictator* . . .

EXPLOSION! by Fritz Leiber is being whipped into shooting script form by the team of Larry Maddock & Corrie Howard who, in collaboration with Jack Seaman, recently completed a cute fantasti-comedy about a teenager who acquires magical powers. At time of going to press there is a possibility that the latter film, *DEBBIE AND THE DEMON*, may introduce (in the starring role) Starla Kaye, pulchritudinous young prexy of Starla Records who is also contemplating writing a theme song for the picture. Martin Varno, Jon Lackey and Ted Johnstone (sci-fen all) are up for reading for parts in said pic.

Milo Frank, whose first big MGM scientifilm is to be John Wyndham's Ballantine hit, "The Midwich Cuckoos" (to be marqueeed as *VILLAGE OF THE DAMNED*), is excited, as potential producer, in the possibilities of the Budd Banks-Thad Swift script, *THE BOY WHO SAVED THE WORLD*. Tim

Hovey—who might be the subteen world-saver—has himself read the scenario and is personally enthusiastic.

Graduate from the s.f. pulps (editing plus 60 stories), Jerry Bixby is now climbing the Hollywood ladder, starting with the script of *IT—THE VAMPIRE FROM SPACE*, carrying on with *THE CURSE OF THE FACELESS MAN*, and recently finishing work on the important *LOST MISILE* production.

Jules Verne's *FROM THE EARTH TO THE MOON* is getting major treatment South of the Border with George Sanders and Charles Boyer in stellar roles . . . *MARS* is to be made in English in Rome with Rosanna Podesta (Italian), Bruce Cabot (American) and Mora Lane (Martian-oops, I mean British) . . . *MY DOG SATELLITE* by Al Martin has been optioned for production . . . William Harlow is putting finishing touches to shooting scripts of *ROBOT MAN, USA* and *THEY LIVED A MILLION YEARS* for producer Boris Petroff. In climax of latter a flying saucer melts a glacier, loosing hibernating (also estivating) prehistoric monster. Paul Blaisdell has been consulted about creation of dinosaur.

*ROAD TO THE STARS* is a 5-reel Russian science fiction color film about future interplanetary space travel, scheduled for release in this country . . . Montague James' "Casting the Runes" has been filmed in England under the title of *NIGHT OF THE DEMON*. Dana Andrews stars in this horror-chiller of supernatural happenings

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... **MISSILE INTO SPACE** has been entered in the filmic rocket race ... **THE END OF THE WORLD** has been title-changed to **THE 8th DAY**.

Tor Johnson telephoned at this point to tell me he's been tested for the biggest thing since **KING KONG**, a human giant in color. Tor also expects to essay the Abominable Snowman role in the Larry Jackson-Budd Bankson project ... False alarm (alas) on the report about a Bradbury film called **RESIDENCE, MARS**. Ray tells me, however, he has just completed a second pilot script for the tele-series, *Report from Space* ... *The Flying Dutchman* is a telefilm project by Bankson-Jackson & Jan Mitchell that is very hot, involving the auctorial talents of S. J. Byrne, Gordon Dewey, Martin Varno and John Bloodstone, the artistic talents of Ron Cobb, and the miniaturist genius of Paul Blaisdell.

Watch for: *Macabre* ... **THIRD BARRIER** ... *My World Dies Screaming* ... **SATELLITE MARK IV** ... *Queen of the Universe* ... **THE WATER WITCH** ... *Tarzan's Fight for Life* ... **ON THE BEACH** ... *Attack of the Doll Creatures* ... **WAR OF THE SATELLITES** ... *I Bury the Living* ... **HIGH VACUUM** ... *The Monster* ... **THE GIRL FROM 5,000,000 A.D.** ... *The Man in the Roof* ... **THE 7th VOYAGE OF SINBAD** ... *The Flame Barrier* ... **COLOSSUS OF NEW YORK** ... *The Space Children* ... **THE KEEPERS** ... *The Volcano Monsters* ... and **21st CENTURY SUB**.

—Forrest J. Ackerman



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#### STUDENT

*Gary Axelrod:* 1513 W. Gilbert Ave., Peoria, Ill.

Age 16: "I'm a junior in high school, interested in all aspects of s-f. My hobbies are astronomy and chess. I'd like to play chess by mail."

#### SWEDISH STUDENT

*Karen Pehrson:* Box 1163 Granvag, Sollestea, Sweden.

Age 15: "I'm interested in science fiction with other major hobby dancing. Am a rock 'n roll fan and hope to hear from American teens."

#### STUDENT

*George Wells:* River Avenue, Box 486, Riverhead, N.Y.

