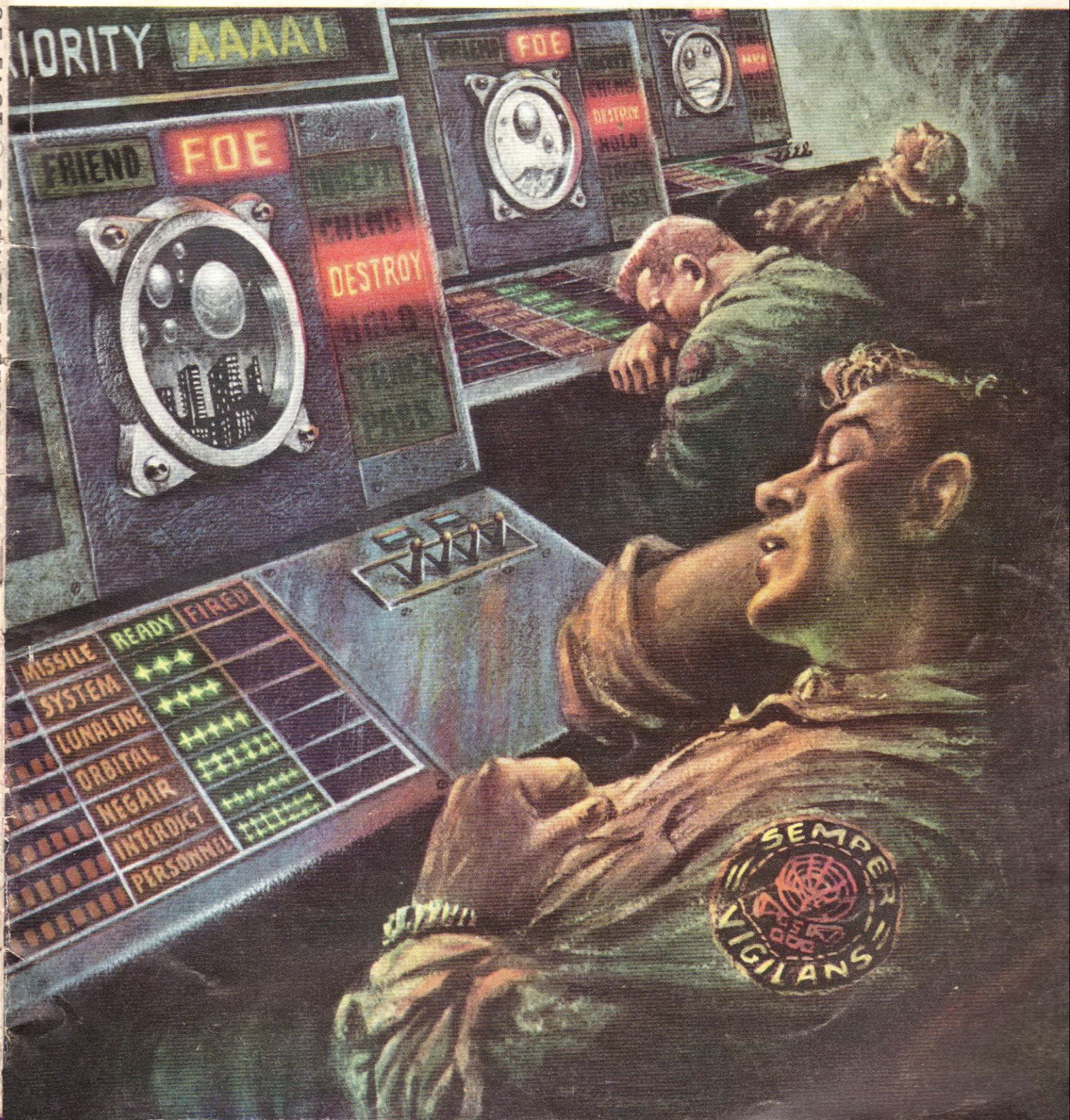
JULY 1964 | 50c 5/-

analog

SCIENCE FACT SCIENCE FICTION

SLEEPING PLANET BY WILLIAM R. BURKETT, JR.



ANALOG | SCIENCE FACT SCIENCE FICTION
JULY 1964

Sylvania/ECG has the answer

Standard photoconductors respond primarily to visible light. Recently, the Sylvania Electronic Components Group tackled the tricky problem of making these cells "see in the dark."

The answer is ingenious. Sylvania developed a photoconductor with a special phosphor that emits visible light when subjected to the invisible rays of ultraviolet.

The new Sylvania UV photoconductor has numerous applications. For instance, it can accurately detect the presence of a man or a mouse in a dark room flooded with "black light," or monitor your furnace by the color of its flame.

Advanced component design such as this is the result of integrated research and engineering in all of the basic sciences.

One of the components developed by Sylvania ECG may solve a problem you have in system design.

Sylvania Electronic Components Group, Sylvania Electric Products Inc., 730 Third Avenue, New York, N. Y. 10017.

SYLVANIA

SUBSIDIARY OF
GENERAL TELEPHONE & ELECTRONICS GT&E

SYLVANIA/ECG OFFERS NEW CAPABILITIES IN: ELECTRONIC TUBES • SEMICONDUCTORS • MICROWAVE DEVICES • SPECIAL COMPONENTS • DISPLAY DEVICES

FREE Album From

The Longines Symphonette®

To Introduce

THE WORLD'S MOST HONORED MELODIES AND SONGS OF

"Love and Romance"

The Longines Symphonette
and the Choraliers directed by
Mishel Piastro!

FREE! This magnificent Longines Symphonette album of The World's Most Honored Waltzes! Over 11 selections... *FREE* when you preview the Treasury of *Love and Romance!*

Over 55 Selections
5 *PURE VINYL RECORDS*
Just $12.95
less than 24¢ a selection!

The *most beautiful, familiar,* popular music ever written... performed in brilliant high-fidelity or stereo... by the Longines Symphonette and The Choraliers! Romance from far-a-way places ... college songs... waltzes... dances... traditional songs... melodies and songs that soar high with happy memories!

Sweetheart of Sigma Chi—Girl of my Dreams—Beyond The Blue Horizon—I'm Falling In Love With Someone—Intermezzo—Liebeslieder Waltz—Some Day—Deep In My Heart, Dear—Smoke Gets In Your Eyes—and many, many more of the songs and melodies you know, love and grew up with.

LISTEN FREE FOR TEN DAYS

Send for the new Treasury of The World's Most Honored Songs of *Love and Romance,* along with your *Free Waltz* album. Play all 5 records—over 55 selections—again and again. You must be delighted in every way... thrilled by the "Living Sound" fidelity... enthralled by the virtuoso performances... or return the Treasury, owe nothing and keep the Waltz album! Own the Treasury for just $5 a month until the full price of $12.95 plus shipping and handling ($1.25 additional for stereo) is paid. The Longines Symphonette Treasuries are available only through this offer. *Mail coupon today!*

Just a few of more than 55 selections
in 10 sides of the melodies and songs of *Love and Romance...*

Golden Days
Fledermaus Selections
Consolation
Falling in Love with Someone
I'm Always Chasing Rainbows
One Alone
Daybreak
Romanza Anduluza
Dancing in the Dark
Only Make Believe
Fur Elise
Intermezzo
Erotik
Sweetheart of Sigma Chi
Open Thy Blue Eyes
Valse Sentimental
Love, I Have Won You
Among My Souvenirs
When Day Is Done
The Voice of the Bells
Best Things in Life Are Free
Smoke Gets in Your Eyes
Just Like the Ivy, I'll Cling to You
—and many, many more of the songs you know and have long wanted to own!

Mail Coupon Below for FREE *Waltz Album*

The Longines Symphonette Recording Society
Longines-Wittnauer Bldg., Fifth Avenue, New York 36, N.Y. 10036

Rush my FREE gift album, The World's Most Honored Waltzes, along with the Treasury of Songs and Melodies of *Love and Romance.* After 10 days I may keep the Waltz album, return the Treasury and owe nothing or remit just $5 a month until $12.95 plus handling and shipping is paid (add only $1.25 for stereo). R291-017

Check One Box ☐ High Fidelity Edition ☐ Stereo Edition

Name .....

Address .....

City ..... Zone..... State.....

NYC residents add 4% sales tax.

☐ SAVE! Enclose full amount. We pay shipping and handling. Money refunded in 10 days if not delighted. You keep gift Album.

SPECIAL OFFER TO ANALOG READERS

Famed epic of the world of the future

— ORIGINALLY PUBLISHED IN THREE VOLUMES AT A COMBINED PRICE OF $10.50

Yours FOR ONLY 10¢

with a short trial membership in the Science Fiction Book Club

THIS brilliantly exciting chronicle of the world of the future combines three great science fiction classics for the first time in one huge volume. *FOUNDATION . . . FOUNDATION and EMPIRE . . .* and *SECOND FOUNDATION* are among the most thought-provoking, compelling epics ever to come from the pen of the distinguished research biochemist and leading science fiction writer, Isaac Asimov.

How to Get This Unusual Value for only 10¢

Because you are an Analog reader, the Science Fiction Book Club would like to acquaint you with the most imaginative, informative, entertaining new science fiction books as they are written. That is why we have arranged to send you THE FOUNDATION TRILOGY for only 10¢ with a Trial Subscription to the Club.

Here's how the Club works: each month it offers a really superb new science *fact* or *fiction* book at a fraction of its regular price. Even though these books sell for $2.50, $3.00 and up in their original editions, Club members get them FOR ONLY $1 EACH — in special full-length, hard-cover editions. Extra-value books cost more. And the Club tells you in advance what each monthly selection will be. During your Trial Subscription you agree to take as few as four books in the next twelve months. After that you may take as few or as many books as you want, and you may cancel at any time. It's a deal that is hard to beat.

Mail Coupon With Only 10¢

THE FOUNDATION TRILOGY costs new members *only 10¢* with a short trial membership. After seven days, if you are NOT delighted, return the book and your membership will be canceled. Otherwise you will be enrolled in the Club as a Trial Member, and you need take only four books in the next twelve months. Mail the coupon *today* to: Science Fiction Book Club, Garden City, New York

THE Foundation Trilogy

BY 12,067 it was clear that the massively corrupt Galactic Empire was near total collapse. Its myriad worlds had already begun to war among themselves, plunging the universe into barbaric chaos. Civilization seemed doomed.

But master scientists laboring to ensure that civilization would be preserved during the dark ages to come, established twin "Foundations" at opposite ends of the Galaxy, to form the *nucleus* of a new civilization, and in time to unite across the Galaxy to form a new . . . a stronger . . . a more enduring Second Empire.

In *Foundation* and *Foundation and Empire*, we follow the course of the First Foundation as it rekindles the light of civilization in an ever-increasing portion of the Galaxy — and as it is confronted by its greatest crisis: a dangerous mutant, *an evil yet brilliant psycopath whose soul-consuming desire is conquest of the Galaxy!*

Because he was a pitifully small, emaciated creature, it was only *too late* that men realized the strange power of his enormous brain — power to read men's minds, discover their subconscious thoughts, destroy their wills, reduce his enemies to efficient puppets eager to perform his slightest wish!

Within a decade, he tyrannized the entire Galaxy — except for the *Second Foundation.* And this became his mania — to find and conquer the Second Foundation. *Everything in the Galaxy must be his! . . .*

SCIENCE FICTION BOOK CLUB
Dept. 4-AE-7, Garden City, N. Y.

I enclose 10¢ to help cover shipping. Please rush me Isaac Asimov's FOUNDATION TRILOGY, and enroll me as a Trial Member in the Club. Then, every month send me the Club's free bulletin, "Things to Come," which describes coming selections. For each book I accept, I will pay only $1, plus shipping, unless I take an extra-value selection at a higher price. I need take only four books within a year and may resign at any time thereafter.

NO RISK GUARANTEE: If not delighted with THE FOUNDATION TRILOGY, I may return it in 7 days, pay nothing, owe nothing, and my membership will be canceled.

Name.....

Address.....

City.....Zone....State.....

If under 18, parent must sign here.....

(Offer good in U.S.A. only.) **10-S68**

JOHN W. CAMPBELL
EDITOR

KAY TARRANT
ASSISTANT EDITOR

HERBERT S. STOLTZ
ART DIRECTOR

ROBERT E. PARK
BUSINESS MANAGER

HARRY F. DECKER
ADVERTISING DIRECTOR

WALTER J. McBRIDE
ADVERTISING MANAGER

EDITORIAL
AND ADVERTISING OFFICE:
420 LEXINGTON AVENUE,
NEW YORK, N.Y. 10017

 Analog Science Fact—Science Fiction is published monthly by The Conde Nast Publications Inc. Editorial and advertising offices: 420 Lexington Avenue, New York, N.Y. 10017. Executive and publishing offices: Greenwich, Connecticut. I.S.V.-Patcevitch, President; Alfred W. Cook, Treasurer; Mary E. Campbell, Secretary. Second class postage paid at Greenwich, Connecticut, and at additional mailing offices, under the Act of March 3, 1879. Subscriptions: In U.S., possessions and Canada, $5 for one year, $9 for two years, $12 for three years. Elsewhere, $7.50 for one year, $15 for two years. Payable in advance. Single copies: In U.S., possessions and Canada, 50¢. Six weeks are required for change of address. In ordering a change, write to Analog Science Fact—Science Fiction, Boulder, Colorado. Give both new and old address as printed on last label.

POSTMASTER: SEND FORM 3579 TO ANALOG SCIENCE FACT • SCIENCE FICTION, BOULDER, COLORADO.

Vol. LXXIII, No. 5 | July 1964

analog
SCIENCE FACT — SCIENCE FICTION

SCIENCE FACT

SERIAL

NOVELETTE

SHORT STORIES

READERS' DEPARTMENTS

NEXT ISSUE ON SALE JULY 9, 1964
$5.00 PER YEAR IN THE U.S.A. 50 CENTS PER COPY
COVER BY KELLY FREAS

BRASS TACKS

Dear Mr. Campbell:

As usual I enjoyed the February issue of Analog and especially your editorial; however, I have a hole to pick in it. You said that a technologically equipped man could "defeat, without serious effort, any nontechnological attacker." If this is always, or almost always true, why is there still all that fighting in Vietnam? How come the government troops armed with the most modern weapons and greatly outnumbering the Viet-Cong have yet to win?

MIKE TIPTON

210 S. Grevillia
Inglewood, California 90301

1. Both sides are technologically equipped.

2. Neither side is made up of technological people; the weapons are not of their own production.

3. The communists believe—rightly or wrongly makes no difference!—in their cause. The government troops are, in effect, in morale and esprit, *mercenaries.*

Dear John,

I am writing out of what is to me a matter of annoyance. The pique is occasioned by the arrogance of meteorologists who maintain that Atomic- and Hydrogen—bomb testing has "No effect whatsoever upon the weather."

Now, mind you, I do not dogmatically state that it does; I merely maintain that it might. In fact, I have a strong opinion that there is cause to believe it does, but I have as little evidence to support that belief as the meteorologists have for the contrary supposition.

What are the arguments used by the professional weather-guessers against the proposition that A&H-bombs affect the weather? Well—there are usually three.

1. The biggest bomb explosion liberates far less energy than a storm. In fact, say they, a mild winter storm generates more energy per hour than a five-megaton bomb.

2. Dust clouds from tests are not heavy enough to screen out the sun's rays sufficiently to cause a temperature drop great enough to initiate a storm.

3. The increment of radiation does not stir up storms.

My position is that all of these are whistles in the dark. The first proposition is based on the idea that the increase in total available energy is insufficient; the second, that the decrease of available solar energy is insufficient. The third is flatly false, as can be demonstrated in a cloud chamber, and as was demonstrated by Langmuir and others on clouds, while the first two constitute a circumlocution, thus destroying the validity of both.

I am reminded of a tale that is told concerning Lavoisier, one of the first great chemists, and also a professional weather-guesser. Said he, when farmers brought to him pieces of pitted stone which, said they, had fallen from the sky, "There are no stones in the sky; therefore, no stones can fall

from the sky." Bringing this remark up to date, "Atomic bombs cannot have any effect upon the weather, therefore Atomic bombs do not have any effect upon the weather."

The introductory arguments being completed, perhaps an analogue or two may point up the fallacies inherent in them.

A. Into an evacuated ten-liter quartz flask, introduce four grams of Benzene and ten grams of Chlorine. Do this by dim artificial light. Observe that the resulting pale yellow-green cloud is quite stable; the flask won't even get warm. Get behind two inches of glass; now allow a one-square-centimeter beam of direct sunlight to fall on the flask. If the resulting explosion doesn't blind and deafen you, you may have realized that it took very little incident energy to release a hell of a lot of energy! (A very few packets of UV of the proper frequency—and bingo! a chain reaction!)

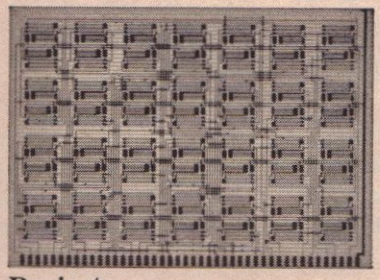
B. Take a pinhead of Lead Azide. Place (gently) against fifty tons of TNT. Attach one copper wire to each side of the Lead Azide. Attach the other two ends of the wire to a Ford Coil. Energize the coil with a battery. If you're still around, repeat the experiment without the TNT. Sounds like a cap pistol, doesn't it? Hardly impressive at all. In fact, you might say that the initiating energy was minuscule—but where did that city block go to? And whence this hole? "Obviously," there isn't enough energy in that little bit of Lead Azide —oh, yes? Well—the energy liberated by that TNT in comparison to the energy of the Lead Azide was—hm-m-m . . .

C. Take a one-thousand ton, roughly spherical, boulder. Balance it on a mountain top. Looks pretty, doesn't it? Now, lean against it. Thank you. You really didn't use much energy to demolish forty million board feet of timber, thirty-seven houses, two supermarkets and a church, now, did you?

Examples could be multiplied, but it is hardly necessary. A friend of mine in an Airlines weather bureau says,

continued on page 93

Technologies in systems design at IBM



Project: to produce angstrom-thin units automatically

An automatic film-fabrication process is essentially a miniature "factory." It has the problems of a full-sized plant squeezed into the space of a closet. The carefully controlled conditions of a laboratory thin film process must be maintained—but at the same time, the process steps must move reliably and at high speed.

To produce a circuit with the correct electrical or magnetic properties on its one and only pass through the vacuum fabrication process, many variables such as temperature, pressure and deposition rate must be held in delicate balance. This calls for solution to a host of instrumentation problems in measurement and control, and a basic understanding of the physical and chemical nature of the deposition process.

IBM engineers and scientists have made substantial progress in the field with development of a number of experimental thin film "factories." IBM developed the first continuous thin film fabrication line for the Navy in 1962.

This line moves substrates successively through four vacuum chambers. The line turns out hundreds of circuits an hour, containing thousands of resistive and capacitive components.

Recently, IBM scientists automated a fabrication process for experimental cryogenic circuits. The process variables needed for a particular circuit configuration are stored on punched cards and fed to a control system. All fabrication steps and process conditions are automatically controlled, resulting in thin film circuits with highly uniform, reproducible electrical properties.

But any factory can be improved. Now IBM is developing processes to fabricate different varieties of thin film circuits. Fabrication speed is being increased as well. There are many opportunities right now to make important contributions to these and other IBM scientific and engineering projects. Send your resume to: Manager of Corporate Employment, IBM Corp., Dept. 1742U, Armonk, New York 10504. IBM is an Equal Opportunity Employer.

There is room for achievement at

IBM.®

EDITORIAL BY JOHN W. CAMPBELL

THE END OF COLONIALISM

The greatness of the Roman Empire depended in large measure on its stability over generations of human time, on the massive public works programs the Romans achieved, and on reliable military strength. And these things, in turn, depended on an enormous mass of human muscle power—sheer manpower—and an enormous stretch of territory. Among Man's greatest inventions are Fire, the Wheel, and—far less celebrated, but truly almost equally great!—the horse-collar. The Romans didn't have the horse-collar—and without that, you can't attach any work load to the muscle power of a horse. Previous to the "Dark Ages" triumph of the horse-collar, the Romans had to attach a load to a horse by putting a rope around the animal's neck—the only part of the beast a rope could stay on. This has the undesirable effect of cutting off the horse's air intake if he pulls very hard.

So all that public works program, all agricultural work, every type of labor had to be carried out by human muscle power. The Roman Roads are famous—and deservedly so. They were the world's first solidly engineered, firmly based, and well-maintained military roads, linking a huge empire together.

Their base, however, was not simply engineering; engineering without physical, objective work to carry it out is useless.

Rome itself had no decent building stone—some very unsatisfactory and rather ugly volcanic rock was about all that occurred nearby. The marble buildings of the Empire period came from quarries in the colonies—Egypt, in particular.

The stability of the economy—food for the Roman people—was founded on the fact that with colonies stretching completely around the Mediterranean, north all the way to Caledonia, and east beyond the Euphrates, the climatic conditions were so variable, the sheer extent so great, that a drought or severely rainy season would not affect *all* the colonial areas at once.

Since all agricultural work, as well as all public works building, has to be done entirely by human muscle power—oxen could be hitched to plows, et cetera, by tying a rope around their horns, but they are slow, and very inefficient; they eat about as much as they produce—manpower and area of agricultural land was essential. The greatest empire in terms of military power was, necessarily, that which had the greatest available manpower.

For one thing, to maintain a body of trained specialists in warfare—a true standing army—takes not only the manpower of the army itself, but sufficient agricultural manpower to support those fighters in nonproductive "idleness". Cavalry was *expensive;* the horses ate like horses, the men ate almost as soundly, and neither horse nor cavalryman produced anything. But without the defensive power of the Legions, the Empire would have been overrun.

Down through history, the power of a culture has been pretty accurately measured in terms of numbers of men, and acres of tillable land, multiplied by a factor representing the efficiency of organization of the culture.

Rome gained supremacy originally, starting with a small number of citizens and a tiny area, by having the most efficient organizational system in the Italian peninsular area. Then when the Romans had added more manpower and area, they maintained and improved their organizational system, and presently dominated the entire Mediterranean area. In the later Empire period, the organizational efficiency had dropped very low indeed—but they had so vast an area, a population, and such a network of military roads that still Rome remained the dominant power.

But the pattern of power and Empire were well-displayed by Rome. The fundamental secret was organization, backed up by colonial supplies of economic goods and manpower.

That pattern remained throughout history . . . up till about the middle of the last century. And the change that came then signaled the end of Colonialism.

At about the middle of this century, the full meaning of that change was finally being felt; the result has been the "liberation" of colonies all over the world—which has been done with brilliant propaganda arguments that make it appear a great, Liberal movement. The oppressed colonial peoples (sob . . . sob . . .) have, at long last, been given their freedom—their independence—their right to individual dignity in the world of nations.

That's one way to put it.

continued on page 91

In any area where there are no fully satisfactory theories—
there is an opportunity for the amateur student to make a real contribution.
In the field of solar system genesis, there is
no fully satisfactory theory—and this new theory, I feel,
offers some highly interesting new approaches.
How "close" is a "close passage" of just-forming proto-stars?
Ten billion miles? A hundred?
What happens when a stellar core plows through the "atmosphere"
of such a proto-star at Mach 50 or so . . ?

WILLIAM F. DAWSON | BEN BOVA

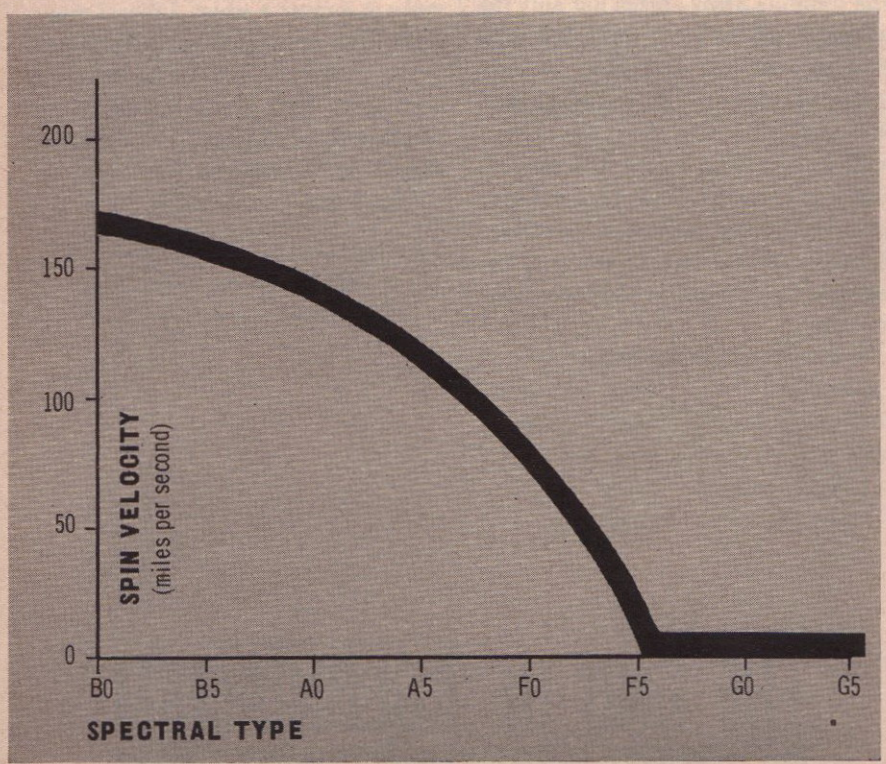
ORIGIN OF THE SOLAR SYSTEM

"There is a tide in the affairs of men," says Shakespeare's Brutus. The Bard might also have observed that there is a tide in the history of scientific theories.

Theories on the origin of the solar system have gone through many ebbs and floods, starting with the ancient Sumerians. Each theory seems to sweep across the intellectual horizon and gather more adherents as it rises. It reaches a crest in popularity and then breaks against a solid wall of fact—usually some observational evidence that the theory cannot explain. Then it ebbs away, to be replaced by a new, incoming tide.

This article will propose a new theory on the formation of the solar system. Not that astronomers and astrophysicists are lacking in theories; they have more than they need already. But cosmology is one of the few fields of scientific endeavor where an amateur can still make a contribution. The theory to be presented here may be no better—or worse—than those in vogue now among the professionals. It is an idea that seems worth discussing. Perhaps it can explain some of the unanswered questions that have haunted earlier explanations of the solar system's origin.

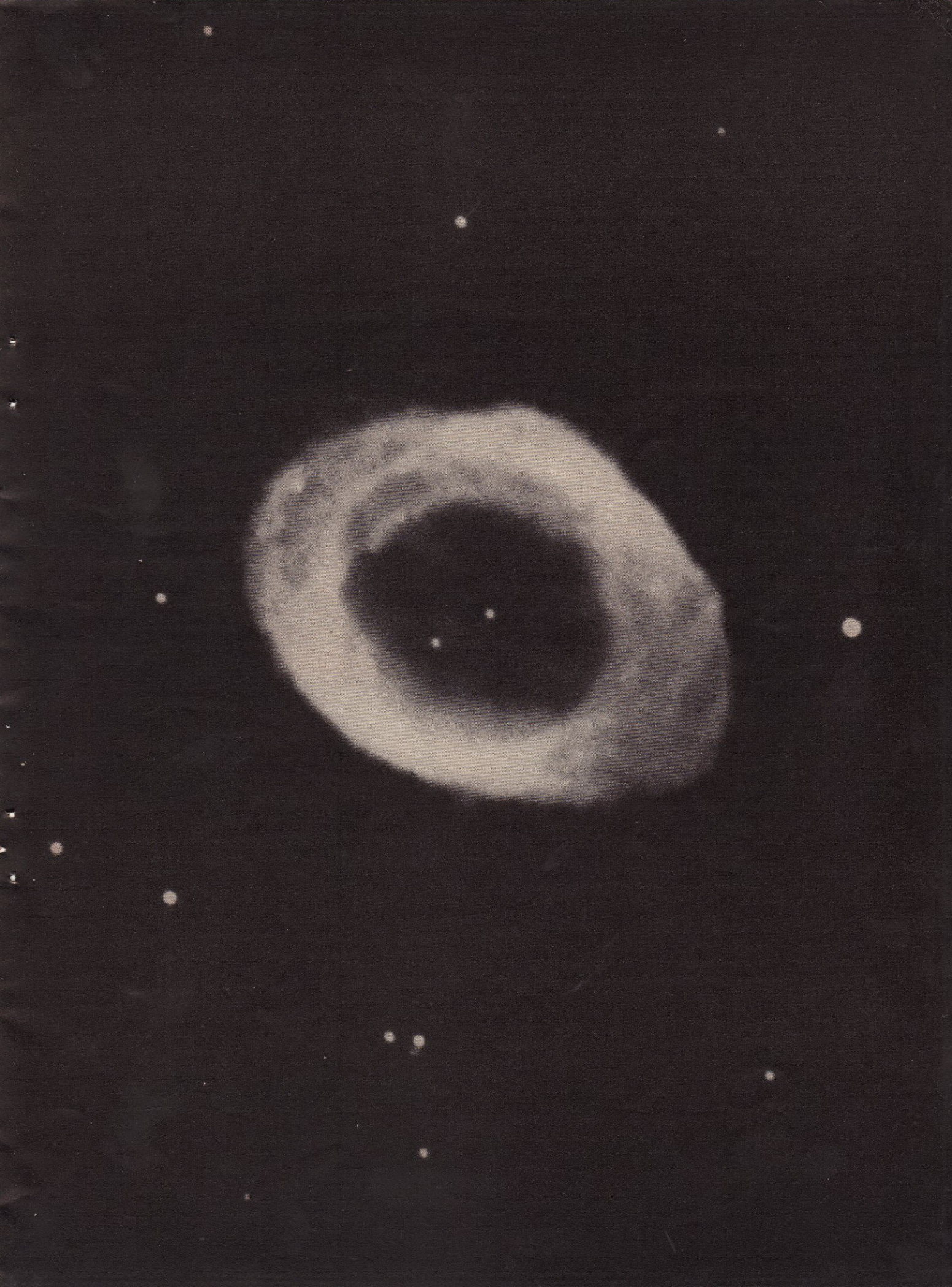
The big problem with theories about the formation of the solar system, of course, is that the solar system is so complex and variegated. Table 1 gives some of the bald facts: note particularly the wide divergencies in densities and spin rates. There are many other oddities to worry about. Body sizes in the solar system range from the Sun's 850,000-mile diameter to dust particles of about 10^{-5} centimeter. Jupiter alone contains two-thirds of the mass of *all* the planets combined, yet there are comets a hundred times Jupiter's goodly size



Rotational Velocity of Main Sequence Stars shows dramatic slowdown in older, cooler stars (from F5 on). This may indicate that B, A, and early F-type stars are too young to have allowed MHD-braking interaction with gases surrounding such stars. Sun is a GO star.

Opposite. Ring Nebula in Lyra: result of an ancient nova explosion. Gases show no indication of planet-building. Instead they are expanding smoothly away from parent star.

MT. WILSON & PALOMAR OBSERVATORIES PHOTO



Origin of the Solar System

that weigh practically nothing at all. All the planets lie in almost the same plane—but not quite. Four of the planets are giant-sized iceballs, four others are small chunks of rock and metal, and the remaining one—Pluto—is a cryogenic question mark. If Pluto's density is actually the figure shown on Table 1, then the planet is denser than the densest element known on Earth: osmium.

The solar system is weird. One planet has rings around it. Why only one? Why one at all? Next to the largest planet of all is a ring of planetesimals. Uranus rolls along on its back with its pole pointing toward the sun, instead of standing reasonably upright on its axis, as do the other planets. Venus is covered with clouds, rotates in a direction opposite that of all the other planets, and actually has a "day" that is longer than its "year!" Earth is brimful of water, but no other planet has shown a trace of liquid water on its surface. The Moon has a density completely different from Earth's; and the Earth-Moon system comes closer to being a double planet than a planet-and-satellite combination. Why? Explain it. Go ahead.

The wonder of it is not that so many theories have been tried and shown wanting. The amazing thing is that people still try!

Practically all the theories proposed to date can be classified into two categories: evolutionary and revolutionary. The evolutionary type of theory sees the formation of the solar system as a natural sequence of events, a completely ordinary and perhaps even inevitable consequence of the birth of a star. In contrast, the revolutionary theories picture the solar system being formed as the result of a cataclysm of some sort; in this view the formation of planets around stars is a very rare event. Moses, for example, considered this Earth to be so unique that a special act of God was necessary to create it. Fred Hoyle—to take a first-rate modern cosmologist — believes that planetary systems are formed quite naturally around stars, and that their creation can be explained by the laws of physics and chemistry.

At the moment, the natural-sequence, evolutionary type of theory is generally accepted by most astronomers. The evidence to support it is mostly indirect, as we shall soon see. There are also some serious gaps in the chain of reasoning. But to understand the situation fully, we should go back a little and get some historical perspective.

The first really scientific explanation for the solar system's origin was put forth about two hundred years ago by the German philosopher Immanuel Kant and the French astronomer Pierre Simon de Laplace. This was the so-called "nebular hypothesis." Kant and Laplace suggested that the solar system might have originated in a gas cloud—a nebula—surrounding the sun. The gas condensed and formed the planets, satellites, meteoroids, comets, etcetera. This was a natural-sequence, evolutionary type of theory. There was no reason why similar events could not occur on other stars, according to the Kant-Laplacian view.

The sharp edge of mathematical fact burst this theoretical balloon about a hundred years later. James Clerk Maxwell, one of the giants of nineteenth-century mathematical physics, proved on paper that a gas cloud simply would not behave in the way the nebular hypothesis demanded. Maxwell showed mathematically that if all the matter now contained in the solid bodies of the solar system was originally gaseous, the gas cloud would have been far too thin to condense into planets. Instead of condensing, the cloud would have dispersed into interstellar space.

Long after Maxwell's death, astronomers found some observational evidence to support his conclusions. They have photographed stars that have gone through a nova phase in the past, and blown off some of their gaseous envelope. The gas flows smoothly away from the stars, and shows no tendency

PLANET	Diameter (miles)	Mean Radius of Orbit (10^6 miles)	Mean Radius of Orbit (AU's)	Spin Rate	Orbital Period	Density (times H_2O)	Mass (Earth = 1)	Inclination of Poles	Inclination of Orbit, Relative to Earth's
MERCURY	3100	36	0.39	88d	88d	3.8	0.06	?	7°
VENUS	7700	67	0.72	230±45d	225d	5.0	0.82	?	3°23′
EARTH	7927	93	1.00	24+h	365.25d	5.52	1.00	23°27′	.....
MOON	2160	.....	.....	29.5d	(geo-centric)	3.37	0.012	.....	.....
MARS	4200	141	1.52	24h37m	~2y	3.81	0.11	25°12′	1°51′
PLANETOIDS	.....	246 (avg.)	2.65	.....	.....	.....	.....	.....	.....
JUPITER	88,700	483	5.20	9h55m	~12y	1.36	318.36	3°7′	1°18′
SATURN	75,100	886	9.55	10h38m	~30y	0.72	95.22	26°45′	2°29′
URANUS	30,900	1783	19.22	10.7h	~84y	1.27	14.58	98°	0°46′
NEPTUNE	33,000	2793	30.11	15.8h	~165y	1.20	17.26	29°	1°46′
PLUTO	3600(?)	3666	39.60	?	~250y	50(!?)	1.0(?)	?	17°7′

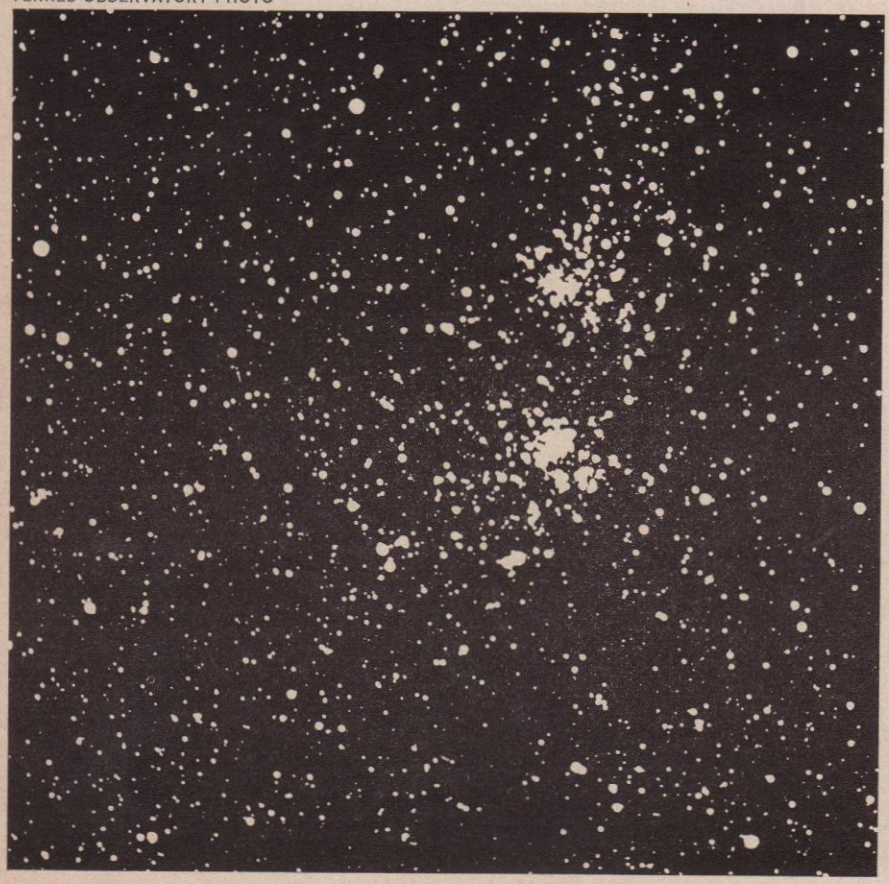
Table 1: MAJOR ELEMENTS OF THE SOLAR SYSTEM

whatsoever to condense into discrete clumps and form solid bodies. The mass of such a post-nova cloud is on the order of 10^{-4} of the mass of the star. Assuming that the masses of the nova star and the sun are roughly equal—stellar masses vary least of all stellar parameters—we can compare the mass of the nova cloud directly to the mass of the solar system's solid bodies. The planets, *et al*, of the sun can hardly be more than 2×10^{-3} solar mass. This is within an order of magnitude of the nova cloud. If the nova cloud is apparently too thin to condense into planets, we could conclude—with Maxwell—that our planets could not have coalesced out of a cloud 2×10^{-3} the sun's mass.

The nebular hypothesis collapsed under the impact of Maxwell's rigorous logic, and a new catastrophic-cause theory took its place. This was the "stellar encounter" theory, expressed in its most definitive form by Thomas Chrowder Chamberlin, a geologist, and Forest Ray Moulton, an astronomer, both Americans. Reduced to its simplest terms, the Chamberlin-Moulton theory pictures a star passing near enough to the sun to pull out a filament of gaseous material—an immense gravitational "tidal" effect. The gas finally condensed to form planets, etcetera. Since stellar encounters are rare indeed, this was a revolutionary theory; the sun was considered to be one of a very, very few stars possessing a planetary system.

Even at the high tide of its popularity, many people regarded this theory with suspicion. Stellar encounters of the sort envisoned by Chamberlin and Moulton are rare almost to the point of absurdity. It can be calculated—from the density of stars in the Milky Way, their velocities and life spans—that the average star will live out its multi-billion-year existence without coming close to such an encounter. This reduces the chances of forming a planetary system to something approaching uniqueness. If there is anything that will make a good astonomer worry, it is a suggestion that the Earth or sun is in some way unique. The lesson of Copernicus has been well-learned.

YERKES OBSERVATORY PHOTO



There were more than suspicions working against the Chamberlin-Moulton theory. Evidence began to pile up against it, too. For one thing, a filament of gas pulled from the sun's interior would be no more likely to coalesce into planets than the Kant-Laplace nebula. Even though the filament might be more massive, it would also be much hotter, and therefore would tend to disperse into space that much more easily. More important, spectroscopic analysis of the sun showed that it consisted almost entirely of hydrogen and helium, with a smattering of heavier elements. The planets seemed to have very different chemical compositions. The Earth and the meteorites—the only bodies available for direct study, even today—certainly contain comparatively little hydrogen or helium. If the planets were pulled directly out of the sun, the argument went, how can they have chemical compositions so different from the sun's?

By the middle of the Twentieth Century, the stellar-encounter theory had passed its high tide of popularity and was ebbing away. It was replaced by a shiny new version of the nebular hypothesis.

This new-yet-old concept can be called the "dust cloud" theory. It is now accepted, in one variation or another, by practically every serious professional astrophysicist. Since it represents the most modern concepts and the best thinking of today's cosmologists, it will be worthwhile to examine the dust cloud theory in some detail. As we shall see, it accounts for many previously unexplainable phenomena. But at the same time, there are several serious questions that this theory still cannot answer. Like the theories that preceded it, the dust cloud concept is open to doubt—and new ideas.

Double Cluster of Stars in Perseus. The sun might have been born in a similar young cluster, some five billion years ago. The spiral arms of the Milky Way and other spiral galaxies are rich in such star clusters, which are apparently breeding grounds of young stars.

Origin of the Solar System

The dust cloud theory envisions the entire solar system—sun, planets and all—as originating together. Astronomers have observed many clouds of dark dust and gas mixtures, light-years in diameter, sprinkled through interstellar space. They believe that these globules of matter are the beginnings of stars, and are now condensing and becoming hotter. In time they will become true stars. Dr. George H. Herbig of Lick Observatory has photographed what may well be the birth of new stars. The theorists are all agreed that new stars are constantly being formed out of the loose gas and dust in the Milky Way. The Great Nebula in Orion, for example, is such a complex of swirling gas, dust, bright young stars, and these distinct globules of dust-and-gas.

Thus the reasoning is that the whole solar system originated in such a dust/gas cloud. It is assumed that the primoridial cloud was more massive than the sun itself is today—about twenty per cent more massive, at least. Since the planets of the solar system are only about 2×10^{-3} of the sun's present mass, this means that something like ten times the present mass of the planets—or more—has somehow disappeared from the solar system since its formation. Explaining that *somehow* is one of the major problems of the dust cloud theory.

The dust/gas cloud is assumed to have consisted almost entirely of hydrogen, since the interstellar gas observed today is mainly hydrogen. Other elements were probably present in the cloud—a few per cent of helium, and traces of heavier elements. These had been "cooked" earlier in the interiors of older stars, and spewed into space through stellar flares or explosions.

Great Nebula in Orion, an active star-building region, studded with hot young stars, glowing gas, and dark dust/gas clouds.

MT. WILSON & PALOMAR OBSERVATORIES PHOTO

The original temperature of the cloud was quite low: about 50°K (-370°F), according to Dr. Fred L. Whipple of the Smithsonian Astrophysical Observatory. This is approximately the ambient temperature of nonluminous objects in interstellar space. The "dust" grains imbedded in the surrounding gas probably consisted mainly of hydrogen compounds —water, ammonia (NH_3), methane (CH_4), which can be called *ices*—and grains of heavier silicates and metals, which can be called *earthy* particles.

The cloud was rotating. How the rotation began is unexplained. Perhaps the cloud's own irregular shape caused it to begin spinning, or the unequal gravitational attraction from nearby star clusters or even the central mass of the galaxy itself might have been the cause. Regardless of the source of the rotation, the dust cloud theory must postulate some spinning motion. It is also assumed that the cloud contained a weak, but not negligible, magnetic field.

There we have the ingredients for the solar system, according to the dust cloud theory. A vast cool cloud of dust and gas, perhaps a light-year or more in diameter, at least twenty per cent more massive than the present-day sun, with a magnetic field, and spinning slowly.

Now we throw in the laws of physics and watch a solar system take shape. But keep your eyes open. The laws of physics may not be completely equal to the task.

As the cloud rotated, it contracted; simple physics tells us that much. Also, as it shrank, its density must have increased and its central temperature had to rise. The cloud began to fall in on itself, and convert gravitational energy to thermal. The dust cloud's collapse might have taken place with surprising speed, astrophysicists now believe: perhaps in only a few million years. (Anything under a hundred million years is an eyeblink in astronomy.)

Now we have a newborn star—a protosun, we can call it—a glowering reddish mass of rather warm gases, about 3000°K (5000°F), at the surface. At this temperature the icy particles originally present in the cloud have certainly been vaporized, and probably most of the earthy particles have also. Vaporized, but not dissociated. Compounds such as water, for example, are still present as water *vapor;* they have not been dissociated into their constituent elements. If and when the temperature drops sufficiently, these compounds will return to the liquid or solid state.

The protosun has now shrunk to a diameter of the order of Mercury's orbit, roughly forty times its present size. Probably its surface is indistinct; such young stars often pulsate irregularly, astronomers have discovered. Despite its size, though, the protosun must still possess all the angular momentum of the original dust/gas cloud. In other words, it must be spinning very rapidly: a revolution every few hours, perhaps. This is very different from the rotation rate of today's sun—one revolution in about a month.

Now the plot thickens. The theorists explain that the protosun's very rapid rotation caused it to spin off a disk of gas from its middle. This equatorial disk eventually reached several billion miles into space. Since it was thin, compared to its diameter, the disk radiated away its own internal heat quite effectively. Its temperature dropped to the point where the earthy materials could condense out of the gaseous phase and into solid particles again. When that happened, the ices could have condensed onto the earthy grains. The process of building planets began.

Remember, Maxwell's mathematics showed that planets could not condense out of a gas cloud that was only as massive as the present combined mass of the solar system's solid bodies. According to the dust cloud theory, the planetary disk spun off from the protosun's equator was between ten and one hundred times more massive than the planets, satellites, comets, planetoids, meteoroids, etcetera, all combined. It is agreed that solid bodies could coalesce out of a cloud that thick.

Origin of the Solar System

Presumably, the planets began to form out of turbulent eddies within the planetary disk. The disk gases would be viscous—sticky—and little bubbles of turbulence would form within it. At these eddies, the dust particles of earthy and icy materials would tend to collect and coalesce. Eventually small bits of matter would grow into sub-planetary sizes. The planetesimals aggregated into true planets. According to the theory.

Remember that these solid bodies represent only a small fraction of the total material of the planetary disk—between ten and one hundred times more matter remained gaseous and was never "collected" into solid bodies. All right then: where is this gas? Not in the solar system, we know. How did it get out of the solar system?

We now have two serious problems with the dust cloud theory: (1) the protosun's rotation rate is too rapid to fit present-day fact; and (2) there is a huge amount of interplanetary gas to dispose of somehow.

The theorists can solve these problems, if you grant them the assumption that the gas in the planetary disk was ionized—some of the atoms had one or more electrons detached. Ionized gases—also called plasmas—can conduct electricity and support magnetic fields. You recall that innocent-sounding assumption that the original dust/gas cloud contained a weak magnetic field? Now we will see the necessity for that assumption.

The cloud's contraction into a protosun would serve to intensify the original magnetic field. When the protosun spun off its planetary disk, the ionized gases bore part of the magnetic field along with them. We can visualize the field's lines of force as huge, pliable loops, pulled out from the poles of the protosun and stretching along the distended disk.

The theorists claim that this magnetic field would interact with the protosun and the ionized gases of the planetary disk in two ways. First, it would transfer angular momentum from the sun to the disk. That is, the protosun's rotation would slow down, and the disk's would speed up. Second, it would cause the loose gas in the disk to fly outward and leave the solar system. Presumably, the increase in the gas' angular momentum would be the agent of expulsion, but this is still open to question. Thus, with one grand wave of the hand, and the magic name of the rather new science of magnetohydrodynamics (MHD), the theorists can explain both the slow rotation rate of today's sun, and the loss of the excess gas of the planetary disk.

In all fairness, there is one piece of evidence—circumstantial, but evidence—to support the MHD-slowdown concept.

Astronomers classify the stars by letters that denote their temperature range, starting with Class O at the hottest end of the scale, and going down to Class M. (There are a few other classes used for peculiar stars that need not bother us now.) The classification sequence is O,B,A,F,G,K,M—easily remembered by reciting, "Oh, Be A Fine Girl, Kiss Me." Each classification is divided into ten subclasses. Thus, while Alpha Centauri A is a G4 star, the sun is a GO; both are yellowish stars, and the sun is slightly hotter. Blue Rigel is a B8, and red Betelgeuse is M2.

What has this to do with anything? Wait a moment. A star's temperature is a fairly good indication of its age: the hottest stars—the O,B,A,F types, are the youngest. Now, astronomers can determine a star's spin rate by studying its spectrum. When the spin rates of many thousands of stars are compared, a staggering anomaly appears. The hot young stars—Class O and B—are whizzing away at rotational velocities of something like 150 miles per second. But this spin rate decreases rapidly for Class A stars, and continues to plummet in Class F. By Class F5, the spin rate has dropped to that of the sun's.

Many of the proponents of the dust cloud theory claim this bit evidence shows that young stars—up to Class F5—have not been in existence long enough to allow MHD braking to slow their spin rates. Older stars, such as the sun, have had their angular momentum absorbed by the planetary disk. In the meantime, they claim further, the gases of the disk have been expelled from the solar system and wafted back into interstellar space. We are left with a young star and a group of planets.

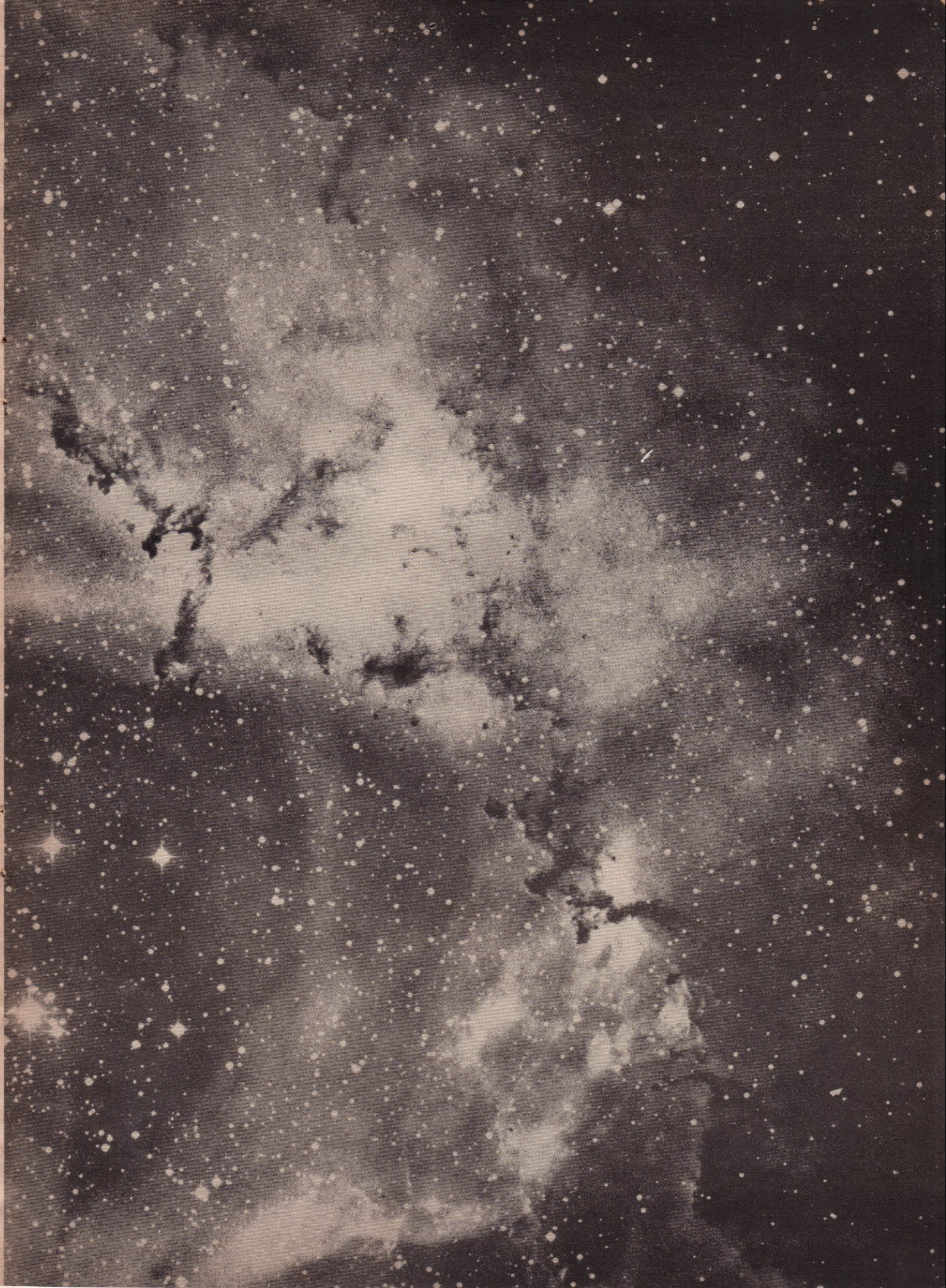
From here the story becomes straightforward. The sun continued to contract until its central temperature became high enough to ignite the proton-proton sequence of thermonuclear fusion. The sun stopped contracting, as gas and radiation pressures struck an equilibrium with gravitational force. The sun became a steady, dependable member of the Milky Way's main sequence of stars.