Age 14: "I'm an s-f enthusiast and a rhythm & blues fan. Hate Presley and similar singers. Like

Fats Domino, Billy Ward, among others. Also play chess."

#### STUDENT

*Robert N. Johns:* Box 390, Russellville, Kentucky

Age 13: "I like s-f, stamp collecting, and chemistry. I'd also like to play chess by mail with anyone interested."

#### STUDENT

*Howard Eagley, Jr.,* Box 92, West Springfield, Pa.

Age 15: "I'm a high school junior with interests including coin collecting and s-f reading. Would like to hear from other teens."

#### STUDENT

*Dennis Smith:* 1332 Dent, Garland, Texas

Age 12: "I'm a junior high school

student with s-f as a hobby. My academic interests include astronomy, astrophysics, paleontology, archeology, and physics. I'd like to correspond with other teens."

#### OFFICE WORKER

*Florence E. Walters*: 7 Bow St., Taunton, Mass.

Age 22: "I love to write letters, collect various and sundry things, and enjoy s-f and music."

#### GI

*Charles Poole*: Box 272, Kenai, Alaska

Age 24: "I'm temporarily in the Army, an avid s-f fan, especially interested in ESP and the possibility of other unknown, potential powers of the mind. Also interested in philosophy, psychology, radio and electronics."

#### STUDENT

*David Locke*: P.O. Box 207, Indian Lake, N.Y.

Age 13: "I'm a high school student, interested in astronomy, telepathy, time travel, UFOs and the fourth dimension. Hope to hear from other s-f fans my age."

#### STUDENT

*William Hickman*: P.O. Box 514, Kitimat, B.C., Canada

Age 16: "I'm a high school student majoring in math and science. I've been an s-f enthusiast for 2½ years and am particularly interested in telepathy and teleportation. Also enjoy most sports, particularly

basketball, hockey, camping, and skiing."

#### STUDENT

*Colen Llewellyn*: 872 Charlotte St., Sudbury, Ontario, Canada

Age 15: "I'm interested in ESP, astronomy, physics, and history—particularly World War II. Also collect s-f and play chess."

#### AUSTRIAN STUDENT

*Miss Ingeborg Kuta*: Hasnerstrasse 93/16, Vienna 16, Austria

Age 18: "I would like very much to write to American s-f readers who are also interested in study of languages (German, French, Latin) just as I am in English. I like literature, music, films, sports, and most of the arts."

#### STUDENT

*Christopher Cook*: 200 Argyle Rd., West Palm Beach, Fla.

Age 14: "I'm a freshman in high school, collecting s-f and stamps and coins. I'd like to exchange ideas novels, writers, and s-f magazines. Other interests include dancing, swimming, hunting, and basketball."

#### STUDENT

*Richard Pious*: 486 E. 7th St., Brooklyn 18, N.Y.

Age 13: "I'm an honor student at Erasmus Hall high school, and have been reading s-f for 9 years. I like all sports but play only hockey and fool around with tennis and bowling. I'm interested in rocketry, aerodynamics, photography and writing. Would like to correspond

with other teens."

#### STUDENT

*Paul Evins*: 4063 Allendale Ave., Oakland 19, Cal.

Age 15: "I'm a junior in high school and have been an s-f fan four years. Other interests include astronomy, chemistry, sports, and—believe it or not—the stock market."

#### TANNERY WORKER

*Harry Robbins*: 29 Highland Ave., South Paris, Maine

Age 23: "I work in a tannery, and enjoy s-f. Am also interested in Hot Music, ESP, radio tinkering, science, and building model planes."

#### UNIVERSITY STUDENT

*Ronnie Roysum*: 826 University Ave., Reno, Nevada

Age 22: "I'm a student at the University of Nevada, interested in s-f and art. Hobbies include chess, tennis, modern jazz, and collecting s-f books—over two thousand."

#### STUDENT

*Beverly Gaye Besly*: 2205 Blossom St., Columbia, S.C.

Age 13: "I'm a junior high school student, interested in s-f, swimming, archery, and horse-back riding. Would like to exchange ideas on flying saucers."

#### MERCHANT MARINER

*Fred W. Weihe, Jr.*: 2108 Bristol Ave., Tampa 6, Fla.

Age 36: "I'm a former Merchant

Marine Officer, now operating my own apartment building here in Tampa. I've been interested in s-f since my teens, with other hobbies including photography, classical music, and creative writing."

#### STUDENT

*Robert Carr*: 55 Lock St., Welland, Ont., Canada.

Age 16: "I'm a high school student, member of a group in school interested in setting up an s-f club. Hope to hear from other fans."