Meanwhile, the planetesimals that had condensed out of the planetary disk were aggregating into still more substantial chunks of solid matter. The details of how the planets were formed from these bits and pieces have not yet been worked out to anyone's satisfaction. Presumably, Jupiter and the other giant planets retained large amounts of the original planetary disk gases before these gases were expelled from the solar system. The small, dense inner planets did not—they were formed primarily from the solid matter and held onto very little interplanetary gas.

Fred Hoyle has raised the question of a sticking agent. How could chunks of solid matter aggregate, he asks, unless there was some sort of glue to hold them together once they had collided? Without a sticking agent, the chunks would recoil from each other like a pair of celestial billiard balls.

Dust/Gas Globules in NGS 2237 Nebula in Monoceros are apparently in process of breaking up into small units, which then condense to form individual stars.

MT. WILSON & PALOMAR OBSERVATORIES PHOTO



Origin of the Solar System

Also, recent studies have suggested that two bodies colliding under such conditions would not be an agent of growth, but a method of destruction. Even a body as massive as the Moon, it has been shown, would *lose mass* as a result of being struck by a large meteoroid. Thus the entire idea of forming planets by aggregating small bodies is open to serious doubt.

There are plenty of other problems unsolved, besides. Although theorists can invoke MHD interactions to account for the expulsion of the excess interplanetary gas, no one has shown —even on paper—how these reactions would take place. Remember, the extra gas had to be postulated to allow the planets to condense, and get around Maxwell's objection to the old Kant-Laplace theory. Once the planets are formed, the gas must be removed, because it certainly is not there today. Would the gas remain in the solar system long enough for the planets to be formed, and then conveniently blow away? There are, at present, no numbers to support this tidy bundle of assumptions.

There is also a basic problem about the chemical composition of the sun and planets. The Chamberlin-Moulton theory, you recall, was shot down partly because it was found that the planets were not of the same chemical composition as the sun. The dust cloud theory explains this by claiming that the planets formed from the earthy and icy particles within the original dust/gas cloud, while the sun is composed of the huge bulk of the cloud—almost entirely hydrogen.

But more recent evidence has shown that there is a good bit of hydrogen and helium even in the solid bodies of the solar system. The giant planets are predominantly hydrogen and helium. So are the comets. It turns out that the chemical composition of the solid bodies, *taken as a whole,* is not very much different from the composition of the sun itself. Full circle! The problem that the dust cloud theory was called on to alleviate turns out to be no problem at all. Where does that leave the theory?

There are other nagging little doubts. To invoke MHD forces for expelling the "extra" interplanetary gas, we must assume that the gas was at least partially ionized. It would be difficult to ionize such a gas, except thermally. Heat would strip electrons from the gas atoms, if the temperature were high enough. But the dust cloud theory also requires that the interplanetary gas was cool enough to allow the earthy, and perhaps even the icy, materials to condense out of the vapor and form solid particles. Could the gas have been hot enough to be slightly ionized and at the same time cool enough to allow ice crystals to form?

Then, too, there is the question about eddies in the planetary disk. It is assumed that these eddies were the focal points for the start of planet-building. But G. J. Odgers and R. W. Stewart of the Dominion Astrophysical Laboratory, Victoria, Canada, pointed out in 1957 that such eddies would be extremely short-lived. The dominant feature of turbulent gas flow —where eddies are found—is that the structure of the turbulence changes rapidly, chaotically. The eddies postulated in the planetary disk might not have lasted long enough to allow particles to congregate and begin building planets.

The dust cloud theory, like the theories that preceded it, is far from a complete and satisfactory answer to the question of the solar system's origin. It raises almost as many problems as it solves. Its popularity, you might suspect, stems from the fact that it is basically an evolutionary, natural-sequence, type of theory. Those who believe in the dust cloud theory can also believe that most—if not all—stars like the sun eventually form planetary systems.

To be useful, theories must be rooted in observational evidence. We saw that there are some pieces of evidence that tend to support the dust cloud theory. But two major points of the theory are unsupported by any evidence whatsoever: the idea that the planetary disk was ten times or more as massive as the present combined mass of the planets, *et al;* and the claim that this excess gas was expelled from the solar system, and therefore cannot be observed today. Without evidence to support them, these two tenets become major weaknesses of the dust cloud theory. If a better theory of the solar system's origin is to be brought forth, it must have even stronger ties with observations. So let us briefly turn to the observational evidence at hand, and see where it leads us.

Even without a telescope we can see that the sky is filled with stars. The evidence is very strong that stars are being formed continuously out of the gas and dust of interstellar space. A good telescope will show that many stars are double or multiple groups. Of the six stars nearest the sun, four are double stars, and one—Alpha Centauri—is a triplet. Spectroscopes show that a great number of stars, perhaps half of those in Milky Way, are double or multiple stars. Castor, for example, is actually three sets of double stars—a stellar sextuplet.

But even with the most senstive instruments, no one has seen a single planet circling another star. Astronomers have deduced that a few of the nearest stars have "dark companions" orbiting around them, however. These dark companions have been detected because of the barely-discernible gravitational pulls they make on their parent stars. But they are quite invisible. Are they planets, or extremely small, dim stars? Their masses are all well above the mass of Jupiter, which means that they are completely unlike anything in our own solar system. Probably they began to form as a normal star does, but simply ran out of building material before they gathered together enough mass to allow internal nuclear fusion reactions to begin. Hence they are nonluminous.

continued on page 81

SLEEPING PLANET First of Three Parts.

Introducing our first science-fiction ghost story, and a new author.
The Llralan invaders took over Earth by the simple process
of putting everybody into a coma . . . except for Grandpa's Ghost.
They'd have done better to knock out Grandpa
and leave everybody else awake . . .

WILLIAM R. BURKETT, JR.

ILLUSTRATED BY KELLY FREAS

PROLOGUE

At eleven a.m., Greenwich Time, 2432 A. D., upon what was to be his last day on Mars, Donald Shey was rudely awakened by the shrill ululation of sirens passing beneath his third floor hotel window. He sat bolt upright in bed, listening tensely. *So soon?* he wondered. *If so, I've overslept, or they're jumped the gun.*

His eyes lighted on the bedside clock and his tenseness vanished. No. The time was not yet. It was one p.m. in Cairo and twelve o'clock in Rome and there were still ten hours to go. And the sirens had been of the police, not Civil Defense.

Nearby, the sirens died horrible moaning deaths, and anxiety of a new kind gripped him. Had he been sniffed out at last? With so little time left to trickle away, was he to be taken? Were feet already pounding on stairs, shifting impatiently on escalators bearing them to his floor? Were guns in hands, fingers ready on triggers?

With such thoughts galvanizing his actions he leaped out of bed and started throwing on clothes, shoving his feet into the insulated half-boots that were standard Martian footgear. Then he was fumbling with the boots' laces and cursing his slowness. Plague of the Black Stars, would those laces *never* fit properly over their grommets . . . ?

A heavy knock came at his door.

He froze, laces forgotten, hand on his gun. "Who is it?"

"Room clerk, sir. Just remindin' you that check-out time is twelve sharp, Green. And th' Earth Ferry you booked passage on leaves at two. It's getting on towards time."

Immensely relieved, Shey replied, "Uh . . . was just about to come down. Thanks."

"All part o' th' service." Footfalls retreated down the hall, paused. Came a muffled knock, then an indistinguishable exchange between the clerk and some other late-abed customer.

Shey took several minutes to let his twanging nerves recover before he finished dressing. Six months—on any calendar—was just too *long* for this kind of assignment. He was too jumpy . . . plenty of time later to dwell on the drawbacks of his profession. Right now he had a job to do.

Sighing wearily he put on his coat, picked up his travel bag and left the room. At least he didn't have to leave in the grand old manner known as "shooting his way out". At least he was spared that. That and the rooftop and alleyway chase sure to follow, with flamer-fire crackling about like summer lighting.

Downstairs he hurried through the formalities of checking out, knowing his haste would be looked upon as that of one who doesn't relish throwing away the price of another day's lodging. Then he went into the hotel dining room, ordered breakfast and sat long over a cup of coffee waiting for Martian night to fall. In the early dusk he hailed a cab and named the spaceport on the northern edge of town as his destination.

Traffic was heavy by virtue of the fact that several of Rusted Plains' mines were changing shifts. While the cab threaded its way north, Shey kept a close watch for signs of a tail. By the time he reached the spaceport he was fairly sure he wasn't being followed; nevertheless, to be on the safe side, he went inside and mingled with the crowd a bit before departing by a side exit and taking a cab at a stand belonging to a different company. Giving the driver an address on the far side of the city he sat back and forced his nerves to unkink by sheer will power. *It's getting,* he thought morosely, *where I'm afraid to go on the streets.*

But in nine hours it would all be over. He hoped.

The cab dropped him within a block of the garage apartment he had rented under the name of William Howards and the driver said, "Two-ten."

Shey handed him three ones, yawned broadly. "Sure feel sleepy today. Must be the weather. How about you?"

"Nah. I'm used to it."

"Not sleepy at all?"

"Nah. Anybody gets used to it if they're here long enough—but the air and these turned-around days gets 'em all at first."

Shey smiled. "Yes, I imagine it does." He waved away his change, watched the cab's taillights out of sight before heading for the apartment. *You may not be sleepy now,* he thought. *But give yourself time.*

Give the entire population of the Solar System time.

About nine hours' worth.

That's all they've got left.

He let himself into the apartment, went upstairs and changed into heavily-insulated clothing suitable for wear beyond the city's atmospheric enricheners and radiant heating. Then he went down to the garage.

The three-wheel jetcar within had its tanks full, its engine checked and its tires flattened for sand travel; in its luggage compartment resided a heap of tools commonly used for prospecting Mars' barren plains. Standing beside it, he took out all documents signifying that he was one Donald Shey, Terran businessman, and burned them thoroughly, scattering the ashes. A battered billfold replaced his pigskin one, complete with papers certifying the fact that he was William Howards, dune rat.

All that remained now was to ascertain that his inhalator was in his mackinaw pocket and in workable order, and to leave his discarded clothing and travel bag in a tool locker by the door. He entered the car, punched the remote stud for the doors and swung carefully out into the street, jets throttled down. A while later and he was miles away, roaring over an expressway that led to the Outer Gates. Here the outskirts of Rusted Plains dwindled away and ended a half-mile short of the big bomb-screen generators and a mile from where the screen would rise when in use. Beyond lay open, untamed Mars.

He approached the Outer Gates, rolled into the slot with the lighted *attended* sign and cut his motors. A burly individual with the unmistakable gait of a born Martian ambled up as he dropped his window.

"Prospector?" he inquired.

Shey nodded.

"See your license, please?"

He handed it across confidently. The forgery would pass muster; of that he was sure. The attendant wasn't here to doubt the validity of licenses; what he was placed here to doubt was the sand-worthiness of vehicles venturing out.

The prospecting permit was handed back. "Your sand-pilot's certificate?"

That got the same brief scrutiny. Then Shey got out and stood shivering in the wind coming off the open dunes while the Martian inspected his car, poking here, prying there, revving the motor, kicking a tire and noting each action carefully in a small notebook. Finally he stepped back.

"You're all o.k., Mr. Howards. Have a good trip."

"Thanks." Shey got back in. "See you."

"Yeh. Good luck.'

He throttled up and rolled through the Gates onto the cold bleak surface of virgin Mars, ghostly in the pale light of the planet's twin moons.

Two hours later the jetcar sat silently on the lip of a millennia-dry watercourse and Shey was crouching miserably in a shallow indentation in the gully's side, hands numb, his breath coming in gasps even the inhalator couldn't altogether calm. From the squat black box before him came a muted humming that gently vibrated the single, slender antenna that extended to a height approximately level with the car above. He watched the telltale grimly, afraid to retreat to the warmth of the jetcar's cabin for fear of missing the response to that silent summons now flashing starward.

Following his thoughts, he looked up at the stark splendor of the Martian night sky. Somewhere out there in the void, unknown and unsuspected, the fleet awaited his signal.

And time was growing short.

Why don't they answer . . . ?

The telltale glowed.

He pounced on the headset, slipped it into place.

" . . . Acknowledging. Sleeper acknowledging. Sleeper acknowledging . . ."

He triggered a stud, cutting short that chant. "This is DS on Mars. Ready to report."

He waited patiently for the time-lag to bring his answer back—"Go ahead. Ready to receive."

"The word"—Shey paused, took a deep breath, suddenly overwhelmingly aware of the tide of events he was setting into motion—"the word is Go."

"The word is Go," came back the distant voice, repeating.

"That's right."

"All right . . ." The voice hesitated, and he got the impression that the word was being passed. Then, "You've done a commendable job; the general thanks you."

Shey grinned. "He can thank me personally before too long. Tell him that for me, will you?"

"Will do." The voice sounded dubious. "Over."

"And out," he responded. The telltale faded away. Contact was broken. He looked at his wrist watch. A little more than six hours were left.

He closed down the transmitter, tucked it back into its hideaway in the gully's wall and clambered back up to the car. Minutes later and he was skimming back for Rusted Plains in a swinging arc that would bring him to a gate other than the one he had left by. There was no point in arousing the burly gateman's suspicions as to the brevity of his trip.

It would never do to spend his last few hours on Mars in a Terran Security prison.

I

The sky was dark over London when Bradford Donovan took his delivery truck out into the streets and began his nightly run. The tires spun as they hit the level after climbing out of the subterranean garage, and left a little rubber on the pavement, for this was one of the bad nights and Donovan was feeling irritable.

As he rolled, he viewed the darkened streets and buildings with a jaundiced eye. London, the Twenty-fifth Century. Bigger, higher, deeper—an unkillable manmade growth upon the British Isles, and its distinctive English flavor gone beyond recall, banished by the winds of time and stellar trafficking. London of the Twenty-fifth Century resembled nothing so much as the New York of the Twentieth—big, uncouth and brawling.

Which was why the cool pressure of the gun under his jacket was so reassuring. Kid gangs—yet too young to be drafted and much too combative to confine their exercise to legalized sport—had discovered a new diversion: trap the late-night delivery vehicle, loot it, burn it and rough up the driver. The insurance companies could stand the gaff and no one was hurt, particularly.

No one except the hapless truck driver.

Donovan growled under his breath. Anyone attempting to slap him around was first going to comb lead out of

his eyebrows. Tonight especially, he was looking for trouble to start.

He turned on the radio, got a husky feminine voice singing one of the freshly-written and highly popular war ballards, "The Saga of the Scout."

". . . And fast cruisers abaft of his beam.
'God,' said the Scout, 'I'll never get out.'
But nevertheless turned on the steam . . ."

Without waiting to hear if the Scout got out, Donovan changed stations.

Again, the voice was female. Most of the disk jockeys and announcers formerly heard were wearing uniforms and fighting Larrys ninety parsecs out. This time it was news.

". . . *Mad Hatter* will be in Londonport for minor repairs the week of the twenty-ninth. Relatives and friends having men aboard the *Hatter* may contact Base Headquarters for details concerning the possibility of dirtside liberty.

"So much for the comings and goings of our boys in uniform. As for the weather, a continuing warming trend can be expected over much of England for the remainder of the week, but Old Man Winter *is* on the way. For those of you having business on the continents, may we recommend Stop-Wear, the *superior* lubricant for the engines of your aircars. Especially to those who have business in the Americas, Stop-Wear will provide that extra margin of safety for those trips across the wintry North Atlantic . . ."

He tried again.

This time he recognized the voice of Johnny Hatcher, a favorite recording artist before the war, since killed in action on some nameless asteroid.

". . . The stars are shining brightly, hanging in the void—
Their beauty catches at the throat, their cold heat chills the soul . . .
Space is deep and space is cruel, but a man'd be paranoid—
To hate the suns that warm the worlds that are the Black Sea's shoals . . ."

And again.

". . . The draft call for November is expected to reach an all-time high, and the government has announced new emergency measures designed to free more able-bodied men for the war effort. If you are an independent businessman, remember: *Hire the Handicapped*—you'll be freeing a man for the front lines."

Click!

Donovan cursed softly and stared out through the windshield. His left hand strayed from the steering wheel, smacked his thigh soundly. The plastic masked by his trousers gave back a dull thump.

Plasteel legs and modified robot muscles to give them mobility—mobility superior in some ways to flesh and blood. But according to the Military Board, it made him half a man. And a fifty-year-old half-man is simply not military material.

"Free a man for the front lines."

But not half a man.

Half a man can push a truck normally handled by a brute with more muscles than a gorilla, less brains than a gnat, while the gorilla-gnat points and fires a gun half a galaxy away. Even a robot could handle this run—but robots were too scarce nowadays to sacrifice to the gangs. Not so a cripple such as himself.

Cripple!

He gritted his teeth and his plastic foot nudged the accelerator a little. The truck began to vibrate gently as the extra speed shifted the load. It shot past deserted intersections, under dim or burnt-out street lights—this was one of London's meaner sections.

Cripple!

Had been a time when Bradford Donovan hadn't been a caricature of a man with robot's legs; had been a time —twenty years ago—when Bradford Donovan had taken a stellar voyage with his bride of six months, a voyage that lasted another half-year with the result that their first son was born *in vacuo*.

At the end of that voyage had been Risstair, world of promise and possible wealth; world within, and under the jurisdiction of, the Llralan Empire, but open to Terran trappers. In the years that he was there his lend-leased trapping line had prospered, thanks to his skillful traps and ready rifle. The Donovan brand had become familiar to Terra-side furriers and his signature to bankers dealing in out-world trade. Things were progressing nicely; Jane had given him another son, and a fat bank account awaited their return to Terra. Another two years, he figured, and they could return to Terra wealthy enough to want for nothing the rest of their natural lives.

Then, on a regular run of the traps, there had been the smell of death in the air.

He could never forget it—that distinctive, incredibily delicate odor exuded by all dying Risstairan life. Often he had wondered if any get-rich-quick character would decide to attempt distilling and bottling the essence for sale to Terran females, but no such scheme had developed while he was on Risstair.

The odor of death had been overpowering, drawing him to the woodland glade irresistibly. And in the glade—the mangled bodies of three Risstairan woodcutters clustered about their loaded logging sled and kept company by a pair of marq carcasses, one with an axe-split skull, the other with a crossbow quarrel in its brain.

They had been hit fast, without warning or provocation, and from the rear. His flesh crawled. That meant one thing on Risstair: rogue pack in a kill-sweep.

And the home station was six miles away through the gathering dusk.

Almost, he made it. The sounds of everyday activity around the station were coming to his ears and the jungle was thinning away to only an occasional thicket growing stubbornly beneath the tall and wide-spaced trees.

That sparsity of cover was the only thing that saved his life.

Out of the corner of his eye he caught sight of a bounding shape that rushed at him with the speed of a greyhound closing on a rabbit. There had been no time to shoot—instead, he leaped straight up. With his still one-gravity accustomed muscles in the lesser pull of Risstair, it had been a good jump—a fantastic jump. The marq, startled, had lunged after its soaring quarry, but lacked the proper timing. Three-inch fangs had slashed across him at a point halfway up the thigh.

The shock of the hit was such that it deadened the pain. Turning as he fell, Donovan fried the recovering marq with a full-strength squirt from his long-barreled flame rifle and took another slash from a second beast quartering in from the opposite direction. That one died with its head cindered, but there was a third, a fourth, a fifth . . . he held down the trigger and waved the gun like a wand, laying a path of flaming destruction around him. The squalls of scalded beasts had mingled with the guttering song of his rifle, but they had come right through the flames with the terrible singlemindedness only a marq in a kill-craze could exhibit. Dying jaws, already headed for the ground, slashed his legs again and again, and the number and seriousness of the wounds had put him on his back and helpless.

But the marqs had finally had enough. With twelve of their number gone and the flame rifle lashing the area all about like blind lighting, even they were at last discouraged and went in search of easier prey.

And the night was still, but someone was screaming and would not shut up and he realized vaguely that it was himself, and voices were calling his name, but distantly, distantly . . .

And then there was nothing. Nothing until he awoke in a Federation Naval hospital back inside Federation territory and was told that his legs were gone—that the choice had been simple for the medic on the ship bringing him in, his legs or his life. And in the months that followed—months in which, he now realized, he had behaved more like a frightened child than the man he thought himself to be—he had come to believe that the medic had made the wrong choice. It had been a long and bitter road down from the lofty status of outhunter with money in the bank to that of lowly truck driver with a budget that seldom balanced.

This last was the final blow. The Federation could take his sons and train them as fodder for Imperial guns—his young, strong sons with their lives still before them—but it refused an embittered old man the right to give the ending of *his* life some dignity and purpose . . .

Abruptly, without preamble, the raid-alarms began to moan from the rooftops.

Donovan came out of his reverie, startled, and looked around.

He had passed into a better section of town, in which aircars moved to and fro over rooftop runways, gleaming groundcars slid through the well-lighted streets and the quality and number of pedestrians had shot upward.

But the aircars were diving for the roofs, the groundcars were pulling in at the curbs and the pedestrians were vanishing from sight with magical speed. As if spewed from sidewalk gratings, characters wearing yellow armbands and helmets topped by amber flashers appeared, gesticulating wildly and mouthing instructions. London's ancient heritage of raids from the sky and experience gained during the past year seemed to have instilled in its populace an instinct for diving promptly, accurately and without question into the nearest hole.

Donovan pulled over, parked and got out. Locking the truck, he glanced at the star-spangled sky and then hurried after a group of citizens looking for their hole. As he joined the tag-end a warden joined the van and ushered them through a door that gave onto a foyer and so through to a seemingly endless series of stairs. The group clattered downward in grim silence, and Donovan followed. After long enough to have reached Hell, the warden halted before a steel door, swung it open. Donovan fully expected to see an imp waiting to show them in, but was disappointed. The room in which they found themselves was filled with wooden benches, had a partitioned room in one corner. A long, low cabinet took up one wall. A shortwave set resided on the cabinet. Naked, yellow-painted I-beams jutted horizontally through the space; dim light bulbs were mounted thereon.

The crowd filled up the benches rapidly. Donovan sat in a pool of shadow and lit a cigarette.

Heavy feet sounded on the stairs, came through the door and became attached to a uniformed policeman. He dogged the door behind him, took two heavy steps into the shelter and gave a quick look round.

His gaze paused briefly on Donovan's cigarette. "Douse the butt," he said, and headed for the shortwave.

Donovan went on smoking.

The cop must have sensed something amiss, for he turned back. For a long moment he seemed at a loss as to how to cope with this bare-faced insubordination. Then he reacted typically for one who has the law in his pocket and glories in abusing the privilege. He took a menacing step forward, hand going to his night stick.

"Maybe you don't hear so good. I said 'Douse the butt.' "

"I hear fine. Why?"

"Just get rid of it."

"But—"

"No buts." The cop unslung his night stick, used it to point at a plastic-fronted list of shelter conduct rules fastened to the door. "Yuh see that? Them are standard-procedure rules, and I know 'em by heart. They say an officer of the law, whether off-duty or on, shall be the authority in any shelter in which he takes refuge."

"So?"

"So douse the butt or grab grief."

In his present mood, Donovan was more inclined to grab grief, but in view of the circumstances he abstained. The cigarette died under his heel. "Satisfied, Bossy?"

"Oh, so you're a wise one, eh?" The cop gave him the cold eye.

"Not at all," contradicted Donovan, undismayed by the glare. "I simply wonder why, when we have purifiers in these holes, you forbid me one of life's few enough pleasures."

"Purifiers have been known to fail, and we might be locked up in here for quite a spell."

"Oh, come now—that's reaching a bit far, isn't it? Aren't you just throwing your weight around to keep up your own nerve?"

"No," said the cop, unconvincingly. "No, that's not it."

"What then?"

"Just chalk it up to my dislike of smoke getting in my eyes," snapped the arm of the law, growing apoplectic. "Now shaddup!"