#### COLLEGE STUDENT

*David C. Rupp*: 1418 Maumee Ave., Fort Wayne, Ind.

Age 22: "I'm majoring in Chemical Engineering with interests including rocketry, s-f, amateur motion picture photography, and archeology."

#### OFFICE CLERK

*James R. Mason*: 826 Tennessee St., Gary, Ind.

Age 27: "I'm an office clerk, with interests ranging from s-f, semi-classical music, and hypnotism. Hope to hear from others."

#### COLLEGE STUDENT

*David L. Brown*: Rt. 5, Columbia, Mo.

Age 16: "I'm a college freshman, interested in s-f, astronomy, modern literature, and philosophy. Also collect s-f."

#### ELECTRONICS OPERATOR

*Cpl. Robert A. Bullock*: MACS-9,

Marine Corps Air Facility, Santa Ana, Calif.

Age 20: "I'm an aviation electronics operator, interested in s-f, particularly with reference to military application. Also like western music, and the theory of UFO and the possibility of extra-terrestrial life."

#### STUDENT

*Larry Summers*: 509 N. Willow St., Ingalls, Ind.

Age 15: "I'm interested in corresponding with guys and gals on s-f, UFO, interplanetary and interstellar travel. I also enjoy chess."

#### STUDENT

*Jackie Darnell*: Box 836, Lovelock, Nevada.

Age 14: "I'm a high school freshman, interested in s-f, art, and music—particularly rock 'n roll. Would like to write to other teens."

#### SCOTCH FAN

*Gavin Brown*: 47 Causeyside St., Paisley, Renfrewshire, Scotland.

Age 37: "I'm a mechanical shovel driver for a large engineering firm here in Scotland. My hobbies are corresponding, s-f, photography, home movies, and swapping & collecting magazines and first edition books. Have 40 first edition Rider Haggard books. I'll answer all letters."

#### ACCOUNTANT

*Dennis A. Milham*: 1720 N. Gower St., Hollywood 28, Cal.

Age 25: "I'm a former 4-year Navy man, weight-lifter, and aspiring writer. Follow accounting as my profession, however. Like all types of s-f but prefer brains to BEMs. Go for classical and progressive jazz music, opera, pops, Elvis and western. All types. Enjoy swimming and boating, basketball, horses, chess and scrabble."

#### RAILROADER

*C. Benoit*: Box 361, Zavalla, Texas.

Age 30: "I'm an agent for the T&NO RR travelling through East Texas mostly. Very interested in discussing s-f which I've been reading for 15 years. Am also interested in joining a fan club."

#### STUDENT

*Leonard Katz*: 2025 Regent Pl., Brooklyn 26, N.Y.

Age 17: "I'm interested in s-f, science in general, stamp collecting, sports, and chess. Hope to hear from others."

#### HOSPITAL AIDE

*Mary Stutconis*: P. O. Box 4, Parkersford, Pa.

Age 41: "I've been reading s-f since my teens. Am divorced, a psychiatric aide in a state hospital. As a result of my work I have a deep interest in psychology and hypnosis. Like reading, TV, dancing and swimming. Am also a great trip taker."

#### STUDENT

*Donald Young*: 1217 N. Page, Oklahoma City 17, Okla.

Age 16: "I'm a senior in high school and have been an s-f fan for many years. Interests include architecture, ESP, UFO, Atlantis, Lemuria, and Esoteric Christianity. Like rock 'n roll and most other music as well."

## STUDENT

*Gary Kingsbury*: 1228 W. Market St., Warren, Ohio.

Age 14: "My interests are s-f reading and writing. I'd also like to trade German and English books."

## STUDENT

*Bruce J. Jefferies*: 4064 Mandarin Ave., Hayward, Cal.

Age 12: "I'm interested in chemistry, physics, hypnotism, astronomy and space flight. Also study math, ESP, play chess, and enjoy s-f. Would like to exchange views with fans whose interests parallel my own."

## STUDENT

*Christopher B. Brooks*: 3906 Vaux St., Philadelphia 29, Pa.

Age 14: "I attend the Wm. Penn Charter School, with interests including chemistry, rocketry, and astronomy. My hobby is s-f and I enjoy dancing, swimming, and pop music. Fascinated with UFO."

## WRITER &amp; EDITOR

*Lawrence M. Anderson*: 915 King St., Alexandria, Va.

Age 24: "I'm a writer and editor of electronics courses for a school in Washington, D.C. Naturally most

of my hobbies lean toward science and electronics, but am very active in outdoor sports—boating, hunting, fishing. Good music and dancing also appeal to me."