With poor grace, Donovan shaddup. Authority when in the hands of chumps—or of anyone else, for that matter—rubbed him the wrong way. Being ordered around was the surest way of unleashing his quick temper. But, again in view of the circumstances, he bowed to stupidity. The same kind of stupidity that kept him Earthbound while men with less on the ball—but with the proper number of natural limbs—tried to hold back the Larry advance.

The radio crackled, said loudly, "Condition Red Maximum! Condition Red Maximum! Central Control Canada reports three full-strength assault waves inbound past Jupiter. Repeat, Condition Red Maximum. E. T. A. first wave, fifteen minutes; advance scouts, momentarily . . ."

Overhead, sudden deep-throated thunder rolled. It started as a mutter, passed quickly to a bellow, then a deafening howl. At its peak, the shelter trembled ever so slightly and loosened dust sifted in the weak light of the naked bulbs. The occupants of the shelter grew still and tense, waiting.

As suddenly as it had come it was gone, fading to a waspish buzz and then dying away altogether. For a seeming eternity, there was only silence. Then the warden straightened from the instinctive crouch he had dropped into, wiped shiny perspiration from his forehead.

"*Wheweee!*" he breathed shakily. "That was a close 'un! Bet there ain't a whole pane of glass left in London."

"Glass can be replaced," came a voice from beyond Donovan's eye-range. "I'll be happy if there's a *city* left."

"Me, too," endorsed another.

The cop scowled darkly. "You shouldn't talk that way—we don't have anything to worry about." Then his authoritative demeanor was spoiled when he gave out with a wide-mouthed yawn.

Donovan turned to his neighbor. "At a time like this, he tells us we shouldn't worry about things like low-flying enemy ships, and then tops it off by gaping like a sick hippopotamus. What do you think . . ."

He never finished the sentence; his thought hung unsaid.

His neighbor, a piglike man nursing a battered brief case and wearing a wrinkled suit, was slumped untidily against the wall. His mouth was hanging open; from it seeped gentle bubbling noises. Porky was in dreamland.

Incredulously, Donovan looked back at the cop. That worthy was hanging onto an I-beam as if it were the proverbial straw and he the drowning man. Even as Donovan watched he slowly and jerkily slid down the beam until he prostrated himself at its base. Now he seemed to be worshiping the sickly fifteen-watt bulb fixed thereon.

The warden turned from where he had been speaking softly into the short wave, glanced without much curiosity at the fallen cop. "He seems a ha' fallen down," he observed thickly. Then he yawned.

"And you don't think that's curious?" inquired Donovan.

The warden regarded him owlishly, pushing his helmet farther and farther back on his head until it fell off and hit the floor with a resounding clang. The amber flasher shattered and went out.

"Wazzat yew say?"

"You don't think his passing out that way is . . ." began Donovan, then hushed as another wash of propulsor noise swept over from the north and dwindled into the southeast. When quiet returned, he noticed a sound not present before in the shelter.

Snores.

He peered hard at the assemblage, and cold prickles began to dance along his spine.

Three-quarters of the occupants of the shelter were sprawled or slumped or hunched about with no care for their posture. As he watched, his eyes began to water and he rubbed them violently. The atmosphere of the shelter suddenly seemed unbearably thick. He blinked again. And again. The room seemed to reel just a bit.

Crash!

He swung his head around dopily, wasn't too surprised to see the warden on the floor, one arm draped in brotherly fashion about the cop's broad shoulders, the other pinned beneath the short-wave set where he had dragged it from the cabinet as he fell.

There was movement in the shelter. Donovan glanced up.

The ceiling came rushing down.

He cried out involuntarily, threw up his arms.

There was no impact. He lowered his arms cautiously, stared hard at the ceiling. It was back in place—no, no it wasn't, not quite. Wasn't it creeping downward again, trying to surprise him?

The next moment he was frantically tearing at the door, then bolting up the metal stairs, taking them four at a time with agility remarkable even for robot legs—extremely difficult for a whole man, even in the prime of condition. He made it back to the street in a fraction of the time

it had taken him going down, burst through the foyer and into the cold night air. Sagging against a wall, he panted for breath.

Far away, propulsors muttered and he looked at the sky.

Blue circles were blooming in clumps and pairs everywhere—blooming and drifting down with the gentleness of the first snow of winter. His jaw dropped. Well he knew, having seen news films taken at the front, what those were.

Paratroopers!

Larry space-infantry, floating in on anti-grav units. And they were unopposed. Nothing was disturbing their orderly downward drift—no airships, no missiles, no autogun tracers or flamer beams were tearing holes in their descending ranks. Not so much as a stone was being hurled against the invaders.

Again, he began to run.

He tore around two corners and across three streets before he ran into a waiting line of lean, tall figures lounging in an intersection. His sudden precipitation into their midst touched off startled exclamations and momentary confusion. He had time to get his gun out and half-empty the clip before they dived for cover, leaving two still forms on the pavement and one that kicked and screamed.

He jumped behind a stalled bus, scooted alongside it and began to gallop frantically away. A pale-blue tongue of fire snapped over his head and authoritative shouts rang in the air behind him. Another searbolt passed so close he felt its hot breath. Then he was around another corner and pounding heavily on. His leg stumps were beginning to throb painfully from the unaccustomed exertion when a string of figures again barred his way. He skidded to a halt, stumbled, brought up his gun.

A searbolt smacked into the concrete at his feet. Blued metal gleamed dully as a dozen weapons shifted to cover him.

Picking the tallest of those before him he fired twice, then started working leftward along the line until the hammer dropped on an empty chamber. Only then did he realize that several searbolts had riddled his remarkable legs, and that their controls were dead.

As he stood there swaying uncertainly, another bolt hit his ankle and severed it completely, knocking the foot awry.

Down he went, like a timbered Sequoia.

II

Beneath the cloudless blue bowl of the midday sky, the Georgia countryside was a shout of autumnal color, stretching as far as the eye could see in all directions, unbroken by industrial smoke or gleaming skyscraper. In the glades and pastures the golden sunlight ruled, forcing the stubborn chill of November back under the evergreens and into the shade of leaves yet unfallen. Off across the overgrown fields an exact replica of an abandoned farmhouse leaned tiredly against the earth. Bobwhite quail scratched dirt and preened beneath fallen rail fences; rusted and sagging barbed wire hung from decaying wooden posts. Near the old house an untended pecan grove laced dead limbs against the sky.

The man sitting flat on his rump with his back propped against a big oak tree puffed contentedly on his pipe and took it all in through the frostbitten branches of a gooseberry bush. The ground was cold beneath his denim-clad legs and the wind blowing in his face made him wish his dungaree jacket's insulation was thicker, but he wouldn't have swapped places with anybody on ten worlds at the moment. James Rierson was in what he considered to be his element, matching wits and gun against the cunning of animals in their native habitat. The ten months of the year in which he lived and matched legal talent and persuasiveness of argument against another attorney before the bar of justice in the air-conditioned and near-hermetically sealed environs of Atlanta were as nothing compared to this.

From the first day of November to the end of the year, Rierson the lawyer underwent a Jekyll-Hyde metamorphosis and became Rierson the country squire, living in a rambling and rustic log dwelling and devoting his exclusive attention to the pursuit of game across the thousand square miles of reclaimed semiwilderness graciously provided by the State of Georgia for just such sentimental reactionaries as himself, men who wistfully recalled the halcyon days of yore, with frost on the pumpkin, a harvest moon and men with shotguns following quartering bird-dogs across the back forty.

Not that he was a complete fool; he realized that those days spoken of so longingly by others of his bent had not been entirely without their shadows, without their empires and wars and heartaches. But five centuries is a deadening opiate, and names become empty things, a dusty roll call upon a little-used booktape. Sherman, and Shiloh, and the Battle of Atlanta fade into insignificance; and was the Kaiser an automobile or a king? Hiroshima and hypocrisy and the hydrogen bomb; Communism and censorship and cerebral palsy . . .

The names, and the meanings behind the names, fade. But the vague longings somehow manage to perpetuate themselves, handing themselves down from generation to generation, stubbornly refusing to die like the names of old soldiers and old battles and old issues.

Daniel Rierson, his uncle, had had such a longing—a desire for uncluttered skies and fresh air in his nostrils and the feel of a good gun in his hands. And so Daniel Rierson, who scoffed at the reclaimed areas of Earth as phony and artificial, packed his gear and his dreams and boarded a stellar liner heading out beyond the furthermost reaches of the Terran Federation. He had found his dream and had settled in to stay, and had once even prevailed upon his brother to allow his nephew to make the long voyage one summer for a visit. The visit had been short, but the fifteen-year-old had managed to kill three

tarl—fur-bearing, goatlike forest-dwellers—during his stay, and the flame was ignited. He had returned home a dedicated hunter and determined to rejoin his uncle as soon as his schooling was finished.

That, as it turned out, was not to be. Within the year, worsening relations between Terra and the Llralan Empire had forced the recall of all settlers beyond the boundaries of Terran holdings and Dan Rierson had come home aboard a Federation warship, his dream finished.

James Rierson, twenty-three years later, had modified his own longings to coincide with what lay within the realm of possibility, and thereby managed to attain a balance in life that men with twice his years and forty times his financial status found themselves envying. For ten months of the year he operated as part of the legal machinery that held his society together; for the remaining two, he forsook that society and rolled back the clock five centuries to a less-complicated era—devoid of its own indigenous miseries—took it easy, and enjoyed life.

His pipe had gone out. Rather than relight it, he stuck it in a pocket and lifted the rifle lying across his knees. That was another part of the illusion: outwardly, the weapon was not much different from the sporting arms of five hundred years ago. Its synthetic stock was stained to resemble walnut, its barrel dyed a deep blue-black. The sleek design of the stock, the telescopic sight raised just enough to permit use of the iron sights beneath, the leather carrying sling—all were features straight out of the distant past. The differences in the gun lay below the surface—and were still quite in keeping with the tradition. The scope—lighter, more compact—magnified better than its ancient counterparts; the long, tapering cartridges in the gun's magazine reached farther and hit harder.

Putting the scope to his eye, he scanned the edge of a meadow eight hundred yards away, where tall, frost-burnt grass ended and a swamp had its beginnings. Just *there*—the crosshairs paused on the spot—was where his quarry should have appeared long since. He started to swing on, but a flicker of movement caught his eye. He held steady, waiting for a repetition.

A deer stepped into his field of view—a bull-necked, heavy chested buck carrying a massive rack of incredibly symmetrical antlers. Rierson had seen him before—this was the one he had been waiting for—but he had never seen him act quite like he was acting now. He held his fire, watching.

The buck, normally regal in bearing as befitted his advancing age and magnificent physical proportions, was now weaving like a drunk. His head drooped, as if that basketwork of rapier-honed points had suddenly become too much to bear. He braced himself on trembling legs, tried to draw himself up, failed, tried again and partially succeeded, only to lose his footing altogether and go down heavily. He raised his head feebly, a leg thrashed once or twice. Then he fell back and lay still.

Rierson lowered his rifle, and the image of the fallen deer was gone. To the unaided eye, the buck across the fields was simply a brownish splotch blending into the ground. He put the scope back to his eye and the deer was lying exactly as he had fallen, unmoving.

In the time it took him to cross the distance separating his stand from his collapsed quarry the deer didn't stir. When he arrived it was lying exactly as it had been when last observed through the scope.

There was no wound on the animal; he hadn't thought there would be. The game ranger had said he would have the whole section to himself, and he had heard no shooting to prove the ranger wrong. Most hunters these days were either in the armed forces or sticking close to home, hearthside and the family bombproof in case one of the increasingly frequent Larry nuisance raids managed to penetrate the defenses. The latter group seemed a little ridiculous to Rierson; no Larry bombadier—living or robotic—would waste bombs, if he ever got the chance to use them, on trees. But timid nimrods were not his concern right now. This deer was.

This deer that staggered into the open like a city slicker lubricated with mountain dew and proceeded to collapse in remarkable imitation of same . . .

And lay there breathing far too slowly, breathing in great surging billows so gradual the eye was hard put to catch the movement of its chest . . .

And snored.

Sitting down on a log James Rierson tried to remember all such similar occurrences he had ever heard or read about. After a careful tally, he came up with exactly none. Meaning something had caused it to act so strangely—meaning something definitely unusual. And meaning the Wildlife Service should be notified posthaste.

He took his leave of the fallen deer and headed for where he had left his aircar in the early morning hours to take his stand. Before he went out of sight he took one last look back.

The deer was still sleeping peacefully.

He made it back to his aircar in fifteen minutes steady walking, climbed in and let it drift up just clear of the treetops before scooting for the ranger's cabin. Another ten minutes and he was there. He dropped in for a landing on the graveled expanse before the cabin, went to the check-out station's open door.

The ranger wasn't in, but one of his little robotic assistants was. The five-foot humanoid was busily sticking colored pins in a large map.

"I have a report concerning a sick animal," Rierson told him.

"Where?" The robot continued to impale the map as fast as he could scoop up pins.

"Right there." Rierson pointed out the location on the map.

"Type of animal?"

"Deer."

"Deer," repeated the robot, selecting a green pin and

jabbing it into the indicated spot. He pointed to a stack of forms on a counter. "Fill out one of those, please."

Rierson went to the counter, saw that the mimeographed sheets wanted all information known by the individual reporting the sick or hurt animal, and the identity and license number of the reporter. He filled it out quickly, handed it to the robot. "This is a rather unusual case . . ." he began.

The robot stopped his enigmatic exercise with the colored pins and flicked emotionless camera-lens eyes over the form. "What is unusual about it?"

Rierson was taken aback. "You mean it *isn't* unusual?"

"Perhaps in the overall sense of the word, yes. In relationship to this Game Management Area, no."

"You mean things like this have happened before?"

"Eighty-four times in the past week."

"And before then?"

"Never."

"But . . . but then why haven't I heard about it? Why haven't the newspapers picked it up?"

"That I do not know."

"Would the ranger know?"

"Perhaps."

"Where *is* the ranger?"

"At present, he is investigating a lake where fourteen lesser scaup were found drowned."

"*Drowned?* Ducks *drowned?*" Rierson stared at the robot incredulously. "And eighty-four cases similar to the one I just reported in one week alone?"

"Yes."

"I see. Where did you say the ranger was?"

"As I told you, he is . . ."

"Not that—*where?* What section? What lake? There's a thousand square miles out there he could be in."

"Hardly, sir," reproved the robot mildly. "His jurisdiction extends over only a tenth of the area—not the whole."

"Then where is he?"

"I don't know. When I last tried to reach him by short wave he didn't respond. Perhaps he wasn't listening. Did you wish to leave a message for him?"

"No . . . no, never mind." Rierson started for the door. "Is that all you need me for?"

"Yes, sir. Thank you for your co-operation."

Rierson sent his car up to two hundred feeling vaguely uneasy. Something was in the air—he could sense it, feel it, almost smell it. Something about the very air itself didn't seem quite right. And this matter of the sleeping buck, the eighty-four similar cases—of the drowned ducks. He made a spur-of-the-moment decision to stop by the Chief Ranger's office in Baxter Township to find out what was happening; this management area was his favorite, and if anything untoward was going on he wanted to know about it and what, if anything, he could do to help correct it.

Setting his course for Baxter he leaned back in his seat, letting the autopilot take over. While half of his mind dwelled on the memory of the big whitetail buck sprawled unconscious, the other half proposed and discarded a hundred fantastic reasons for its doing so. He was really reaching when an alien sound intruded itself upon his consciousness, interrupting his train of thought.

His first thought was that it was an irregularity in the beat of his alo engine and he scanned his instruments. Nothing. Then he realized the sound was not coming from his car, but from an outside source. Another ship, then. He made a quick radar sweep, found the ship miles behind and at twelve thousand feet, closing rapidly. He checked his airspeed with thoughts of a Sky Patrol unit, then realized the ship's angle of descent would bring it down far ahead of him.

Within seconds the ship was above him, blunt prow glinting in the sun. It was then that he realized what had been bothering him about the cadence of its engine. Black, oily smoke was pouring out of its motor hatch and pluming away behind, leaving a dirty trail across the clean blue of the sky. As he watched, the ship slewed sideways, corrected, plunged on.

Unpronging his short-wave mike, he switched the selector to general traffic.

"Civilan Craft XD-4538-P calling ship in distress over Robert E. Lee Game Management Area. Do you read?"

There was no response. He tried again.

"Civilian Craft XD-4538-P calling ship in distress. What's your trouble? If your sender's dead, do a mild bank to south-southwest."

The ship bored determinedly onward.

Switching channels he said, "This is CC-XD-4538-P, over REL-GMA. Have sighted ship in distress heading due south, speed . . . Do you read me, Savannah Control?"

Savannah Control obviously didn't. There was no answer.

"Savannah Control, this is CC-XD-4538-P, over REL-GMA, reporting ship in distress. Do you read?"

No answer.

He swore. So it was his own radio that was at fault. He could not tell anyone of the other ship's plight. He consulted his map. It said an ancient superhighway—now a truck route—ran through the area from east to west, then bent south into Florida. A truck stop was indicated not far from his present position. Nosing over, he headed there.

He overran his destination, circled back and put down so hastily he left skid marks on the landing area. No one came out to look despite his overhead acrobatics and reckless landing; he climbed out and went around to the front. The place was the stereotype of truck stops on any of fifty Federation worlds. The building was surrounded by a sea of concrete broken at intervals by banks of fuel pumps and maintenance racks; the structure itself was large and rectangular, housing a roborepair unit at one end and a mechanic's office and automat at the other.

A big red groundcar—a Catamount—was pulled up at the pumps nearest the building. Otherwise, the place was

deserted. The paunchy individual seated behind the Cat's wheel seemed to be the sole occupant. The glass-walled office was empty and no one answered Rierson's hail.

He walked toward the Catamount. "Hey . . . where's the attendant?"

The fat man maintained his hunched, head-down embrace of the steering wheel and offered no answer. He didn't even bother to look up at the big man stalking toward him.

Rierson went around the car to the driver's window. "You deaf or something? I asked you where . . ."

His voice trailed off. The man's eyes were closed, and suddenly his utter laxness was very apparent. He was either dead, very drunk or a sound sleeper.

Rierson reached through the open window, shook him gently by the shoulder.

"Hey . . ."

The fat man's bulk shifted slightly; that was all. His eyelids didn't even flutter.

The lawyer grabbed the door handle, lugged at it. The door swung open—and the driver toppled out. He was caught by surprise but managed to grab a handful of expensive suit fabric to keep the other from dashing his brains out on the pavement. Lowering him gently, he dropped to his knees beside him.

Leaning over, Rierson sniffed his breath suspiciously —there was breathing, at least—but there was no odor of liquor—just one of strong nicotine. So he wasn't dead and he wasn't drunk. Rierson straightened. What did that leave? Stun-shock? Some sort of seizure? Or was the man just a really heavy sleeper?

He let the head down on the pavement carefully, stood up. The shifted position brought forth snores from his unconscious friend. Long-drawn and noisy inhalations followed by a prolonged hesitation and then equally long-drawn and noisy exhalations. There was something about that extreme slowness of breath. . .

Uttering a wordless exclamation, Rierson dropped back to his knees and lifted the other into a sitting position against the side of the car. Then he slapped the flabby face gently—a light blow intended to sting into consciousness.

The fat man didn't even flinch.

He took a deep breath, struck again, harder.

He might as well have been slapping jelly; the consistency and response were about the same.

Rocking back on his heels, he looked around him, feeling cold. There was nothing but the warm golden sunlight, the deserted station and the chill wind rustling pines across the road.

First the deer, now a man. And the robot ranger had said there were eighty-four similar cases among other forms of life. The ducks, he saw with a sudden flash of insight, had drowned because they had become unconscious, even as the deer and Fatso here. And the ranger had not answered his assistant's hail . . .

Rierson left the fat man to his dreams and went in search of the attendant. It wasn't a long search; it ended at the right rear flank of the Catamount. A dark-haired youth in greasy coveralls was huddled between the fuel pumps and the car, hose still gripped loosely in his right hand. Fuel had leaked from the nozzle to form a pool.

He, like the Catamount's driver, was snoring in slow motion.

Getting him under the armpits Rierson dragged him clear, then carried him around the car and deposited him beside the fat man. Stepping back. Rierson looked them over. To his way of thinking, this had definitely gone beyond the province of the Wildlife Service, had become a matter for the police. He went into the office, found a battered phone with a scarred visiplate and consulted a list of emergency numbers scribbled on a desk calendar. Finding the one he wanted, he dialed it.

The phone rang and rang, without answer.

Finally a voice cut in on the line and the smooth, featureless mug of a worker-class robot appeared on the screen. "What number are you calling, please?"

"Who're you?" countered Rierson.

"South Georgia Switchboard, sir."

"O.K., George—I'm calling EXN-988. Highway Patrol."

"One moment, please."

Rierson waited impatiently, had about given up when George came back with, "The trouble is not with the line, sir. No one is answering."

"All right . . . try Sky Patrol Barracks at Savannah."

"Yes, sir." Again the screen went blank, and Rierson could hear a distant phone jangling. There was no response. George's unlovely face appeared once more. "Sir, there is no answer."

"I heard. Doesn't that strike you as peculiar?"

"Sir?" George sounded puzzled.

"Doesn't the fact that neither of the two forces supposed to protect the public can be reached by the public—that no one is answering the phone in the middle of the afternoon?"

"It is a little irregular, sir, but . . ."

"But what?"

"Sir, I wouldn't let it worry you . . . humans are a chronically erratic species." George let go the equivalent of a superior sniff. "There is hardly any logic or order to anything they do."

"Thanks for the compliment," commented Rierson sourly.

"Sir," began George earnestly, "it was not meant as a compliment but as a serious observation upon the follies of . . ."

He never finished his sentence. The phone went dead and the visiplate did likewise. Completely, utterly dead. Rierson jiggled the receiver, but there was no response. It was as if a curtain had been dropped—a thick, all-absorbent curtain.

He became aware of a muted humming he had not heard before, hunted around until he found a minuscule

transistorized radio. It was on, but the station to which it was attuned was very obviously off. He twisted the selector as far as it would go to both sides, turning up the volume.

Not one word did he get. No station seemed to be broadcasting. He looked out at the Catamount, found himself wondering if the radio stations had stopped sending before or after the fat man and the attendant had succumbed to . . . to whatever they had succumbed to.

In any event, he couldn't just stand here wondering for the remainder of the day and into the night. Some definite move was called for. Since he had started for Baxter, he might as well continue in that direction—the direction the burning ship had taken.

Thinking of the burning ship brought up another point: whatever was in the wind, it boded no good for airships—not judging from the looks of the only one he'd seen all day. If he was going anywhere, his traveling should be done on the ground.

In keeping with that decision he went out and dragged the two sleepers inside, finished filling the fuel tank of the Catamount, replaced the cap and racked the hose. Then he went to his aircar and got out his rifle and cartridge belt, strapping the latter, with its row of gleaming shells and long-bladed hunting knife, around his middle. He could well imagine the sensation his dirty denim garb, artillery and week's growth of beard was going to cause in Baxter, but that couldn't be helped. The familiar presence of the rifle bolstered his confidence, and at this point—what with dead radios, blanketed phone lines and burning airships, and sleeping deer and sleeping men—his confidence could *use* a little bolstering. As for taking the car, it looked as if Fatso needed medical help worse than he needed the Catamount, and it was necessary for Rierson to acquisition the latter in order to provide the former.

Which he hoped would sound plausible to local authorities when he showed up in Baxter armed to the teeth and driving a "borrowed" car. One could never tell how small-town cops would react to anything.

Climbing into the Cat, he pulled out onto the highway and pointed its sleek prow at Baxter.

III

Face down, thrashing on the sidewalk like a bloated fish, Donovan struggled to reach the spare ammo-clip in his jacket pocket. His legs were a dead, unresponsive burden.

He moved in a dream. All sense of reality had fled; he was a performer and this a stage set for some fantasy-melodrama. Things like Larry troopers raining down out of the evening sky simply don't happen in real life.

But it *was* happening. With startling clarity he perceived each little detail of its happening even as he flopped about. Troopers were running forward, jump boots pounding hollowly against the wind whispering through darkened streets. Others were bending over three supine, silent forms on the pavement. Above, thick clusters of blue haloes were still descending, and—very high up—red stars moved across the sky as the paratroop ships made another run, inundating the city with propulsor noise.

He felt a need for deeper darkness; here he was exposed. He relaxed the muscular tension holding his legs in place and scrabbled forward on his belly, letting them drag out of his trousers' legs. When they were gone, the empty legs flapped in the gusting wind like the protesting arms of a ghost.

Hoarse shouts sounded back and forth among the Llralans. They stopped their headlong advance and half of them brought up weapons. Donovan's tensed against the expected impact of searing fire.

A blocky specimen near the Terran used his own gun to knock up that of another, uttered a sharp command. His action was almost too late; the soldier's gun discharged upward with a static *fzack!* and a second rifle burned a black rut along the sidewalk that ended just short of Donovan.

There was a choked cry from overhead.

The troopers involuntarily craned their necks, seeking the source of that piteous sound. Seeing his chance, Donovan hustled for an alley mouth on knuckles and thigh stumps. Crashed against a wall behind a garbage can. Dug in his pocket and found his clip, discarded the empty and rammed the new one home. Fed the chamber and turned back toward the street.

A blue circle of light was descending not twenty yards away, right over the gawping troopers. It came down very slowly, and one of the Llralans played a hand-torch over it.

The gray-clad body suspended from the harness was dangling with a laxity only death can bring. The head lolled on the chest; the arms moved loosely with the pendulum-like motion of the body. In slow motion, the Llralan's jump boots touched the street and he stood grotesquely for a long moment before his legs buckled and he went to his knees, slowly settling back on his haunches.

There the grav-unit halted its descent. He squatted there on his haunches, head bowed and arms hanging loosely. His position suggested some humble prayer to his alien gods that his soul be wafted home across the stellar wastes. Donovan could now see the ornate, rainbow-colored boards on his shoulders—indication of high rank. Charred remnants of uniform tunic flapped in the wind and the odor of burned flesh came strongly. The officer's upper trunk was a blackened ruin.