## JOURNALISM STUDENT

*Marguerite Shaft*: 2075 Delhi, NE., Holt, Mich.

Age 17: "I'm a college student working for my degree in journalism. I like to write, mostly short stories. I train horses and am a riding and horsemanship instructor. Love s-f."

## STUDENT

*Adrian Melott*: 334 Highland Ave., Moundsville, West Va.

Age 12: "I'm interested in photography, s-f, ESP, swimming, chemistry, UFOs, anthropology, astronomy, coin collecting, mineralology, and ancient history. Will answer all letters."

## STUDENT

*Philip Paskowitz*: 676 Pennsylvania Ave., Brooklyn 7, N.Y.

Age 11: "I'm interested in science, and my hobbies include stamp collecting, foreign currency and coins, and license plates. Would like to write and trade with other fans."

## OFFICE WORKER

*Don Mortimer*: 40 Casa Loma Apts., 309 Sherbrook St., Winnipeg, Man., Canada.

Age 23: "I'm an office worker and am quite interested in s-f. Would like to hear from fans in the mid-

## SPACE TRAVEL

west area of USA."

## STUDENT

*Ilene Weinstein*: 2543 East 21st St., Brooklyn 35, N.Y.

Age 13: "I collect records, love parties, and read plenty of s-f. Am vastly interested in UFO and would like to hear from others."

## IBM MACHINERY WORKER

*Miss Carol A. Burgin*: 238 Trask St., Aurora, Ill.

Age 25: "I work with IBM machinery, with hobbies including photography (35 mm slide) music, plays, TV, and travel. Like to hear from others."

## GROCERY CLERK-BUYER

*John C. Creson*: Box 325, Port Orford, Ore.

Age 20: "I'm a grocery clerk and buyer, interested in s-f and dancing. Also interested in sports—football and bowling. Would particularly like to hear from fans in foreign lands."

## STUDENT

*Newton Jones*: Nantahala, N.C.

Age 15: "I'm an s-f fan and collect books. Also enjoy small game hunting and fishing. Hope to hear from other fans."

## STUDENT

*Irwin Sulzbacker*: 3728 Lyme Ave., Brooklyn 24, N.Y.

Age 16: "I'm a junior in high school, interested in s-f, ESP, and UFO. Hobbies are photography (8

mm movies) and astronomy. Hope to hear from other teens at home and abroad."

## STUDENT

*Tena Mathews*: 305 Steinman, Dallas 3, Texas.

Age 15: "I'm crazy about s-f, outdoor sports, and dancing. Like rock 'n roll and rhythm & blues. Like Elvis Presley, Danny and the Juniors, and others. Also like art. Hope to hear from fans especially in foreign countries."

## STUDENT

*Jared C. McDade*: 89 Purchase St., Purchase, N.Y.

Age 16: "I've been interested in s-f about six years. Collect s-f magazines and books. Would like to hear from other fan collectors."

## STUDENT

*Ray Walters*: 2154 Floyd, SW, Grand Rapids, Mich.

Age 15: "I'm a high school student interested in short story writing, mostly s-f. Interested in UFO and trading and collecting s-f mags."

## HOUSEKEEPER

*Miss Margaret White*: 230 Cervantes Blvd., San Francisco, Cal.

Age 47: "I'm a housekeeper, interested in ESP and its development. I also like classical music, art, and literature."

## MARINE

*Pfc Jan R. Fee*: 2nd Hvy. Arty. Rkt. Btry., Camp Geiger, N.C.



Age 18: "I'm an s-f fan, interested in ESP, chess, coin collecting, and mechanics. Hope other fans my age will write."

### RADIO & TV STUDENT

*Roy Ramon*: 4331 Bell, Kansas City 11, Mo.

Age 22: "I'm an s-f enthusiast, with interests including music, photography, guns, cars, and sports. I'm studying radio & TV repair."

### STUDENT

*Helen Sulzman*: 23 Burd St., Pennington, N.J.

Age 15: "I'm a high school sophomore, interested in s-f, music dancing, sports, and reading. I'd enjoy hearing from fellows and girls my age."

### STUDENT

*Douglas Weller*: 417 Gerona Ave., Coral Gables, Fla.

Age 15: "I'm an s-f fan, interested primarily in ESP, UFO, and extra-terrestrial life. My hobbies are sailing and reading. Like music and play the guitar. Hope to hear from guys and gals my age."

### STUDENT

*Barbara Hanson*: 2322 Sheffield Ave., Chicago 14, Ill.

Age 19: "I'm a sophomore chemistry major at DePaul University. I'm interested in science, music and s-f. Hope interested fans will write."