While the soldiers stood momentarily awed in the presence of brass-hatted death, Donovan began a careful sneak down the alley.

He had made about thirty feet when something hard and conical rammed deep into his spine. A high-pitched voice said, "*Sig vash, frambule!*"

He stiffened, half-raised his gun.

"*Vash, frambule!*" The gun in his back jabbed harder. "*Vlisor gur stugor.*"

He hesitated, calculating his chances.

The voice became edged with something akin to hysteria, and the gun jittered nervously on his spine. *"Vlisor gur stugor, frambule!"*

Obediently, Donovan dropped his gun. He felt bitter as he did it. Whatever was going on—whatever the situation on the rest of Terra—he would rather have met it as a man on the loose—even legless—than as a prisoner of war. Especially one that had just made a dent in the opposition. But dead he couldn't accomplish anything, and this Larry behind him seemed just nervous enough to chill him by frying if he resisted too much.

Loud cries sounded in the street and heavy footsteps came on the run. They had noticed his absence and in typical fashion became overwrought. Shouting and running about seemed to be their way of meeting every situation.

His captor called out and guided them. Greenish-beamed torches came alive, converged on him. Behind the glare, boots shifted uneasily and throats were cleared. He could imagine their feelings; the thought of a legless cripple chopping down several of their number and playing hard to get—even for such a brief interim—was disquieting. By simple arithmetic, if a cripple could do so much, then a whole man. . . .

He grunted irritably. There was where the logic fell down: no one considered him as an individual. He was classified as *cripple*. Half a man. What half a man can do, a whole man can double or better.

The alley was crowded now. An authoritative voice spoke from behind the glare of lights.

"You speak Llralan, Rekk?" The query was in English.

He shrugged. Why try to deny it? "Yio," he gave the Llralan affirmative.

"Good," applauded the other, slipping back into Llralan. "Then let me inform you that you are a prisoner of Empire, upon what is rapidly becoming an Empire-held planet. I tell you this to show the futility of trying to escape. Any such attempt will be dealt with harshly. Understand?"

"What could I do?" Donovan indicated his legs.

"Plenty!" rasped another voice. "You killed my partner, you stinking . . ."

"Corporal!" reproved the bossy one.

"I am sorry, my captain. I spoke out of turn."

"It is forgotten," returned the officer condescendingly. "When one loses a partner, he is entitled to his grief, his anger." Then, "You, Rekk . . . what is your name?"

"Donovan."

"And your occupation?"

"Larry-killer."

"Hm-m-m." The captain sounded troubled. "You do not feel the least bit sleepy or unsteady, Donovan?"

"Are you kidding?"

"No, I am not kidding."

"Then you should be. Anyone who'd ask a question like that ought to be kidding."

The captain sighed heavily. "So it's going to be like that, is it?"

"It's going to be like that," Donovan confirmed.

"Ah, well—there are those better qualified than I to ask questions and dig out the answers. Sergeant!"

"Yes, my captain?"

"Take the prisoner in charge, detail a squad and escort him to the nearest checkpoint. Have the flivver-pilot there make contact with the mother ship. The commander should be advised of this at once."

"Yes, my captain. My captain . . . ?"

"What is it?"

"The nearest checkpoint is LO-80. That is a good twenty *siveb* from here—and the prisoner, as you can see . . ."

"Yes. Yes, you have a point. What would you suggest, sergeant?"

"Back along the street, my captain—in a merchant's window—I observed several wheeled tables. The prisoner could be placed upon one of those and pushed. Or Dispensary could be contacted and a wheelchair requisitioned."

"No time," the captain dismissed the second idea. "The wheeled tables sound like a good idea. Carry on, sergeant."

"Yes, my captain."

A gun-muzzle found his already tender spine. *"Vaga, Rekk!"*

Donovan marched. He made his way back to the street surrounded by towering troopers who managed to look exceedingly self-conscious as they paced alongside their stubby captive. Then one of the troopers stepped on a trailing trouser leg that sent him sprawling. Donovan cursed him roundly and fluently in Llralan. After that, they watched his dragging clothing and didn't seem quite as embarrassed.

The sergeant sent a pair of troopers off on the run to get the table. They were back in ten minutes, pushing a utility cart of the type used in kitchens and on patios—big rubber tires, a power outlet; large, flat table surface and shelves underneath.

Rough hands got him under the arms, boosted him aboard. "You hang on," said the sergeant grimly, "or off you fall. We'll put you back on, but we won't keep you from falling."

"Oh, no sergeant—you'll have to do much better than that," Donovan told him. "Much better. According to the captain, I'm a rare specimen. Get me banged up and there'll be a reckoning."

"Reckoning, is it?" inquired the sergeant nastily. He took a menacing step forward, reminding Donovan somewhat of the cop in the bomb shelter. But for the physical differences—four fingers as opposed to five, pointed head as opposed to domed, and orange skin as opposed to pink—they were cut from the same cloth. Toughs—their answer to everything being a fist, or club, or gun.

Donovan was too numbed from the suddenness of it all,

too angry at himself because he had not reacted swiftly enough to avoid capture, to be dismayed by the sergeant's scowl. "Yes, reckoning," he said flatly. "What if I told your commander that I personally saw you shoot that colonel while his attention was on me? Grudge against authority, that sort of thing. Then there'd be a reckoning!"

The sergeant glanced around hastily, lowered his voice to a growl. "It's a long way to LO-80, Rekk—and you just brought yourself a side trip down some dark alley. A one-way trip."

"Then I'll just say my piece here," countered Donovan. He raised his voice. "Captain! Hey, captain!"

"*Shh-h-h!*" The sergeant made shooing motions. "Shut up, you fool!"

"Why? What do I care if you get the ax? You're the enemy; I've got a weapon. Therefore you're dead. But as to that proposed side trip—you don't dare pull such a stunt."

"Why not?"

"Because no tale you could dream up would save you if I get killed and cannot be questioned. I'm important to the big brass. Incompetent *frambules* that can't keep a prisoner important to the big brass alive and healthy get shot—you know that. So you're over a barrel, friend—and you might as well admit it."

The sergeant fumed; the troopers fidgeted. But Donovan was right and they knew it.

It was a very, very smooth ride to Checkpoint LO-80, Donovan sitting at ease on the table and managing to convey the impression of a prince surrounded by his vassals.

The flivver-pilot at Checkpoint LO-80 got an immediate and vehement response to his message. The commander thought, it ran, that there was supposed to be no opposition to the landings. Therefore what did Checkpoint LO-80 mean by coming up with a Rekk that had killed six men—they were giving him credit for the colonel—and critically wounding another? That just wasn't proper procedure. Not at all. The commander would message the Supreme Commander of the occupational forces at once. Meanwhile, the pilot would hustle the prisoner aboard his craft, abandon LO-80 and head for the grounding site of the mother ship.

The pilot helped the sergeant load Donovan into a too-narrow bucket seat, called his gunner away from a rapt contemplation of fall wearing apparel in a shop window, and saw to it that the sergeant was comfortably ensconced beside the captive with drawn gun. Then he took the flivver up fast, circled out over the Thames. After that, a combination of speed, darkness and violent maneuvering made the Terran lose his bearings. Once the vagrant beams of a new moon sparkled on water—either the Channel or the Atlantic.

Finally they went down like a falling elevator and Donovan got a confused picture of patchwork fields and hedgerows and neat little cottages before a massive, space-scarred globe loomed up at them, portholes ablaze with light.

They dropped into a cleared space where an honor guard with a motorized warehouse truck awaited. Donovan was lugged out, loaded aboard the truck. The sergeant followed, got on and the driver started up, moving toward the spaceship slowly to allow the guard to keep pace. The flivver from LO-80 dove back into the sky.

There was frenetic and noisy activity around the base and halfway up the flanks of the interstellar leviathan. Burdened warehouse trucks scooted out of the gaping holds and empty ones scooted in; winches rose and fell. Ground armor clanked into the maws of big freight copters and the loaded copters lifted swiftly to make room for others. Higher up, pale lemon tractor beams reached out to enfold the long, slim paratroop ships as they returned from their drops, and warp them home. A steady stream of materiel was being disseminated quickly, but without undue haste. Perspiring Llralans stripped to their under-tunics took time from their work to goggle as Donovan's truck moved past, then turned back to their tasks shaking their heads.

From the looks of things, Larry was settling in for a long stay.

The truck climbed a wide ramp and went into an immense hangar that was rapidly being emptied. It threaded through the confusion, arrived at a wide bank of intraship cars resembling nothing so much as old-fashioned Terran elevators. Donovan was carried unceremoniously into one of the cars and shoved into one corner by the press of guards. The doors closed, the car lurched and began to climb steadily to the accompaniment of a nerve-shattering whine. When it stopped and the doors rattled open, two brawny specimens lifted him bodily and carried him along a metal corridor that stretched into the distance. At an alcove some three hundred feet from the elevator they set him down before a plastic-topped steel counter while a pair of Llralans with blue armbands on their sleeves stared curiously.

"Prisoner for you," said the corporal of the guard.

"What *is* it?" asked the shorter of the two, leaning over the barrier and peering down.

"A *vis* come straight out of that *walsos* bottle you've got in your hip pocket," retorted Donovan sharply. "Come to haunt your dreams for all the miserable tricks you've pulled, you misbegotten *frambule.*"

The turnkey recoiled, put a guilty hand to the bulge on his hip. "He speaks our language?"

"And how!" endorsed the sergeant from London, giving Donovan a dirty look.

"Where'd you dig him up?" The other blueband wanted to know.

"In that big burg over on the island," contributed the corporal. "*London,* they call it."

"Yio? Have any trouble?"

"A little."

"I blasted five of your bully boys," informed Donovan,

blowing his own horn. "And I got another one burned, and left still another very sick with lead poisoning."

"Real fresh *frambule*, ain't you?" inquired the corporal.

"That's right." Donovan sighed. "And since you're about to put me on ice, it looks like I'll stay that way. Real fresh."

His sense of triumph at having maintained a vestige of independence by tongue-lashing his captors was very short-lived. They carried him down the corridor, opened one of many doors and dumped him on a cot within. The door clanged shut behind their departing backs with a sound of utter finality.

Donovan lay on his back and stared at his new home—a tiny cell about ten by fifteen, featureless except for the one blank door, the bunk and a tiny table.

"Damn," he said. Then he repeated it twelve times, with feeling.

It didn't help at all.

He was still in the bowels of an enemy ship sitting somewhere in the countryside of France; he was still legless; he was still under lock and key. He might as well have been nine thousand light-years from London as a short hop across the Channel. His world—and London's—had ended when the raid-alarms sounded and the Llralan ships came booming over. As to what came next he had no idea. But it was certain to be unpleasant, probably painful and possibly fatal.

He sighed heavily. If it were fatal, he would at least have the consolation of knowing he had not come cheaply—that he had swapped his life for six and possibly seven out of their ranks. That was something, anyway. He thought of Jane suddenly, and realized that he was *not* nine thousand light-years away—that London and their flat were only a couple of minutes away by air.

And what had that Larry captain said? Something about being a prisoner of Empire on what "is rapidly becoming an Empire-held planet." The Llralans had invaded the ancestral home of humanity, yet the fact of his being awake and kicking had disconcerted them—they were expecting no opposition. Remembering the occupants of the bomb shelter—how they had slumped one by one into unconsciousness—he didn't wonder.

So this, he thought wryly, *is the way the world ends. Not with a bang but with a snore.*

The way the world ends—this is the way the world ends . . .

Not with a bang. No one had time to whimper.

Not with a bang . . . not with a whimper . . .

With a snore.

IV

The township of Baxter slept peacefully in the slanting rays of the late afternoon sun. Everything was quiet; nothing moved in the stillness save a questing breeze with the nip of winter in its breath.

Rierson stopped the Catamount midway between the city limits and the precisely centered shopping area, rested big hands on the steering wheel and looked around carefully, noticing details.

He was on a two-lane street bordered by well-kept verges and clean sidewalks. Beyond the sidewalks—each in its neat little lot—were pleasant bungalows of various pastel colorings. The lawns were green and close-clipped; the shrubbery showed signs of careful tending. Cars sat here and there along the street, pulled up at the curb or parked before garages. A toy space helmet was lying on the sidewalk not fifteen feet away.

Taken as a whole, it was a tranquil, pastoral scene the likes of which could be found virtually anywhere on Terra now that the brawling, sprawling masses had clustered around the spaceports or gone starward to the colonies.

All it lacked was one essential ingredient: People.

The wind moved in the short grass, in the exotic plants and manicured hedges; the wind pried leaves from the stately oaks along the street and sent them whirling in helter-skelter confusion.

The wind moved, and only the wind.

The scene bore nightmarish connotations—as if some prankish diety had waited until the wee hour before dawn when the town slumbered deepest, then flipped the world about on its axis, leaving the unsuspecting sleepers peacefully dreaming on.

Unease prickled in the back of his mind—a tiny voice that shouted something was terribly wrong, that urged him to turn the car around and leave while there yet was time.

He shook off the feeling, touched the accelerator and rolled forward into the business district. These buildings alternated in height between one and three stories; they were square, pastel-colored and possessed of yard upon yard of plate glass. Graveled car parks dotted every other corner or so, and none were over a quarter full. The bulk of the cars were lined along the curbs.

Still no sign of life.

He began to see other things.

The window of a hardware store was smashed; glass fragments sprinkled both the merchandise within and the pavement without. There was a conspicuous gap in a displayed line of sporting rifles, and what had been neatly-arranged boxes of cartridges looked like a tornado had whirled through them. A car pulled up at the opposite curb had a badly-dented fender and shattered headlight. Directly across the streets from the hardware store, a ladies' apparel shop's display window was peppered with symmetrical, bullet-sized holes. Within the window, several mannequins were overturned.

The Catamount moved farther.

Several other vehicles showed fresh signs of minor collision damage. No other buildings had been disturbed as far as he could tell.

He approached a wide, divided boulevard.

In its center, safety islands bloomed with multi-hued

late-season flowers and were festooned with short, healthy palm trees. Tall, graceful light standards arched above. He turned left into the boulevard, continued his slow ride.

Five blocks ahead and on the right, a massive graystone church occupied a full block of real estate. Its architecture—vaguely Spanish—contrasted sharply with the square and modernistic auxiliary building of brick, aluminum and glass enclosing its rear half in a square horseshoe. At the very least, the contrast of structures was eye-catching. The church, facing on a back street running parallel to the boulevard, was as devoid of life as the rest of Baxter.

Atop the church's steeple, diluted by the sun, an amber flasher revolved.

So that was it.

Rierson grinned, shaking his head as the tension that had been building in him since he discovered the Catamount's sleeping driver drained away with a rush. While he had been hunting, the Larrys had pulled off another of their incessant nuisance raids, and the staunch local citizenry was cowering in its bomb shelters.

That explained the smoking ship—possibly a crippled Larry drone, perhaps a civilian craft that had not gotten down quickly enough when the shooting started. It would also explain radio silence and the fact that commercial stations were off the air—if not the telephone embargo, which was probably some new measure dreamed up by bureaucrats to make the public more war-conscious. And at this very moment, one of those selfsame bureaucrats was undoubtedly totaling up with vindictive glee the fines to be levied against one James Rierson: operating an aircraft during an alert, breaking radio silence, attempting to use a telephone and various and sundry subsidiary charges. It was going to take a lot of talking to get out of this when confronted by war-hysterical authorities.

If it got too bad, he might even have to hire a lawyer.

With these happy thoughts running through his head, he pulled up opposite the rear of the church and killed the engine. Might as well go on in and surrender to the local raid warden and start facing the music.

Fwack!

With his hand on the door handle, he looked down at the puncture in the fabric covering the door. It was the making of that puncture that had caused the sound. He looked up. In the right side of the windshield was a neat round hole with spidery cracks radiating from it.

In seeming slow-motion, his brain assimilated the facts and produced a conclusion:

Someone was shooting at him.

Again in seeming slow-motion, he reacted. He flung the door wide and fell out onto the street, taking his rifle with him. In his ears racketed the sharp crack of a high-powered rifle. Came a second shot close on the echoes of the first, and fine glass fragments powdered him as he hunched against the Catamount's flank.

He inched down to the front of the car, peered around.

Blowie!

As he ducked back, concrete chips stung his arm. No doubt about it, somebody wanted his scalp and wanted it badly. But at least he knew now where his would-be assassin was: on the roof of the auxiliary church building.

He put his back against the Catamount, checked the loading of his gun. There were five shells in the magazine. He bolted one home. waited.

A fourth shot disturbed the tomblike stillness of Baxter and the slug ricocheted off the roof of the car, screaming away into space. He moved back to the front, scanned the area before him cautiously.

Between himself and the church building was a sidewalk, a lawn and a sign. Nothing else—nothing to afford a scrap of protection. The sign was the only thing resembling cover; he studied it carefully. It was a large affair, approximately five feet by ten, and made of the same fake brick as the auxiliary church building. It was surrounded by a petit flower bed lifted above the ground by a brick enclosure; in raised plastic lettering upon both sides of that expanse was spelled *Baxter Methodist Church.*

Rierson eased back to a position of safety and waited some more. The silence of the afternoon returned. The sniper was waiting, too. Waiting for what? Reinforcements? Had he bumped into a gang of hoodlums intent on ransacking the town while the Baxterites hid in their shelters? Sweat trickled down his ribs, made his palms slippery. Was that why he was being shot at? If not, what possible reason could there be?

"You on the roof!" he bellowed. "You hear me?"

Silence answered.

"I said, *Can you hear me?*"

No answer.

"Why're you shooting at me?" His voice, distorted, flung echoes across the silent boulevard to bounce among the buildings there.

Nothing.

Hot anger coursed through him. This had gone just about as far as it was going to. Shoving himself to his feet, he started around the car, intent on getting satisfaction.

A head and pair of shoulders popped above the edge of the roof, and sunlight glinted on rapidly shifted metal. Rierson dove for the turf. The rifle above cracked, and the bullet plowed a furrow wide of its mark. He came up on his elbows, sighted along the gun barrel beneath the scope-tube. The gold bead of his front sight dropped into the notch of the rear and centered on the figure.

The other just wouldn't give up. He made violent motions with his hands—working in another cartridge—and slammed the gun back against his shoulder.

Rierson squeezed his trigger.

The three orange-skinned men were staring morosely at their stove-up scout ship when the first shot sounded. They jerked almost simultaneously, hands going to guns—and

then relaxed, exchanging looks of disgust as a second shot followed.

"I wish," said the pilot, "that Agirt would stop shooting off that thing."

"Me, too," endorsed the gunner. "Didn't he get enough kick out of peppering those store-window dummies?"

"Not Agirt." The lieutenant smiled. "He has an incredible fondness for archaic and alien weapons." He raised the rifle he was holding. "And these are both archaic and alien."

"But hardly a weapon," opined the pilot. "Me, I'll take a crossbow over that thing anytime."

The distant rifle sounded again.

"He's supposed to be standing watch," said the pilot. "Not playing with alien toys."

The lieutenant shrugged tolerantly. "Who's to hear him? The Rekks?"

"Maybe," insisted the pilot doggedly. "Remember that aircar we saw? It could have been . . ."

Agirt's rifle cracked a fourth time. "It was flying by automatic pilot," said the lieutenant.

"How do you know?"

"Because its living pilot would have succumbed to the Dust by now. We were informed of the possibility of seeing aircraft still flying—and instructed to let them alone."

"We were also informed there would be no danger from Terran defenses," muttered the gunner. "But where's the landing ship that brought our air squadron down, eh? Where's half our squadron . . . ?"

"That's enough!" The lieutenant's voice assumed the cold weight of authority. "Our landing barge was destroyed by sheer chance—a last-gasp effort of defenders falling asleep at their guns. Now be silent, or you will find yourself on report . . ."

"Listen!" That was the pilot.

"To what?" the lieutenant wanted to know.

"I heard voices . . . a voice . . . something . . . from over near Agirt."

"You're imagining things."

"No! I swear it. I . . ."

Agirt fired again.

"Voices or not," said the lieutenant, frowning, "I think Agirt *is* taking this a little too far. I'd better . . ."

A sixth shot sounded. His voice choked off.

"That," said the pilot unnecessarily, "was not Agirt's rifle."

The lieutenant felt a sudden coldness in his belly. He dropped the Terran rifle, drew his sidearm. "Gunner, you come with me—pilot, you stay with the ship. See if you can lift it—and if the cannon are working." Then he was running toward Agirt's position, with the gunner pounding heavily along behind.

The unknown rifleman flung his arms up and went over backwards, leaving his rifle on the parapet. The abandoned gun teetered precariously for a long heartbeat, then fell end over end to the ground below.

Climbing to his feet, Rierson went across the lawn, around the building and through an arched doorway. Within was a patio formed by the three wings of the Sunday school building and the rear of the church proper. Shrubbery similar to that adorning the boulevard safety islands lined the walls; the enclosure was bisected by flagstone paths.

A paint-stained plastic ladder leaned against one wing of the auxiliary building. He went to it, ascended cautiously, using one hand to climb, the other to keep his rifle ready. Reaching the roof, he stepped onto it and found his ambusher.

The rifleman was lying spread-eagled on his back, arms flung wide, eyes open and glassy.

He was utterly dead.

He was also a Llralan soldier.

Rierson stood there incredulously, seeing the neat hole drilled through the Larry's forehead, seeing the ruin made of the back of his head by the soft-nosed hunting round. The lean body was lying loosely, like a discarded rag doll. It was clad in tight-fitting gray trousers stuffed into space-black knee boots, and a billowy, soft-looking gray blouse. A peaked cap and neatly folded tunic lay beside the parapet, alongside several brightly-colored boxes of Terran hunting ammunition.

For long moments the lawyer stood there, unable to believe what he saw, yet unable to discredit his eyes. A Llralan soldier dead atop the roof of a Sunday school building in Georgia. There had to be irony in that, but he was in no mood to appreciate it. There was also probably an excellent explanation, but he couldn't think of one offhand.

Right now, only one thought occupied his mind: if there was one, was it not possible that there were more?

As if in answer to his question, there was a furtive movement back in the direction of the business district. He dropped instinctively to the graveled surface of the roof, but no shot was forthcoming. Crawling to the parapet, he peered over.

Sure enough, someone was slinking along, hugging every bit of cover, about three hundred yards away. He leveled his rifle across the parapet, put his eye to the scope.

The slinker was a Llralan.

Uniformed like his dead fellow, but carrying a seer pistol instead of a Terran rifle, he was heading for the church. He was not aware of being observed. His face was taut, eyes narrowed. The shots had probably drawn him from whatever he was about. As Rierson watched, he disappeared behind a building, reappeared fifty yards closer. He felt suddenly cold. Never before had he been stalked by a sentient being—and the idea wasn't particularly appealing.

The Llralan came on. Rierson waited, crosshairs centered on his chest.

His advancing target halted, looked around. A second sinuous form glided from between two palm trees to join him. Rierson began to sweat in earnest. Two of them now,

rangy orange men with searguns in their hands and murder on their minds.

How many *were* there, anyway? The lawyer began to have visions of a creeping horde, stealthily encircling the church.

However many there were, two less would make the odds that much better for him. Rierson sighted carefully, gently let off the shot.

The right-hand Llralan jack-knifed, staggered backwards several yards and went down in a kicking heap. The left-hand one reacted swiftly to his companion's downfall, spinning on his heel and bolting for cover. Rierson worked the bolt smoothly, with ease born of long practice, and swung the gun after the running figure.

The bullet kicked up chips beneath the other's flying heels. Then he was behind a row of cars and running crouched. Rierson snapped a shot at him as he crossed an opening, missed by ten feet. He continued to gallop back the way he had come.

He ran through a yard, vaulted a low fence and steamed at another, higher one, long legs scissoring along with amazing rapidity. As he took to the air like an ungainly water-bird, Rierson fired again.

He seemed to trip over some invisible obstacle, went pinwheeling through the air. He cleared the fence, dropped behind it and was lost to view. Rierson swung back to cover the first one, saw that he was huddled on the sidewalk, head dangling loosely from the curbing. That made one he didn't have to worry about.

Turning, he got to the ladder and down it hastily. Pausing only to reload, he went to a heavy door set in the rear of the church—the one marked with yellow—the bomb shelter entrance. As he had figured, it was locked tight. He debated whether or not to try banging for admittance, decided against it. The place to get was away from here. He headed for the archway, went through it and began to run back toward the Catamount.

To the west, something large and silvery rose above the rooftops and wavered uncertainly toward the church. The staccato thrum of its engine marked it as no ship of Terran make, though the difference was hard to discern through the coughing irregularity of its beat. Caught in the open, Rierson resorted to the big sign, flattening himself against it as the ship arrived overhead. A round hatch opened in its under-belly as it hovered, casting a saucer-shaped shadow on the lawn, and a stubby, cone-shaped snout jutted from it. A low buzz became apparent over the throb of the ship's engines; a blue blur formed in the hatch.

Rierson studied that haze thoughtfully. Whatever the frame of mind of the pilot of the craft, it had caused him to forget his cup-shields—the force shimmering about that projector was unprotected. Should a material object enter that field at this moment—an object, say, the size of a bullet . . .

Suiting action to thoughts, he placed a bullet through the hatch.

The afternoon came apart in a blinding flash of white flame. The sound of the ship-disintegrating blast was rather felt than heard. Rierson lay flat in the flower bed, stunned by the concussion, the bolt of his rifle digging into the pit of his stomach.

It was a long while before he came back to reality and looked around him. His ears still rang; his eyes still smarted. Every window in the Sunday school building had been blown inward. Likewise the windows across the boulevard. Several trees were uprooted and one light standard leaned drunkenly.

Of the Llralan ship there was no trace. None.

He crawled out of the flower bed, staggered to his feet and picked up his rifle, checking the barrel for obstructions, the mechanism for damage. Satisfied that all was well, he moved unsteadily to the Catamount. The big red car was windowless, and several ragged holes in its body showed where chunks of the airship had disappeared to. Miraculously, the tires were unharmed.

Brushing powdered glass from the seat, he got in. He was still in a state of shock; the possibility that more Larrys probably were close by never occurred to him. The engine turned over first try, sounding loud in the stillness after the blast.

He began to drive. The wind coming in through the windshieldless front window was cold; he fastened his jacket, hunched his neck and drove on, north out of Baxter. The sun was going down with its usual pyrotechnics in the clouds.

When darkness was complete, he abandoned the car and continued on foot. The headlights were smashed and he had no intentions of driving blind. He had no intentions at all, in fact, except to get as far away from Baxter as he could. He was cold, tired, confused. And scared.

Scared as hell.

With dragging footsteps, he kept moving north.

V

For Bradford Donovan, time had virtually ceased to exist. In the cell there was no night or day—the lights were never dimmed or darkened. His watch had been taken from him; so had all his other personal belongings —they hadn't even left him cigarettes.

Interrogation, he knew, having been so informed, was coming as soon as the commander got around to him. The commander, it seemed, was presently occupied doing his part in arranging an orderly Conquest Duty. Until he was called, he would remain jailed, be fed at fairly regular intervals and taken to a multi-species type head down the hall when he made the wish to do so known.

That was all. His only contact with his captors was when two guards brought him a tray of food—one carrying the tray, the other a wicked looking truncheon—and returned later to suspiciously count dishes and utensils and then go away until he was compelled to summon an honor guard for a journey to the head. In-between times, he lay on his

bunk and gloomed up at the ceiling. He did not know how the battle was progressing—whether the Llralan tactic had succeeded wholly, partially or not at all. He had only the word of his captors and the vast boredom evinced by his guards to judge by—and judging by that, the outlook for Terra was black indeed. He especially believed that the guards could not be so bored if they considered Terran retaliation imminent.

Which would infer that Terra was incapable of retaliation.

Out among the stars, along the Line, Terra had fleets boasting technical superiority but numerical inferiority to those of the enemy. Weaken those fleets to drive Larry off Terra, and the hordes opposing them out there would make a push. Save three worlds, lose fifty—that kind of arithmetic just wouldn't work, even if one of the three was Terra.

Terra, Venus, Mars—the first, second and third planets, respectively, ever to be inhabited by *homo sapiens.*

Terra, Venus, Mars—taken in force from the rear, going down to ignominious defeat at the hands of an enemy heretofore considered too stupid to accomplish any such victory.

Terra, Venus, Mars—casualties in a stellar conflict, expended pawns in a game of cosmic chess. Cut off, captured, carried off the board.

Sometime in the far future, when the depths of the Empire of Four Thousand Suns had been plumbed, bombs delivered to its factories and governmental palaces, and blockades thrown across its supply routes—when and if—then the Federation could proclaim victory and declare surrender terms for the smashed foe. Then, no doubt, the three worlds would be handed back—and any atrocities committed upon the inhabitants thereof repaid in blood and broken necks.

But that was in the future, and this was the present. The grim, grim present. Donovan doubted whether he would have lived to see the end of the war anyway—it threatened to far outlast the remainder of his natural life—but his present situation removed the doubt. He would die in captivity and before the end of the war, whether against a wall, on the rack, or in a POW camp. To come to such a futile end had he threaded precariously through fifty years of hazardous life, wandered over parsecs in search of the rainbow's end and struggled to keep certain principles more or less intact. And done so with the deep conviction that he was the main character, held the center stage, and would emerge victorious in the end.

Now from the looks of things, the only victors would be the Larrys. Just how many races, he wondered, must be buried within the sprawling reaches of Empire—races that harbored billions of individuals such as himself, possessed of dreams, loves, hates, and idiosyncrasies—individuals who had died or been subjugated when their races died or fell.

It must be an old, old tale to the lank conquistadors from Llrala.

When an irresistible force meets a movable object, there is only one result; and the Llralan Empire was that irresistible force—a lapping sea of soldiers and guns and ships that eroded and finally inundated any bulwark erected against it, and then moved on.

Homo sapiens, join the honored rolls of the vanished peoples, of the space-island dwellers lost to sight beneath the Llralan wave.

Somewhere, time passed—but for Bradford Donovan, time had ceased to exist. His life became a round of cryptic orange faces and plastic food trays and stumping trips to the head—of fitful periods of sleep in which distorted nightmares left him dripping with sweat when he awoke to the close oppressiveness of the cell.

Returning from one of his journeys down the corridor, a trouser leg worked free from where he had tucked it under his belt and began to trail. He stopped, got the dragging leg and began tucking it back in place. His lone escort—a dopey-looking type with which the lower echelons of Larry infantry seemed well stocked—stopped obligingly and waited. Donovan noticed that the corner of his mouth twitched convulsively.

"Well," he growled irritibly, "what's *your* problem?"

"Problem?" The guard was taken aback. "I have no problem."

"Then why are you staring at me?" Donovan glowered up at him. "It seems to me your mother would have taught you it's impolite to stare—if you *had* a mother."

"But I'm not staring!" protested the guard.

"Don't hand me that! You're staring, all right—and I know why, too."

"You do?"

"Yio, I do. You're wondering why a cripple should be guarded so closely; you're wondering why the brass thinks I'm so important. Where you come from, legless men are either beggars in the street or—if affluent enough to afford artificial legs—possessors of soft jobs out of deference to their condition. They are objects of pity—not fear."

The guard stared at him, round-eyed. "How did you know all that?"

"Grandpa's ghost told me," retorted Donovan, occupied with pulling the trouser leg up good and tight.

"Gremper?" the guard repeated, butchering the Terran word. "Who is Gremper? You are forbidden to speak to other prisoners"—he indicated the doors lining the corridor—"and there is no guard by that name. My name is Svitta. So who or what is Gremper?"

Donovan looked up at him, thinking he was being kidded. He wasn't; Svitta was dead serious, his brow corrugated in puzzlement. Somewhere in Donovan's brain, a gear meshed and wheels began to turn . . .

"A *Grandpa,*" he explained solemnly, "is the father of your father, or maybe of your mother, but never both."

"Oh," said Svitta relievedly. "That explains it." Then his face clouded. "Doesn't it?"

"Oh, definitely," agreed Donovan, having a hard time keeping a straight face.

"But you said you were *talking* to Gremper!"

"I was. And he was talking to me. We talked together."

"I see . . . I think." Svitta frowned, added perplexedly, "But I remember no visitors being authorized to see you. Of course, he could have come while I was off-duty . . . I didn't have a chance to read the log when I came on, but that must be it."

"Yio, that must be," echoed Donovan.

"I shall check the log first thing I report back to the desk," promised Svitta. "If I don't keep up with events, some officer will catch me one day and have me flogged."

"It's a hard life," sympathized the Terran.

"Yio, it sure is."

Svitta deposited him in his cell, closed the door with a clang. The stride of his hurriedly departing jump boots vibrated faintly through the walls.

Donovan lay back on his bunk and waited.

It didn't take long.

Where one pair of boots had departed, two returned and paused before his door while a key scraped in the lock. It opened and Svitta came in, his face a study in bewilderment. He was followed by a heavy, beetle-browed specimen wearing sergeant's insignia. Beetle-brow was frowning like a thundercloud.

Donovan pulled himself to a sitting position. "And to what do I owe the pleasure of this unexpected visit?"

"You told me you had a visitor," accused Svitta reproachfully.

"I did."

The sergeant looked from the Terran to his subordinate as if both had taken leave of their senses. Finally, he addressed Donovan. "You had a visitor—here in this cell?"

"That is correct."

"There is no record of such a visit," he informed. "If such a breach in procedure had occurred, the day-sergeant would have told me. What do you say to that?"

"What should I say? I'm not in charge of your paperwork, nor your jail. I'm but a stranger here; Heaven is my home."

"Huh?"

"I cannot take responsibility for the incompetency of your staff."

"You persist in your claim that you had a visitor here?"

"There's no persistence involved," countered Donovan. "It is a fact—perhaps an unrecorded one, but nevertheless a fact."

"I see."

"There's only one reason I can think of that would excuse your staff from disciplinary measures of the strictest nature," he went on, in a musing voice.

"What?" asked the sergeant, in spite of himself—hooked by his eagerness to duck painful manifestations of official displeasure.

"Why," said Donovan, in the manner of one pointing out the obvious, "perhaps Grandpa didn't come through official channels at all. That would explain it, wouldn' it?"

"Yio . . ." admitted the sergeant, somewhat hesitantly. "But how could he *get* here without coming through channels?"

"Simple," Donovan told him. "If he didn't come through channels, what's left?"

"What?" prompted the sergeant.

"Why the walls, of course."

"The *walls?* Great Sirri, Rekk—have your brains become addled?"

"Not at all. Grandpa *ought* to be able to come through walls"—he rapped his fist on the bulkhead—"he's had enough practice in the last thirty years."

"What d'you mean?" queried the sergeant suspiciously.

"Well, he's been dead for thirty years, and . . ."

"*Dead?*" yelped the sergeant. "Did you say—*dead?*"

Donovan blinked at him in amazement. "But of course—didn't I mention that before? How careless of me . . . but then I'm prone to forget little details like that."

The sergeant simply stared at him in incomprehension. Svitta, however, reacted much more satisfactorily. His face lost color, his eyes widened perceptibly and he swallowed several times.

After a long-drawn moment, the sergeant looked at Svitta. "Let's go."

Svitta obediently led the way out of the cell, eyes shunting around as if to espy any spooks in the process of wall-coming-through. The fact that he saw none seemed to please him immensely. The sergeant stalked out, stuck his head back through the door.

"You will not change your story?"

"What story? I have stated a simple fact—that Grandpa visited me—and you have attached a lot of unnecessary significance to it, that's all. Seems a person can't visit a relative in bad straits and offer his condolences without a top-level investigation. Why, if I were Grandpa . . ."

Slam, went the door.

It was several minutes before Donovan's ears stopped ringing in sympathy. By that time the Llralans had moved beyond the limited earshot afforded by the metal walls.

He leaned back against the wall and contemplated overhead rivets, old and half-forgotten memories of his days among the Llralan stars flooding back. Planets and mountains and seas, cities and villages and people, all parading across his mind's eye in kaleidoscopic array. Local dress, local custom, local superstitution . . . foibles, fancies, fantasies.

"*May your forebears sleep well and deeply.*"

It had only been a form of greeting to him then—an expressed hope for one's continued well-being. And on certain festival days, various offerings were made at tiny, fairy-like chapels scattered across the countryside to insure that ancestors *did* sleep well. The ceremonies were simple, dignified and touched with a certain hushed awe for those who had gone before—and had been choice

fodder for his tourist's camera, while some Imperial Intelligence agent hung around close by, trying to be inconspicuous, and watched to make sure no military installations fell within the range of his lens.

On many of the worlds, the ceremony had become simply part of a way of life, without too much inherent meaning. A labor performed on festival day, that was all, just a meaningless ritual. But on others . . .

Ah, therein lay that which made the wheels go round in his cranium.

"May your forebears sleep well . . ."

In ancient tradition stretching back to the time when Llralans were not haughty rulers of a stellar empire, but simple mud-slogging, planet-bound slobs, there was a very good reason for that pious wish. If forebears *didn't* sleep, they hung around their living descendants and bent an ear to hear how oft and kindly they were mentioned. If what they heard didn't please them, they took out their pique on the offenders by methods ruthless and bloody.

"May your forebears sleep . . ."

Well, he had exhumed one of his. Now to see just how old Rumjet Donovan would react to his favorite planet being infested with Larrys, and his favorite grandson incarcerated by same. If Llralans could believe in inimical ancestors, then what was to keep them from swallowing a benevolent one? Benevolent to one Bradford Donovan, that was—and pure hell on Larrys.

Which went to show just how desperate he was for a friend and confidant, he mused sadly. Desperate enough to whistle up a spook. Much more of this, and he's be seeing things, too.

"Grandpa," he said at length, "Grandpa, bless your rum-soaked old bones, you're finally going to come in useful. I hope."

If Rumjet Donovan had known the use to which his carefully and artfully besmirched name—remembered only by relatives, a modest tombstone and in legend in bars from Singapore to Alpha City—was going to be put, he would have rolled over in his grave, sat up, and called hoarsely for a double Scotch.

VI

The Llralan gun truck rolled slowly down the road, twin blast-cannon pointing at the sky in preparation for quick unlimbering in any direction. A lone head, weighed down by a blue-green combat helmet, poked up through a hatch; the Llralan was scanning the underbrush along the road with binoculars. From various vents in the vehicle's armor, periscopes did the same. A mounted autogun jutted from the prow, shifting occasionally as the unseen gunner jiggled it.

For what seemed like the thousandth time, James Rierson lay in concealment and sweated.

There could be no doubt now.

Llralans were everywhere. Silent, ghosting patrols in the woods; grinding, gas-reeking vehicles on the roads; whirring flivvers overhead. Roads were closed, and "sleeper" units were infiltrating the area—units that spread out in thin nets, dug in and waited for the unwary to come bumbling into them.

For the past four days he had lived on the brink of discovery, walking shoulder to shoulder with death. Once he had crouched beneath a ground-sweeping cedar tree while a patrol bearing a wounded soldier on a litter went by. Snatches of half-heard conversation informed him that the soldier had been cut down by a jittery watcher.

Three things he knew with utter certainty: Llralans were on Terra in force and virtually unopposed; they had thrown a gigantic trap around Baxter and were slowly squeezing it shut; and he was caught in the center of that trap. Steadily, inexorably—step by step, tree by tree—he was being forced back toward the town he had left so hurriedly five days ago. Whether he slipped up out here, or was pushed back into Baxter—to be systematically cut off and bottled up until no escape was left—it was only a matter of time until he lost the nerve-jangling game.

The irony inherent in the death of an alien soldier atop a Sunday school building was present here, too. He was a man who had built his life around language and the usage thereof, and yet he was skulking through the woods like a hunted Apache—where even to open one's mouth or clear one's throat was to precipitate a blast of gunfire. A respected attorney-at-law, he was playing a game as old as history—a game of grim, silent, deadly maneuvering through light and shadow, glade and growth, where the first misstep was also the last.

A lawyer lives by his persuasiveness of argument, and by his wits. His tongue is his foil; he parries and thrusts, he tries to wear down, catch off guard or bewilder his opponent into a position for the fatal blow. A lawyer uses his tongue as a soldier uses his gun—to rattle, scatter, pin down and ultimately destroy. But destructiveness is a relative thing. In a courtroom, destruction is confined to arguments—arguments are destroyed. And even then there is an appeal.

In the tangled flora north of Baxter, a life would be destroyed.

His.

And there would be no appeal.

Cold, constant fear had come to be his companion since he had fled Baxter—a bubbling terror just below the surface that threatened momentarily to well up and choke him. That and the dull, unfamiliar ache of hunger that cramped his stomach and sapped his strength. But apart from the depression brought on by his state of being and the morbid conviction that his fate was sealed, his doom inevitable, a different side of his nature sat up and —albeit in a small voice—raged in indignation that he should be submitted to such treatment. Who did they think they were, these Larrys? By what right did they burst in on a perfectly serene planet and disrupt his life? By what right did they hunt the hunter?

And he knew the answer to that, too: by the right of

might. There was no one to say them nay. No Terran rockets, war robots or divisions—no *nothing*.

Just him, a hunting rifle and twenty-three rounds of ammunition.

Those, he felt, were not the best odds in the world.

The truck ground around a curve with a rasp of changing gears, disappeared from view. The engine noise faded gradually, died out altogether. Rierson waited. If the Larrys patrolling this road followed standard procedure, there would be a second truck following at a discreet distance—but close enough to pounce on anyone crossing the road behind the first one. That lesson he had learned painlessly by seeing the method work on a road winding beneath a hill upon which he hid under a tangled windfall while troopers scoured the slopes.

Sure enough, the second truck rolled into view presently, repeated the scanning activities of the first almost perfectly, then moved out of sight.

When it did, Rierson was on his feet and moving swiftly. Out of the trees, across the highway, into the cover beyond. If there were ever a third truck, this maneuver might get him killed—but a third one didn't make sense. No matter how many trucks they had, dozens of them following each other around and around could accomplish nothing more than tire-wear and frayed nerves. The patrols were the more serious threat, and even they could be avoided.

Reaching the safety of the other side he slipped through a gap in the solid wall of greenery, crouched along for a bit, then straightened as the tangle thinned and large trees replaced it. He slowed his pace, began to glide from trunk to trunk, pausing often to look and listen, his rifle held ready across his chest. Just such areas were favored by the sleeper patrols, and here was where one should be. Continuing at right angles to the highway just crossed would allow him to skirt Baxter and eventually wind up on the coast.

As it turned out, there was no waiting squad. Whether they had something else in mind—were herding him into some as-yet-unsuspected trap—or had simply missed a bet, he had no way of knowing. He decided to take the setup with several grains of salt and veered toward Baxter. Toward Baxter was probably where they wanted him to go, but this gaping hole in their dragnet reeked of contrivedness. So he moved toward Baxter.

He didn't have far to go. He had only been fifty miles away when they slammed the door to the north in his face. Since then he had been pushed back until the city limits couldn't be more than two miles away. Weariness pulled at him; he had not slept more than twenty hours out of the one hundred and twenty since he had last slept peacefully in his hunting cabin. His hunger had only been whetted by scraps of food stolen from isolated farmhouses, but was not yet such that he could put aside his civilized conditioning and eat without cooking some of the various small animals he had come across unconscious. A fire, of course, was out of the question. Tension, fear, lack of food and sleep—all coupled with endless miles of walking—had just about extended him as far as he could go. He wasn't thinking too coherently; only one clear thought remained. One thought, one purpose, that threatened to ride him until he collapsed.

Keep away from the Larrys.

Left foot, right foot; look ahead, look behind; look up, look around . . .

Keep moving.

Stop and you sleep. Sleep and you're caught. Caught and you die.

Move. Keep your gun up. Watch. Keep your eyes and ears open. Keep away from the Larrys . . .

Move or you sleep; keep your gun up or you're beaten to the draw; keep your eyes and ears open or you're surprised; keep away from the Larrys or you're dead.

Sleepy . . . *Don't sleep* . . . So blasted sleepy . . .

The woods were darkening rapidly with another sunset—the fifth one since he had killed the Larry on the Sunday school building—when he found the house. It was squarish, two-storied and possessed of a circular landing apron with skidway leading to the garage appended to the main building. The clearing around it was vacant, undisturbed.

He waited until full dark before deciding to chance entry, the promise of food overcoming caution. Once decided he made a bold approach, marched up the front stairs and tried the door knob. It twisted easily and the door opened. He went in.

He found himself in a parlor straight out of another century, complete with fireplace and overstuffed furniture. The sole, and yet glaring, inconsistency in the decor was a section of quasi-wood paneling swung out at right angles to the wall to reveal a rounded steel door. Going to the steel door, he worked the handle. The door swung back on unoiled hinges, complaining squeakily. Revealed was a flight of stairs leading down into the earth. He went down them. At the lower end of the stairs he found a second door, went through it and into a smallish room equipped with steel let-down bunks and various survival items—a bomb shelter.

Sprawled on one of the bunks was an old codger of ninety or ninety-five; crumpled in the limited floorspace was a woman of at least equal age, and a short-legged Beagle hound. He checked the trio over, using more or less the same procedure followed at the trucker's stop. They were neither dead, drunk, nor normally sleeping. Rierson stepped on the Beagle's tail twice, and neither time did the little dog so much as quiver. He lifted the frail little woman onto the second bunk, moved the Beagle out of further harm's way beneath his master's resting place.

The only light in the bomb shelter was provided by a tiny bulb set into a small radio. It glowed steadily, blood-red. The yellow, orange and white bulbs were not burning.

So the attack alarm had been a Condition Red Maximum—that in itself was a precedent. Never before had a

Llralan task-force penetrated far enough into Terran space to warrant such an alarm here.

Now they were tramping around outside, thick as quills on a porcupine.

And this old couple and their dog slept peacefully. So, too, had the men at the truck stop . . . and the white-tail buck, and the various creatures come upon in his four days of wandering.

As for Baxter . . . as for Baxter, he had not seen a soul of its inhabitants during his rather short visit there. But he *had* wondered what the Llralan was doing on the Sunday school roof—and now the answer was obvious. He had been guarding the bomb shelter. That there had been only that one—only three plus the flivver in the whole town—would infer that they were expecting no trouble.

No trouble? Expecting no trouble from a townful of Terrans? Then they must have a hole card, and a high one. But what? Surely they would expect trouble of some sort, even from civilians, unless . . .

Unless the entire population of Baxter was asleep?

Whatever had put to sleep eighty-four reported heads of game, drowned ducks, keeled over a whitetail buck and overcome four people and a Beagle hound was certainly not a freakish twist of nature. It had to be an introduced element. If the Larrys were banking on that element, then they had probably introduced it—and followed up with a full-scale invasion.

Invasion of one town—Baxter—and one state—Georgia—would profit them nothing and get them promptly splattered over the landscape by planetary defense centers. But they had not been splattered.

Which meant the Terrans were powerless to splatter them.

Baxter was asleep. What then would prevent Atlanta from sharing the same fate—or New York, or London? What would prevent the gunners of El Scorpio Southern Planetary Defense Center, in Texas, from succumbing to what had knocked over men and women elsewhere?

Turning, he went upstairs and hunted a kitchen. Finding it, he went to the robotic chef, scanned the list of available items and dialed what he wanted. The unit started humming softly and its metal sides grew warm to the touch; mouth-watering odors began to seep into the room.

While the robochef busied itself with the meal Rierson went to the front of the house and looked out over the silent woods. No shadows moved without; no unnatural outlines bulked suspiciously against the greater darkness. From the looks of things he had found a house as yet unwatched by the hunters. And, now that he was in, he wasn't going to leave until his meal was served up, if it meant fighting the whole Llralan Empire between mouthfuls.

He explored further, found in the garage a trim two-seat aircar with a fast, silent alo-motor. He tried the overhead garage doors, found them unlocked and tested them gingerly. Unlike the rusty shelter door, they moved quietly on their tracks. His next move took him upstairs in search of the ignition key. He found it among other pocket junk on a bedside table. In the drawer of that same table resided a lightweight, deadly machine pistol with two clips of ammunition beside it. As to what fear of spooks, burglars or of a violent past catching up to its owner the weapon's presence bespoke, he had no idea; neither did he care. But it might come in handy. He loaded it and tucked it in a jacket pocket along with the second clip.

Downstairs, a bell chimed softly. The meal was prepared, the dinner bell being rung.

He wasted no time in heeding its call.

Later, belly full to an almost uncomfortable degree, he was faced with a decision: whether to leave, hoping to find a place in the woods to sleep, or to push his luck and stay here for the night.

When he opened the front door, a chill wind swept in, biting into him after the warmth of the house. He shivered, sleepily imagining himself stumbling around in the dark trying to keep his eyes open and sense of direction operational. The ultimate result would likely be collapse and unconsciousness for a number of hours. At worst, such an event could bring capture; at least, sleeping in the cold unprotected and with resistance lowered could bring pneumonia. Neither extreme was pleasant to contemplate from the seeming security and undisputed comfort of the house.

He pondered for a while longer, but his mind was made up.

He was staying.

VII

The corridor without resounded to the militant tramp of many feet. Donovan, thus alerted, was sitting up facing the door when the van of the small horde entered.

The highest rank visible was lieutenant; then, in descending order, the beetle-browed cellblock sergeant, two specialists and a pair of hard-faced paratroopers.

The sergeant grinned mirthlessly. "May your Gremper help you, Rekk. Your interrogation is at hand."

So that was it. He felt suddenly very cold, but managed not to show it. He was as ready as he'd ever be.

The lieutenant frowned. "Gremper? Just what, sergeant, is a *gremper?*"

Before the sergeant could answer, Donovan said quickly, "Don't worry, sergeant—he will. And when the time comes, you'll be near the top of his list." There—that sounded sufficiently sinister for an opening gambit. If he was going to instill the fear of the supernatural in these characters, there was no time like the present.

The sergeant was taken aback. "Near the top of his list for what?"

"You'll find out—when the time comes."

The lieutenant looked around wildly. "Will somebody *please* tell me what's going on? Tell me what's he talking about?"

"My grandfather's ghost, if it's any of your business

—which I don't think it is," responded Donovan snobbishly.

The lieutenant shook his head. "That's for sure! I'm a robotocist—not an interrogator doomed to deal with whirly aliens, for which I thank Sirri."

"So you're a nonbeliever, eh? A *Sirritei.*" He made it an indictment.

The lieutenant shrugged, obviously giving him up as hopelessly insane. "I'm here for only one reason—and it isn't to discuss theology."

"Then what *are* you here for?" demanded Donovan, grabbing the initiative while it was his to grab.

The lieutenant looked at the taller specialist, who was burdened with an oblong and unwieldy canvas-wrapped bundle. "Give them to him."

The specialist, with an assist from his fellow, pulled off the wrappings and came forward bearing two familiar objects.

"My legs!" ejaculated the Terran.

"Precisely," said the lieutenant. "Your legs. Our men are tired of matching their pace to yours, or lugging you around like a war bag, so I was called upon to repair them."

"It is also detrimental to the morale if they are constantly reminded that a handicapped Terran is worth seven of them," observed Donovan shrewdly. "They're liable to do some arithmetic and come up with the conclusion that a whole man can do a heck of a lot more than a cripple. And that is bad for the morale, isn't it, lieutenant?"

"I am not the judge of that," responded the other, refusing to be baited. He nodded to the specialist, who had stopped and silently suffered through this exchange. "Give him his legs."