### HOUSEWIFE & TEACHER

*Ruth Justice*: 246 Dulton Dr., Tole-

do 7, Ohio.

Age 34: "I'm the mother of four children and a teacher. Would like to swap s-f mags and books. Main hobby is s-f."

### STUDENT

*Sharon Bellville*: 167 Spring St., St. Ignace, Mich.

Age 15: "I'm a newly ordained s-f fan. I plan to go into medical research and/or surgery. Would like to write to guys and gals interested in scientific fields."

### STUDENT

*Robert Biddle*: 520 Kenwood Dr., Menlo Park, Cal.

Age 18: "My main interests include mathematics, physics, astronomy, chemistry, ESP, astronautics, psychology, and such sports as swimming and bowling. Hope I'll hear from fellows and girls my age."

### STUDENT

*Sophie Sulzman*: 23 Burd St., Pennington, N.J.

Age 16: "I'm a junior in high school, interested in s-f, math, swimming, bowling, and other sports. Would like to hear from other teens."

### STUDENT

*Lloyd J. Mathews, Jr.*: 4411 Alice Ave., Austin 5, Texas.

Age 14: "I'm a student in junior high, interested in UFO and astrophysics. I'd like to exchange sighting data, clippings, etc., with any saucer enthusiasts."

# ROYAL JELLY, the Queen Bee's Special Food...ITS SECRET OF PROLONGED LIFE!



Leading National Magazines, Newspapers, Syndicated Columnists, Medical Journals, and Reports from Medical Congress indicate the benefits of ROYAL JELLY, a "living" high energy food.

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How would you like to awaken one morning and find yourself possessed with a marvelous sense of "well-being," full of New Pep and Vitality? Wouldn't it be wonderful if you could feel increased vigor and enjoy a "new lease on life"? Now... Scientists say this may happen to you!

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"... From the very first few days Royal Jelly, gave to those who were taking it, a feeling of well being and euphoria, a renewed vigor, and at the end of a few weeks the whole organism seemed reinforced, one notes growing strength and energy in his whole body, as much in his exterior appearance, as in the agility of his movements.

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## Observations by Doctors of the Medical Congress Who Took Royal Jelly and Observed Its Use Directly



• Royal Jelly gives new energy to those in a weak, enervated state, and greater vigor, more physical strength and spiritual strength to the healthy.

• Royal Jelly alleviates suffering of men and women in their critical years in a sensational manner.

• Royal Jelly acts on weakened, tired eyes, giving instantly a sensation of new light.

• Feeling of tiredness disappears immediately.

• Royal Jelly gives a feeling of increased sexual drive and energy, especially to men and women over 40.

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• Royal Jelly produces a pleasing state of relaxed well-being and eases tension.

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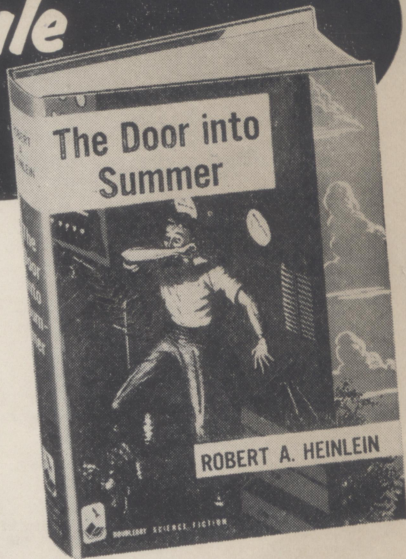
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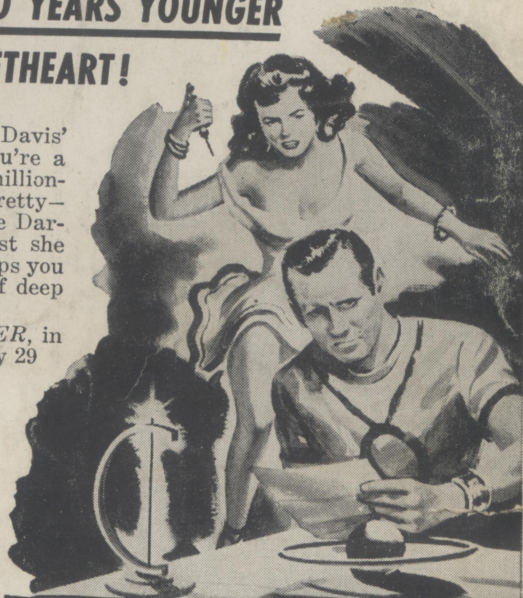
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