The specialist complied gladly, retreated to stand with the others.

"Try them on," urged the lieutenant. "Let us see what kind of leg doctor I'd make."

Donovan laid his trousers aside, placed the stump of his right thigh into the fitted hollow in the top of the right leg, connected the leads. Tensing his muscles, he experimented. The leg functioned smoothly. Quickly he got the other one in place, noticing the crudely-patched burn areas. Other than those blotches, the legs looked entirely real, down to faint tracings of veins under the plastaflesh. He slipped the shoes off his plastic feet, climbed into his trousers, replaced the shoes and then paced to and fro across the cell. The lieutenant and his specialists watched the performance professionally, and the former smiled when the legs seemed to work.

The soldiers reacted a little differently.

The troopers and the sergeant bore the unmistakable flat cheekbones of Llralan peasantry; all undoubtedly came from worlds still in the process of colonization and development. The kind of world where ancestor-worship still flourished. The kind of world where all but the crudest artificial limbs would be a rarity. To see a man legless one moment and not the next, though having witnessed the metamorphosis from start to finish, seemed to bother them more than slightly. Donovan smiled faintly. Dolts like Svitta and unsophisticates such as these were the base stock of Empire's armed might. It would be to these and others like them—if he could swing it—that Rumjet Donovan would assume inimical life, fleshed in by their own secret fears to dog their waking hours and haunt their nights.

He turned to the lieutenant. "My compliments on your skill as a robotocist."

The lieutenant inclined his head. "It was nothing." He turned to leave, gesturing his men to follow. When they were gone, the sergeant displayed a set of hand-manacles.

"Hold out your paws."

He held out his paws, the cuffs were snapped in place, and the two troopers took him away to face his interrogation.

They reached the place appointed for it after a long climbing journey on one of the shrieking intraship elevators and a walk down a corridor that was—by contrast to the bleak cellblock hall—opulent. Heavy tapestries covered the walls; a thick carpet covered the steel decking. Three-dimensional solidographs of Llralan cities and landscapes hung at regular intervals over the tapestry; a faint, not unpleasant odor was wafted through the air by hidden blowers. Officer's country, without a doubt.

The right-hand trooper rapped on the door, received an invitation to enter from a wall-grid and they trooped in. The soldiers flanked him to a big desk, stood rigidly at attention as he underwent an appraisal from the officer behind the desk. On the commander's right hand was an infantry major; on his left, an air force captain.

"This," said the captain, indicating his seated superior, "is Commander Sa-Dzalla Sarak, master of the *Kalistra* and marshal of its air and ground forces."

He was obviously supposed to react in some way, so he bowed mockingly. "Honored . . . I'm almost sure."

The captain and the major stiffened perceptibly; the commander merely raised an eyebrow. He was a thoughtful-looking character with shrewd eyes, and he radiated quiet authority. This one, Donovan decided, was going to be a tough nut.

The tough nut waved at a convenient chair. "Terran, be seated."

Donovan sat, and the troopers retreated to frame the door like book ends. Sarak arranged a sheaf of papers before him, studied the topmost one a long moment, then looked up.

"Now then . . . you are Bradford Donovan?"

"Yes."

"You were captured by soldiers under my command on twelve November, in the city of London and on the island of England?"

"I was captured on the twelfth, and in London. If you say they were your men, I am unable to deny it."

"Hm-m-m." Sarak looked again at his papers. "Before you were captured, you managed to shoot and kill several Imperial soldiers. Do you remember how many?"

"Perfectly. I killed or wounded five. As to their being stone-dead, I cannot say, as I had no time to examine them. A sixth was still kicking when I last saw him, so I can't claim a kill there; he'll have to be tallied as a cripple."

"You speak of killing men as one would speak of swatting *veq*," put in the infantry major.

"I speak of killing *invaders*," corrected Donovan. "London is my home; I defended it to the best of my ability. Those dead men have no kick coming—they made themselves liable to death or maiming when they participated in the landing."

"He is right," Sarak chided the major. "You, a soldier, should know that." He turned back to Donovan. "But you have only mentioned six men shot by yourself. What of Colonel Slanel?"

"I know no Colonel Slanel," Donovan told him truthfully.

"He was also killed during your capture—but by searfire, not bullets."

"I had no seargun—only the .40." Donovan shrugged. "Your troopers carry the searguns. You'll have to ask them about Slanel."

"*No!*" That was the air force captain, driving his fist against the arm of his chair. "You do not wriggle out by trying to make us suspect our own men. They are trained and loyal soldiers—they would neither accidentally nor deliberately shoot a superior . . ."

Donovan hoisted surprised eyebrows. "Who said anything about accidents or treason? I merely said . . ."

"I *know* what you said! But you will not get away with it—not here! You will *not* protect your comrades in Georgia . . ."

"Captain!" Sarak's voice sliced through his subordinate's anger. "Captain, control yourself. I understand your feelings—but please refrain from such outbursts."

The captain subsided, seething.

"What's eating him?" Donovan wanted to know.

"He has lost a cadet-brother—a man who graduated with him from officer's school. They were friends."

"Slanel?"

"No—a flivver commander, killed in Georgia."

"He appears pretty overwrought," Donovan commented. "So did the soldiers in London. Seems pretty funny to me—you come busting in with guns and ships, all set to stomp somebody, and then get all upset if somebody stomps back."

"Our soldiers can die as bravely as any—in battle!" snapped Sarak. "A soldier expects to die. But when his superiors have told him he will have nothing to fear, and it would seem to be so . . . and then, out of nowhere, death, and no one to fight back at . . ."

Donovan had no idea what the commander was talking about, but it did make a likely opening. So he said, "Sounds positively supernatural, doesn't it?" in a knowing tone.

Sarak looked up quickly. "Which brings up another point. This wild tale of an ancestral spirit visiting you in your cell—what possessed you to dream up such a thing?"

"There was no dreaming involved," asserted Donovan. "And no tale, either—at least no tale told by me. I simply mentioned that I had a visitor, and you treat it like a major crime."

"Look . . . you undoubtedly know that there are certain stratas of the Llralan peoples who worship ancestral spirits. An old passport in your personal belongings shows that you spent quite some time on Imperial worlds before the war. I think that you decided to use that knowledge to put your guards in awe of you—to perhaps even secure certain privileges—as a favorite descendant of a restless ghost."

"You think I invented Grandpa? Think he's a figment of my imagination?"

"Frankly, yes."

"Then why don't *you* tell *me* what happened in Georgia—and how Slanel came to be shot by his own loyal and well-trained soldiers?"

For the first time, he had the feeling that he had gotten through to the commander. Sarak was a long time in answering. When he did, he went off on a new tack altogether.

"I'm going to tell you a few facts," he said. "Then we'll see what you've got to say about Slanel and Gremper. And Georgia."

"I'm listening."

"First of all—that thickhead Svitta *is* from one of those backward planets where ancestor-worship still flourishes. Since you gave him that rigmarole about Gremper, he's spread the word to other believers on this and other ships, and they have spread the word in turn to outside units. They are uneasy—no one likes to tangle with the supernatural. That unease *could* spread to other troops, causing a breakdown in morale and a subsequent disruption of our Conquest Duty. I intend to stop that before it starts, by making you admit that you fabricated the whole thing . . . and by conclusively proving that the only Donovan in your cell was you."

"Just how do you intend to make me admit anything?"

"By letting you know how we stand in this solar system. You appear to have guessed that we have employed a new and totally indefensible weapon in capturing the three inhabited planets. What you may not have guessed"—he leaned forward, speaking slowly for emphasis—"is that, very likely, you are the last Terran alive or awake on Earth."

The deadly assurance and titanic import of those words chilled Donovan to the marrow of his being. He had guessed as much, hoping against hope that he was wrong. but now there was no guesswork involved. And no hope. *The last Terran alive or awake on Earth.* Abruptly his

utter aloneness came welling up in him. Terra was taken, and he was a prisoner aboard an enemy warship. Captured, weaponless and alone.

Sarak and the others were watching him smugly, confident now that they had him where they wanted him. Something he had almost forgotten he possessed—his hair-trigger temper—came to the fore. He mentally gave himself a swift kick in the pants. He, alone, had them worried, or he wouldn't be here—and they wouldn't be trying to scare him speechless.

For that was the only weapon they had left him.

Speech.

And he wasn't alone; he had one potent ally.

The late, unlamented Rumjet Donovan.

Now to use them.

"Well?" prompted Sarak. "What? No smart retort? No clever play on words? Come, now . . . don't give up so easily! What do you say about that?

Assuming an expression if immeasurable woe, Donovan said, "I am sorry. Deeply, truly sorry. Please allow me to extend my condolences to your valiant fleet before it is too late to do so. May you go to your greater reward knowing that your supreme sacrifice here will inspire others to similar bravery when the reckoning comes upon them. The Empire will doubtless award the highest honors, posthumously, to . . ."

Sarak was left floundering by this sudden reversal of the Terran's attitude. "Condolences? Sacrifice? Posthumously? What words are these?"

"He is just trying to confuse us," opined the captain. "He . . ."

"Let him speak," Sarak overrode him. "He's trying to make a point. Let him make it." He looked at Donovan. "This better be good."

"It isn't," Donovan told him. "It's bad. Very bad. You have said that I was the only living or sentient native left on Terra. Therefore I felt obligated to offer my condolences."

"Why?"

Looking pious, Donovan replied, "Because I detest wholesale slaughter. Because you are going to need all the condolences you can get."

Not to be put off, Sarak reiterated, "Why? Why will we need them?"

Donovan shrugged helplessly. "Figure it out for yourself. You have on your hands a planet whose occupants have been drugged into some type of prolonged slumber and eventual death . . ."

"Only slumber—not death," Sarak corrected. "But go on."

"Then you have a planet of slumberers. Venus and Mars . . ."

"Have succumbed also," nodded Sarak. "You will get no help from them."

Ignoring that, Donovan continued dramatically, "So you are stuck with a sleeping planet." He considered, added, "In fact, you are stuck with *three* sleeping planets. Three planets populated by the sleeping . . . and the dead."

"The sleeping, anyway," Sarak conceded.

"Oh, the dead we have always with us," pronounced Donovan solemnly. "Since the dawn of our time, men have lived and died on Terra. Even now, with her sons gone starward, the graveyards are not idle, nor funeral parlors nonexistent. Some far-ranging Terrans have even had their bodies or ashes shipped home for internment in parent soil. So the dead we have with us, in numbers uncountable. You know the adage: All the world's a grave, and all the men and women mobile corpses. The great majority of the dead sleep well and deeply, just as your traditional greeting would bid them do—but some do not. And my grandfather is one of those."

"Very moving," complimented Sarak. "Very literate, too—and it might scare a fool or an ancestor-worshiper out of his wits."

"Then they'd be smart. It's *enough* to scare somebody—even me.

"The present, living heirs of Terra are in no shape to assert their rights and push the spirits back into the nether regions where they belong. There is nothing to stop veritable hordes from arising to walk the Earth—and there is nothing in the makeup of an invading army to make them rest the easier.

"And, once freed, they aren't likely to want to be vanquished a second time. They will want what they consider theirs by right of prior claim—the Earth!" He paused, studied his listeners covertly. They appeared to be listening earnestly; he hoped they weren't letting him make a complete fool of himself preparatory to giving him the big ha-ha.

"The forces of the afterlife are gathering," he went on, "and you"—jabbing a finger at Sarak—"and you and you" two more jabs for the captain and major—"and you and you"—twisting in his seat to include the troopers—"the whole fleet"—a wide, all-encompassing wave—"are trespassers upon what they consider to be their private domain. They will be irritated—and you can't even claim a common birthright to trade on for leniency. They will take steps to rid themselves of the unwanted guests."

Sarak was beginning to look half-convinced despite himself, and yet could not by rights believe what he heard. The major looked thoughtful; the captain wore an expression of cynicism, but it ill-concealed his underlying uneasiness.

"Steps," said the commander, at length. "What kind of steps?"

"*Unpleasant* ones."

Donovan leaned back in his chair, crossed his artificial legs and endeavored to look sure of himself.

He had gone as far as he could go without having an actual specter put in an appearance—and he somehow doubted that Rumjet would be able to make it tonight. Or any other night.

It was solely up to the Llralans, and their imaginations.

If they *had* imaginations.

VIII

On the sixth day of his fleet's occupation of the Terran home system, Martak Sarno, Supreme Commander of the invasionary forces, finally reached a relative lull in his duties and was able to sit back and take stock. Remanding the fleet into the hands of Vice-Commander Blanatta he retired to his cabin and poured himself a long drink.

In the midst of reading a report on the overall state of the invasion, somewhere between an optimistic quote from the admiral in charge of Mars foreseeing no more trouble in the future than he had had to date—in other words, none—and a mention that no new light had been shed upon the mysterious destruction of Scout Flit S-90980 and its crew in Georgia, he leaned back and stared meditatively at the ceiling. Events in this man's galaxy, he decided, moved *fast.* It seemed only yesterday—surely not back in the very first months of the war—that he had been sitting in his office on Risstair and fulfilling his function as military administrator to that world by wading through pile after pile of appallingly tedious paperwork, all concerned in the most explicit detail with every trivial fact of provincial life.

In all that vast sea of boredom, anything vaguely resembling something out of the ordinary was a priceless gem to be pounced on joyfully. And the fact that Terran prisoners of war, clearing military sites in areas rendered so fearsome by venerable native taboo that not even the whips of the Star Gods nor threats of more drastic action could force the local work crews into them, were succumbing to some mysterious malady was certainly out of the ordinary. The malady took the form of abrupt precipitation into an hours-long coma from which nothing could rouse them. Recovery, it was noted, was every bit as swift as the seizure, and ever thereafter the victim was immune to whatever it was that had affected him. One coma to a customer seemed to be the hard and fast rule. And always in the taboo areas.

Work-stoppage on military sites, no matter how fleeting, was sufficient excuse to lock his office, shed his paperwork burden and go investigating—an opportunity he seldom had. Besides, the facts of the case were intriguing.

So he had played it to the limit. Blanatta, then his chief of police, brought in local witch doctors and questioned then intensively in relation to the taboo. Top medics in the star-cluster were requisitioned through the auspices of internal security agencies. His direct superior, the Sector Lord, authorized whatever measures became necessary to discover the cause of the ailment.

With such overwhelming pressure brought to bear it was inevitable that the exotic planet must give up its secret, and Sarno was in at the kill. The culprit, it turned out, was a flower. A very unusual flower of delicate alien beauty and the indelicate constitution of a meat-eater. A carnivore. Since it was not equipped with tooth, claw or mobility, nature had compensated nicely by arming it with a gaseous vapor and the ability to spray it with deadly accuracy when its sensory equipment detected meat on the hoof within range.

The bell ringer was the fact that, while swift and deadly poison to all Risstairan life, the vapor's effect on Terrans was no more than that of a good sleeping potion. True, it tended to slow all bodily functions down to a level that could almost be classified as hibernation had the Terrans been a hibernating species, but it never lasted. And after one time around, the victim was permanently immune. Subsequent tests revealed that it affected Llralan fauna not at all, and the case was closed forthwith. The medics recommended that Sarno subject all future work-gangs to the effects of the flower—*xil'tressk,* or blossom of death, in native parlance—and let them have their comas before starting to work on the installations; promised that he would get a footnote in the annals of stellar botany as the discoverer of the effect then packed their bags and left for home.

With the little mystery cleared up and work back to normal, there was nothing for it but to unlock his dusty office and put his nose back to the grindstone. He found himself back at his desk facing even greater mounds of reports, requests and receipts, than he had left behind. Stifling an urge to turn a seargun on the lot, he dug in. Hundreds of bills and measures and mandates awaited his personal approval. The Highway Department needed more money—didn't they always?—the Coastal Patrol needed refittings and repairs for its boats, and the smallest incorporated township on the planet needed a new garbage truck. And those were only the top three forms on a stack nearly as tall as himself.

He thought about retirement, then seriously considered suicide. He'd already tried an even dozen times to get out of administration and into the field or onto the bridge of a warship, had received a dozen flat rejections. Top-flight administrators were scarce, ran the wording, and they had to make the best use of each individual in the war effort. So that avenue of escape was closed to him. He was trapped on a backwater planet going slowly insane while visions of budget allowances marched through his aching head.

From that to this in one leap. He took a long pull on his drink and shifted slightly, easing his heavy frame into a more comfortable position. Somewhere between a garbage truck for Altoburv and the tall cool glass of *walsos* he now held, somewhere between then and now, he had hit upon the magic combination that opened doors and melted obstacles and accelerated events. One moment and he was beating his head against a blank wall, the next and he had butted through that wall and was being carried into unexplored realms by the impetus of that final thrust.

He could not recall just where the inspiration that the *xil'tressk's* unusual gas might be utilized as an unorthodox weapon against Terra had come from—all he could seem to remember of those days was his mounting frus-

tration at books that would not balance and a kind of desperation that waxed and waned in exact proportion to the volume of paperwork pouring in from all over the planet. Somehow in his off-hours, which were few and far between, his fevered brain had conjured up the image of sleeping multitudes of Terrans with Llralans standing over them—and himself holding the power of life and death over the sleepers. Perhaps the dream was brought on by what he had seen in the POW camps—or perhaps his military brain, trained long ago and far away to recognize military potential when confronted by it, was struggling in his subconscious to reach the politics-deadened regions of his conscious mind.

And once it had, he had begun musing what a pity it was that the unconscious state lasted only roughly nine Terran hours. Suppose it lasted a day—two days? *Suppose it lasted quite a while longer?*

For the time, it was enough. He now spent his off-hours building a theoretical invasion plan upon the hypothetical Dust of his imagination—the Dust whose effect lasted at least several months. It was a diversion, anyway—a hobby. He began disposing of his paperwork with a will, discovering a vigor within him he would have thought long, lusterless years had drained away. His hobby became his obsession, and he began to almost believe that his post on Risstair was only temporary—a cover assignment to be endured until his masterful deathblow to the Federation could be worked out to the fullest. Rusty old talents for logistics and maneuvering for which he had no use since his days in the Transport Service were brought out and polished up. A hundred—a thousand—timetables for conquest were drawn up and discarded. Martak Sarno had discovered a new lease on life. His administration of planetary affairs began to reflect his quickened interest in living, and he implemented policies with a flair. Among other things, Altoburv got *two* new garbage trucks. His mental rebellion at being relegated to such duties was gone, and he no longer regarded his job as a trap, but as a mere step upward—and the stars were the limit.

In his exhilaration he became excessively bold. He pulled his rank on spaceport personnel shamelessly to gain access to the massive data computers therein. To these he submitted reams of figures and calculations, correcting his mistakes and making new calculations until his figures and those of the computers jibed.

It had been on the last night he intended to use the computers that his world of illusion had been shattered abrupty into a million fragments. All figures at last checked against each other—ships and men, supplies and weapons, timetables and distances. It was all figured to the nth degree, and he was at least as jubilant as if he had really conquered the home system of the Federation and was proceeding with his Conquest Duty plans—all of which he had carefully thought out and made allowances for. He had carefully filled his several brief cases with all the neatly processed data, erased all indications of what he had been doing from the memory banks of the computers and turned to go, with the pale glow of more stars than even the Empire boasted penetrating into the now-darkened spaceport control tower.

And then the lights had flashed on, and a man he had never seen before was stepping forward, saturnine features foreboding, and was presenting a badge that gleamed gold before his squinted eyes while two more strangers appeared at his elbows and dexterously divested him of his bulging brief cases before he could protest.

And the most dreaded words in the whole vocabulary of Empire were ringing in his ears:

"Imperial Security. Afraid you'll have to come along with us."

Before he could recover from the shock he found himself aboard an ultrafast Intelligence courier bound for Llrala, undergoing intensive questioning as to the contents of his brief cases. But the questions were being asked by a board of military strategists, the lowliest of which outranked him by a dozen shoulder strips, and not by suspicious-minded Security agents. Somewhere between questions he was offhandedly informed that Imperial laboratories had been experimenting with the *xil'tressk* ever since the botanists who had come to Risstair at his behest had sent in samples along with a case history, in keeping with regulations. Ever since a routine Security check had disclosed his unusual activities and the purpose behind them, that experimentation had taken on a positive direction: the lengthening of the coma-duration, through mutation of the plant.

What it all boiled down to was the fact that, where his dream world had been shattered beyond repair, his position in the real world had altered so violently it had begun to resemble something of his own contriving. A scant three years, by Llralan calculation, had passed since he had begun his nightly trips to the spaceport control tower, but already his yearnings had come true. The provincial pencil-pusher had become the conquering hero. Sarno stretched his big body like some huge carnivore after a particularly satisfying meal and returned to the present, hitching forward to peruse the reports on his desk.

From paperwork to paperwork in one easy lesson, he thought wryly, then sobered as he took up where he had left off, with the failure of searchers to find any trace of the destroyer of Scout-Flit S-90980. A ring of troops had been thrown around the village of Baxter and was being slowly contracted; when the noose was tightened, it was calculated that their prey would be inside. Results so far: negative.

He read on. Reports from other Scout-Flits as well as infantry units indicated the previous theory, that not all Terran fauna would be affected equally by the Dust, had proved correct; several lower forms of life had been observed moving freely about with no sign of impediment. This did not include the pet species *dogs,* which had succumbed along with their masters. Of all types,

birds seemed least affected of all, though some groupings—for instance, the *ducks*—had proven even more susceptible than men, going under as much as three weeks before D-Hour. In spite of this unusual side-effect, no suspicion on the part of the Terrans had been aroused. This facet, promised the report, would be enlarged upon more fully in the reports of the Intelligence agent dropped on Terra six months prior to D-Hour explicitly to watch for such manifestations of suspicion.

One aspect worthy of note regarding the unevenness of the affect on the overall population of the three planets was the fact that several human Unaffecteds had been discovered, and no apparent reason for their immunity to the Dust found. Their names were neatly listed below. Though Sarno knew the list by heart, he read the list again.

1—MARGARET CASSIDY; *Butte, Montana, Terra*
2—BRADFORD DONOVAN; *London, England, Terra*
3—MICHAEL HARRIS; *Canali, Mars*
4—JENNIFER NOGALES; *San Francisco, California, Terra*
5—PAUL NOGALES; *Blue Hills, Yagari, Venus*
6—RICHARD RAYBURN, SR.; *New York, New York, Terra*
7—RICHARD RAYBURN, JR.; *New York, New York, Terra*
8—DANIEL RIERSON; *Venusburg, Mudcounty, Venus*
9—HOGATE YOGANDA; *Hong Kong, Terra*

Nine names. Five totally strange, four utterly familiar—and all representative of the most perplexing and disturbing development to date. Nine who did not succumb to the Dust. Nine who had been awake and aware when the Llralan fleet came in; nine witnesses to his invasion when there should have been none. Nine—and a tenth, yet unnamed—who had reacted in various and generally violent ways against an invader who had expected no reaction at all. Since his troopers' guards were lowered, naturally there were casualties. Casualties which just should not have been. Casualties to add to the total already on the books, put there by a combination of overeager Llralan pilots and Terran gunners doggedly fighting to stay awake long enough to loose one ragged but effective salvo.

The Cassidy woman had struggled violently, inflicting scratches and lacerations, condemning them all to perdition forever and ever, while the Nogales woman had taken one look at the orange faces and gray uniforms framed in the door of her San Francisco bomb shelter and gone into a state of shock from which she had yet to to emerge. Rayburn Senior put up such a strenuous resistance he had been killed; his son had laid the entrails of a jump-sergeant on the floor in front of him and slashed two troopers with a lektro-blade before gun butts had driven him into insensibility. Michael Harris and Paul Nogales—two of the familiar names—had put up no resistance whatever. The former took one look at leveled guns and raised his hands; the latter happened to be in a jail cell when confronted by soldiers and in no position to argue. Hogate Yoganda, physical giant though he was, had offered no trouble, and Daniel Rierson—the third familiar name—had got in only one good punch before being floored.

The owner of the ninth—and fourth familiar—name had put himself into a class all by himself by the simple expedient of gunning down six soldiers and causing the death of a full colonel in some as yet unknown fashion. And, as if that weren't enough for him, he was now, for reasons known only to himself, claiming that his immunity to the Dust and his impressive kill-total on Imperial soldiers was all due solely to the machinations of his grandfather—dead these thirty years. He was regaling guards and crew-members—anyone who would listen—aboard the ship upon which he was being held with blood-curdling prophesies of horrors to come as the undead rallied to the colors. Which on the face of it was absurd—but then so had been the idea of conquering a system with a vapor three years ago. And the skepticism of his soldiers, Sarno knew, could stand only so much before they would start believing anything and everything. The happenings in Baxter had done nothing to help matters—had in fact offered seeming substantiation for Donovan's wild tales.

All of which neither he nor the High Command could have foreseen when they stood on a rainswept Llralan spacefield less than a year ago and watched the first of the Terra-bound robot ships thunder aloft to sow her skies with the means of her own downfall. By loosing the Dust and following it up with a full-scale invasion, they had opened a Pandora's box of unknown and unsuspected pitfalls—and like that Terran figure of folklore, he was beginning to learn the consequences.

He shrugged philosophically. If this was the worst Pandora's box had to offer, then his fleet was more than equal to the challenge. At least; it was *as things stood now*. If Donovan kept up his tale-telling and the "Spook of Baxter"—nicknamed so by the troops chasing him—remained at large, things might not stand the same a week hence as they did now. And that couldn't be allowed.

He pressed a com switch. "Blanatta."

"Yes, my general?" The vice commander's voice had not changed one whit since Risstairan days—he almost might have been going to order a police investigation of illegal *walsos* distilling in the Korvalj foothills instead of giving an order concerning the fate of a full-strength battle-fleet.

"My general wishes . . . ?" The vice commander broke his train of thought.

"Blanatta, I've decided to have all the Unaffecteds transferred here. That includes Donovan. And Blanatta?"

"Yes, my general?"

"Have Sjilla detailed to the *Kalistra*, to accompany Donovan back here. Do you understand what I'm driving at?"

"I do, my general."

"Good. Give the appropriate orders then. I'm going to be tied up with these reports for sometime to come."

"Yes, my general. Anything else?"

"No. As they say in this man's navy—carry on."

"Yes, my general."

Sarno released the switch, took another sip of his now-warm drink and pulled a sheaf of dispatches out of his *In* tray. The uppermost was concerned with the gathering-in, recharging and storage of the hundreds of thousands of anti-grav jump-chutes used by the troopers and now scattered all over three planets.

"From paperwork to paperwork," he groaned aloud, and began reading. It occurred to him that there was one bright spot after all: the paperwork of a battle-fleet was much more terse, to the point and just plain *interesting* than that of a provincial planet.

He drained his glass, signed his name in triplicate and went on to the next one—tidying up, attesting to and preparing for filing the last little details of the downfall of the species Terran.

IX

He came out of a sound, dreamless sleep to stare uncomprehendingly at an unfamiliar ceiling. Diffused sunlight glowed through an opaqued window, and the room was pleasantly warm. For a long moment he lay there, pleasantly between consciousness and unconsciousness, feeling at peace with the cosmos; then he became aware of the unyielding contours of the pistol beneath his pillow. In a rush, everything came back to him and he threw off the covers.

Somehow in this tranquil bedroom the exhaustion and fear of yesterday felt far and away. His clean-scrubbed body was a thousand per cent better for the bath; that his beard still graced his face was testimony to the fact that he had not been able to find shaving tools. His clothes—from underwear to rough denim pants and jacket—he had surrendered with some misgivings to the household robolaundry . . . suppose he was forced to depart hurriedly in the night? But he hadn't been, and the clothing was neatly piled on the *Out* chute. En route to them he passed a full-length mirror, garnered the impression of a mobile bear rug. If hirsute wasn't the word for him, just plain shaggy was.

Grinning, he dressed quickly, slipped on his hunting boots and refilled his pockets with the paraphanelia he had emptied from them last night. Then he buckled on his cartridge belt, stuck the machine pistol in the waistband of his trousers and—feeling like a new man—took rifle and jacket in hand and went downstairs.

He spent the next half hour eating breakfast and preparing a small bundle of food to take with him. Then he toured the premises with pistol in one hand and third cup of coffee in the other, peering out various windows for signs of skulking Llralan patrols.

There weren't any. The sky was clean and cloudless, the day was still. It looked like the kind of day that would beguile the strictest militarist into relaxing his vigilance—but then he didn't know what kind of day Larrys considered ideal for loafing and daydreaming.

In any case, he had to get away from this locale while the getting was good . . . if it was now. He headed for the garage, dumped rifle and bundle in the aircar and started the engine. While it idled, he rolled up the well-oiled overhead doors, then climbed in and eased it out into the bright sunlight. Again he got out, closed the doors behind him—no need to get the hunt onto his trail before he had to by having some sharp-eyed peruser of aerial photographs notice doors open where before they had been closed.

Lifting the car ten feet he hurdled a tall hedge, immediately dropped back to just about two feet above-ground. Keeping speed negligible, he drove straight for a wall of trees, slid past one and around another. Methodically then, with windows open and ears straining for untoward sounds, he steered silently through the cathedral aisles beneath the trees, an occasional branch lashing the windshield.

He angled toward Baxter, intending to skirt it closely and head east to the coast. Once there, he could work north and away from the troop concentration around the township by leaps and bounds.

But it was not to be.

He saw the soldier rise out of the foliage for a quick look-around at the same moment that the soldier saw him. For a split-second, both were petrified—Rierson by the abruptness of the ruination of his plans, the soldier obviously by the silent and stealthy arrival of a vehicle his mind associated with the upper air spaces.

Rierson let the car charge forward just as the soldier started bringing up his weapon. There was a long heartbeat of time in which he stared straight into the horrified, panicky eyes of the doomed trooper as he strove to bring his gun to bear. Then the car lurched, a *vu-u-ump!* resounded through its hull and it was slowing again. He glimpsed a broken gray-clad figure in his rearview mirror, huddled on the forest mold. The soldier hadn't screamed when the car hit him—had died in grim silence.

Cruu-u-mmp!

The car staggered a bit, and Rierson thought he had rammed a tree. Then the acrid tang of discharged energy reached his nostrils and he swiveled his head rapidly, trying to find his assailant. There was nothing.

Cruu-u-mmp!

This time he saw the blue beam lick from a clump of trees to his left. The sniper was well-shielded—he couldn't reach him with the car, neither could he abandon it now, under fire, and shoot it out. The woods around probably held an entire patrol. That left only one way out. He took it. Sawing back on the wheel, he gunned the engine and grabbed for sky. Overhead, interweaving branches rushed at him in a confusion of light and shadow; then he was

clear, with garlands trailing from the vibrating short-wave aerial. A red light was winking on the dash. He read the dial, felt his blood run cold.

A searbolt had burned into the alo-reactor housing and freed energy was upsetting the precise stability needed for operation. Already the engine was rebelling, the craft hanging sluggishly in the air.

The car went into a long, climbing spiral and his insides rotated in sympathy. Shoving the wheel over hard, he got back down below the dangerous radar horizon. Black, oily smoke was dribbling behind, marking his passage clearly across the sky. Searbolts snapped by to right and left. The car's bucking was throwing off their aim. That, at least, was something.

The peaceful, deserted buildings of Baxter swam into view. He pointed the car's nose at the most prominent structure—the Methodist church—and concentrated on getting down on three skids and in one piece.

He made it—just barely. The car slewed around, tipped up and almost over, then settled back with a violent jounce. He shoved open the door, toppled out, taking his rifle with him but deserting the food bundle. On the dead run he crossed the boulevard, galloped into a back yard, narrowly missed garroting himself on a plastic cord supporting several flapping blankets and brought up panting under the scanty protection afforded by an outside staircase. From the vicinity of the church came shouts, the sound of alien engines. They were right behind him this time—his luck had just about sifted away.

Grimly, he began moving away from the commotion. He crossed two streets after carefully looking both ways, dived for cover near a third while a speedy little truck crammed with eager-looking troopers roared by, rocked around a corner on two wheels. Then he got up, ran on. To lie in hiding was to allow the trap to close about him. He had to get away *now*—or not at all.

On the face of it, the latter possibility seemed increasingly to be the odds-on favorite.

Reaching the fourth street, he began looking into parked cars. The fifteenth he tried—one street and two dives for cover later—had the ignition key in the lock, but the door was secured.

No time for finesse. He drove the butt of his rifle against the glass again and again, shivering and finally smashing through the flexible, multi-ply stuff. Piling in, he almost knocked the key from the lock in his haste, then spun the wheels backing out into the street. Cutting left, he put the accelerator on the floorboard and prayed he wouldn't meet any troop-trucks head-on.

The speedometer was sitting on eighty when he saw the barricade upahead—two guntrucks end to end, festooned with helmets and gun barrels. He rode the brake hard and the shrill of tortured rubber was like a human scream of terror. The car fishtailed wildly, leaving twin lines of rubber, sparks and drifting smoke behind. Two streets from the roadblock he spun the wheel and dove at a side street with the speedometer registering forty. He didn't quite make it; the wheels bumped up over the far curb. He oversteered violently and the car shot leftward, along the new route.

And slammed to a halt, yawed around sideways in the street.

Not two hundred yards away there was a second roadblock.

He threw the gear-selector in reverse and the tires again thinly protested their abuse as he jerked back onto the intersecting street.

To his right, soldiers were running forward from the roadblock. They started firing as he came back into view. Directly before him, the turret guns of the second roadblock's trucks were swiveling to cover him.

To his left, a light tank was coming up fast.

He put the car in forward, jumped straight ahead as the first searbolts from the running soldiers began to rip the side of the vehicle. The guns on the truck depressed to follow his impetuous advance. Gritting his teeth, he cut the wheel to the left, slammed up onto the sidewalk and shaved off speed along a blank expanse of wall. A white-hot flash snapped down the street; a deafening concussion rent the air. Where pavement had been was now only a blackened crater scooped out of the street.

He slid across the seat, kicked open the buckled right-hand door and came out bringing rifle to shoulder. He snapped off three shots, saw one soldier throw up his arms and pitch backwards, another stagger but keep his footing. The spiteful crack of his rifle seemed to give them pause. He utilized the lull to full advantage, diving into a doorway. As he tried the double doors within, belated shots crackled across the building front, knocking out brick, plaster and glass.

The doors were open. Their lock had been fused by the hot breath of an energy gun. In an inspired flash he saw all the men and trucks and ships that had pushed him back into Baxter, the way he had been neatly herded into a box with only one possible escape—through the doors along this street—once he was in Baxter. And now he found the doors he chose doctored for easy entrance.

He put down his rifle, drew the pistol, put his shoulder to the doors and went through in one continuous motion. He landed rolling.

Fzap!

Brilliant blue dazzled his eyes in the dimness of the building's interior. Flat on his belly, he aimed for the source of that blue streak and held down the pistol's trigger. Sounded a choked cry, a heavy thump, then a peculiar muffled tattoo.

He waited tensely for several seconds. There was nothing else. He scrambled to his feet, retrieved his rifle and crossed the room—a paint store, he could see now. Beside the sales counter sprawled a rangy body. A sear pistol had dropped from nerveless fingers to lie beside its late owner. Rierson scooped that up, saw that the machine pistol had hemstitched a neat row of slugs across the Llralan's chest

from shoulder to shoulder. His tunic was sodden with red-orange blood.

Leaving him there, Rierson went through a curtain and found an exit onto a service alley. He scanned the narrow, debris-littered way before crossing, noted that both ends were plugged. Across the alley he mounted concrete steps at the end of a loading platform, found the large metal bolt on massive warehouse doors drawn back, its lock nowhere to be seen.

He was still in their trap.

Sliding back one door just enough to allow egress he slid through, crouched in the gloom and waited for lights to come on or guns to blast.

Nothing happened.

Taking no time to wonder at his luck he threaded through stacked packing crates, went through a door and onto a furniture display floor featuring Early American.

To his left, a stopped escalator gave access to the second floor. Before him, doors led onto a fairly wide street. Through wide windows he could see unmoving cars and a traffic light that went from red to amber to green with fine disregard for the fact that traffic was stationary. The power was still on in Baxter, just as it had been at the house where he passed the night.

With his danger-whetted senses guiding him, he turned and ascended the escalator. Reaching the second floor, he headed for a window masked by a crinkle-finish plastic drape and peered out.

Flanking the doors below on both sides, flattened against walls, crouching in alley mouths and behind cars, a good dozen helmeted troopers waited for him to come bumbling straight into their arms.

Twisting, he surveyed the room in which he found himself. It was cluttered with furniture, offered only three exits. One was the escalator. The other two consisted of a wide archway leading to another display floor and a door just beyond Sirius III dinette styles. A sign above the latter declared in fluorescent lettering: *Roof—parking for customers only, please.*

One of the Llralans below must have been watching the windows—either on his own initiative or by command—and spotted movement. He left his alleyway post and raised his rifle carefully, deliberately. Rierson flattened against the wall. The window buckled inward with a sucking sound, rained the rich broadloom carpet below the casement with blackened shards of glass. The curtain jumped and contorted, then fell back limp.

From his position against the wall Rierson couldn't see the soldiers directly below him—but he could see a pair running down the street to join the fray. Backing off to prevent his gun muzzle from betraying his position he caught them in his scope, fired once. They slammed to a halt stung but unhurt as the bullet sprayed them with concrete chips. He fired again. The left-hand one went down in one spinning motion and lay still; the other sprinted for cover. Rierson let him go, saving his shells.

A flurry of shots kicked the curtain about, scattered glass. The window was now glassless; the curtain hung in smoldering shreds. Hollow footsteps rang on the escalator risers. Rierson turned, got set.

A Llralan burst into view, saw him, and whipped back a long arm to heave something. Rierson's bullet took him high in the chest, knocked him off his feet and somersaulted him out of sight. The cylindrical object he had been in the act of throwing went with him. Several others scattered and rolled, released from his other hand.

Rierson dropped to the floor.

Before his eyes, the floor surrounding the escalator bulged upward in seeming slow motion, developed jagged cracks, lost solidarity and wrecked the ceiling overhead with spinning fragments. Pungent, whitish smoke roiled upward, dissipated to show twisted and exposed steel floor supports, rubble-heaped risers not previously visible from this angle. The entire section of flooring around the escalator well was either gone or smashed to bits; wiring and insulation hung in tatters from warped supports.

Gradually, hearing returned.

He shoved fresh loads into his rifle and swapped the near-empty pistol clip for the full one, thoroughly shaken. One small bomb had done all that—and from below. And how many such bombs—and searguns and autoguns blast cannon—had his name inscribed upon them?

He moved as one in a dream back to the window, risked a look at the street.

Two gun trucks had arrived below. Their turret guns were pointing in his direction and quivering with a sort of electric aliveness. Hopefully he surveyed the point where the projectors entered the turrets. If someone had gotten careless . . .

No such luck; all the cup-shields were locked firmly in place. There would be no spectacular encore to the detonation of the flivver six days ago. No more gimmicks and dodges—just straight bullet for searbolt until his weapons ran dry.

Thus reminded of his ammunition shortage he pulled back from the window, dropped behind a pneumatic sofa and made a quick check in that department.

The machine pistol's full clip held twelve rounds. With the three left in the second one, that made fifteen; the rifle was fully loaded and there were eleven cartridges yet in the bandoleer—making seventeen. Fifteen plus seventeen—thirty-two chances. At last check there had been just about that many soldiers outside, excluding the trucks and their crews. Tugging out the seargun he had taken from the Larry in the paint store, he inspected it thoughtfully. The leading edge of the grip had three wide indentions, one above the other, one for each finger of a Llralan hand. A small button was set almost flush into the top indention. He pointed the weapon at a wall, pressed the button. Nothing happened. He lowered it, examined it from every angle.

The receiver was an elongated egg-shaped, rounding off at the rear, tapering down to the short barrel in front. The barrel ended in a bulbous, cone-tipped thingumbob topped by a thin blade sight and with a roughened ring marked in Llralan characters encircling its girth. The ring's function was obvious enough: it controlled the spread of the energy discharge. That left what looked exactly like a terrestrial cross-bolt shotgun safety placed up where the trigger-guard joined the receiver. He pushed that as far in as it would go, again pointed it at the wall. This time a gratifying burst of energy dug an ugly wound in the plaster.

The besiegers were strangely inactive. Suspiciously, he reconnoitered.

The trucks were still covering the second floor with their cannon; troopers made cautious by his rifle crouched behind every available bit of cover. Down the street a smaller vehicle flying a Llralan pennant was parked, surrounded by several figures.

Leaving the window, he approached the escalator, moving quietly. From below came almost inaudible rustlings of clothing and sounds of breathing. The risers were rubble-choked but not impassable; an agile being could scramble up that jumble easily. And Larry troopers were, to say the very least, agile.

He grabbed a heavy chair, man handled it to the dangerous footing near the blast-ripped area. Getting a good purchase, he heaved mightily. It rose on two legs, toppled, crashed downward and thumped hesitantly to a point halfway between floors. The rustling and breathing retreated. A second chair joined the first, nudged it a bit farther before both became lodged solidly. He added a half-dozen lighter ones for good measure, then left to check other approaches.

A second escalator stood innocently in the next section. From below came sibilant whispering. Prowling closer he strained his ears, silently congratulating himself on three diligent afternoons spent with the language tapes some twenty-three years ago.

Came a hoarse voice, nearly cracking in its effort to be quiet. "What do you think we've got up there, Raist?"

"Who knows? A Rekk—that's all we know for sure. Enough of us have seen him . . ."

"And he's seen us!" endorsed a new voice. "Strange that since we started chasing him this morning five are dead and one is dying—while he remains unscratched."

There was a snort. "Hush, ancestor-worshiper. Don't believe everything your big-brother-on-the-flagship tells you."

"Laugh if you want—Verif was the radioman who received the message from the *Kalistra* asking Sarno's personal attention on the matter . . ."

"What can Sarno do about spooks, I'd like to know? And this spook is real enough to kill with seeming impunity. So what can Sarno do about spooks we can't kill but can kill us?"

"Don't *talk* that way," entreated the ancestor-worshiper.

"Why? Got the galloping creeps, have you?"

"*Shh-h-h!*" That was Raist.

"What . . . ?"

"I heard something. Up above. Like footballs . . ."

"Arr, you're just imagining . . ."

"Am I? Wasn't he barricading those other stairs a while back? Could be he's right up there now, listening to every word we say!"

"And he's got Sergeant Cax's pistol," inserted the ancestor-worshiper. "If he points that our way and holds back the stud . . ."

There was momentary silence, followed by, "Move away from the steps—quietly. If he's up there . . ."

The voice faded and surreptitious sounds told the Terran they were moving away. He went back to the first display floor, avoiding windows. He should try to blockade that escalator as well as this one, but any such attempt, now that they were ready for it, might precipitate a wild blather of gunfire.

He had hoped to learn some cogent facts from his eavesdropping but had been disappointed. All he had learned was that the Larrys were a bit leery of him due to his success thus far at dodging sudden and violent death. In view of the beliefs held on some of the Empire's far-flung worlds, that wasn't particularly startling. But their semi-superstitious fear would evaporate magically upon viewing his mangled corpse.

Which brought up a ticklish question. He was in the pink of health, prime of life and in no particular hurry to end it all. On the other hand, scores of soldiers owing their allegiance to a far sun were very desirous of his demise. While he pondered the dilemma thus posed, he lugged several pneumatic sofas and lounges into a rough circle and climbed within. The Llralans were waiting for something, else they would have rushed him long since. With soldiers in the building with him, it wasn't likely that the awaited event entailed flattening of same. So he, too, would wait developments.

Upon reflection, he decided there was no other choice open to him, anyway.

Outside, grinding engines sounded the arrival of reinforcements. *As if they needed 'em,* was his thought.

Abruptly and shockingly a voice bigger than life racketed up from the troops below—a voice speaking English.

"YOU IN THERE—REKK! DO YOU HEAR ME?" There was a waiting pause.

Uh-uh, Larry—I'm not going to give myself away.

"WE DO NOT WISH YOU TO BETRAY YOURSELF TO US," came the voice again, as if reading his thoughts. *"WE WILL NOT FIRE ON YOU. WE WISH TO TALK. THIS IS COLONEL VARGIR ZOWAL OF THE IMPERIAL ARMIES OF THE EXALTED EMPIRE OF FOUR THOUSAND SUNS . . ."*

In spite of himself, Rierson was impressed. A full

colonel in charge of rounding up one lone Terran—they must really consider him important.

"VERY WELL, THEN—I CAN UNDERSTAND YOUR CONFUSION AND MISTRUST AT FINDING YOUR FELLOWS ASLEEP AND YOURSELF PURSUED BY OUR FORCES. I WILL TALK; YOU LISTEN."

He listened, but kept shooting nervous glances toward the roof entrance and the unblocked escalator. Likely the loud-speaker and pomposity was a diversion to allow them to creep in on him and catch him napping.

The colonel spoke again.

"TERRA, VENUS AND MARS HAVE BEEN SUBJECTED TO A TOXIN THAT RENDERS ALL TERRAN LIFE UNCONSCIOUS, CAUSING A KIND OF HIBERNATION. THE PROCESS IS NOT—REPEAT NOT—HARMFUL TO THE INDIVIDUAL. ONCE HE IS AWAKENED, HE IS AS HE WAS BEFORE, AND WILL HAVE NO RECOLLECTION OF THE TIME ELAPSED. THAT, SIMPLY, IS THE WEAPON BY WHICH YOUR HOME SYSTEM WAS CAPTURED."

Rierson swore. So there it was—unorthodox, but obviously effective. Effective enough to overcome a culture that, as a whole, had been highly contemptuous of the sprawling military oligarchy that sought its downfall.

The colonel, having paused to let that sink in, went on.

"THE SURRENDER OF THE FEDERATION NAVY AND DISSOLUTION OF THE CORRUPT FEDERAL GOVERNMENT IS INEVITABLE NOW. THE WAR IS OVER; THE DESPOT FEDERATION RULERS ARE OVERCOME, THEIR MERCENARIES SLAIN OR STYMIED. THE PEOPLES OF THE FEDERATION WILL BE GRANTED THE BENEFITS OF IMPERIAL CITIZENSHIP . . ."

That was a test: a hot retort would betray a rabid patriot and also give them a target for their hungry guns; if the cornered man was a doubter, then the promises would soothe him, lull him into possible surrender.

". . . YOUR FAMILY WILL NEED YOU IN THE TRYING WEEKS OF READJUSTMENT THAT LIE AHEAD . . ."

A gentle suggestion that his family's welfare hinged on what he did here.

"THE WAR IS DEAD; YOU CANNOT BREATHE LIFE BACK INTO IT SINGLEHANDED . . ."

An appeal to sweet reasonableness.

". . . YOU WILL BE GIVEN FIVE MINUTES NOW TO CONSIDER THESE THINGS AND LAY ASIDE YOUR WEAPONS. . . ."

And, finally, the ultimatum: agree or else.

Colonel Zowal was trying to avoid a costly assault that would result in only one bedraggled body to show for its losses—and already there had been too many deaths this fine morning. He was trying to save a few lives with his persuasiveness. Rierson could feel a detached kind of sympathy for him—but he wasn't buying any.

"The benefits of Imperial citizenship," Zowal had said. He wondered if the colonel meant the same benefits enjoyed by his own kind—state-run factories and farms, troop-enforced mandates sent down to local planetary governments by the omnipotent Supreme Council, secret police, movement permits, police stooges, the works. If he did, he could keep them. Rierson looked to his weapons. As a lawyer, a believer in justice—as an erratic personality nurtured in freedom and impatient of restraint—he could never fit into that sort of scheme of things. He would literally rather die first.

He *would* die first.

"YOUR FIVE MINUTES ARE UP," informed Zowal.

From his pneumatic stronghold, Rierson could watch the windows, the clogged escalator, the stairway to the roof and the arch leading to the unbarricaded escalator. For the hastiness of its preparation, it was an excellent place for a gallant last stand.

Only he didn't feel gallant. He felt scared.

A shadow buzzed across the windows. Searbolts fingered through, searching for him. They were yards wide. The flivver banked, went out of sight, came back again straight on. Rierson hugged the floor as unleashed energy clackled through the room. The improvised barricade on the escalator shifted as if someone were tampering with it. From the display room adjoining came what could only be the cautious tread of advancing soldiers.

"YOU HAVE ONE LAST CHANCE. SURRENDER AT ONCE."

Overhead the flivver's engine whined as it banked again. He hunkered lower, gripping his rifle in slippery hands. His mouth was parched and his belly was cold. He wished he had a glass of fresh, cool water. His head pounded.

"VERY WELL. AS YOU WOULD HAVE IT, SO IT WILL BE."

The flivver went by again and a volley of shots ripped away the tattered curtains, leaving a wide expanse of blue sky visible. He saw with surprise that the morning had been slipping away, that the sun was standing almost noon-high.

He knew he would never see the evening.

X

"You," Donovan said conversationally to the guard placing his food tray on the cell's tiny table, "look like a man who comes from a long line of military men."

The Llralan froze as if the sound of Donovan's voice had turned him to stone. Then, slowly, he turned and looked at the Terran, having no one else to look at. The usual truncheon-wielder was missing; the soldier carried a seargun in an open holster and looked as if he could use it.

There his visible virtues came to a grinding halt. He could point and shoot a gun—could probably bend Donovan into a pretzel with various alien forms of ju-jitsu despite the latter's stronger body—but so could a Terran

combat robot. In the attributes that separate men from machines, he was not of the elite. Upon reflection, Donovan decided he was probably a moron.

"I . . . I am," said the moron. "What of it?"

"Why, I'll bet you have a large number of relatives in the armed services."

"That's right," admitted the moron, his tone cautious. "But none so adept as you, eh?"

Despite himself, the Llralan flushed with pleasure at this praise. "Oh, no—there are many better than I."

"You are modest," insisted Donovan. "Why else would you have been chosen for this hazardous mission and your kin left off the troop-lists? They *were* left off, weren't they?" Donovan peered hard at him. "Weren't they?"

"Why . . . no. I have a brother and two cousins in the fleet."

"Here? On Terra?"

"Yio—and another cousin on Venus." This proudly.

Donovan assumed a look of mourning. "That's too bad. That really is too bad."

"It is?" The other's eyes went round. This one, Donovan decided, was worse than Svitta when it came to making saucer eyes at the suggestion of something amiss. "Why is it too bad?"

"I'd rather spare you the strain. You'd only try to warn them, and your superiors might construe that as an act not quite true-blue—undermining the morale and all that. But then again, they *are* your relatives . . ."

"You must tell me!"

Casting eyes ceilingward, Donovan indicated acquiescence. "So be it. These relatives—are they working outside the ships?" He tried to impart just how bad working outside the ships could be.

The guard, hooked thoroughly, swallowed hard and nodded.

"Then they're doomed."

"*Doomed?*" The Llralan's voice was little more than a whisper.

"I'm afraid so."

"But *why?* What have they done? What . . ."

"*They* haven't done anything—not *them*. It's your leaders—*they're* the ones that did it, and *I* think *they* should be punished . . . not innocent soldiers. But"—he shrugged—"I don't have much influence with the punishers, still being in my mortal body and all . . ."

"The punishers?"

"You know . . . the spirits of the dead. Say . . . didn't your commander tell you about this?"

The Llralan gave a violent negative shake of his head. "I was only asked what my religion was. When I told them, I drew this assignment."

"Then you haven't been briefed?"

Again the negation.

Donovan looked wary. "Then I've said too much. They didn't want you to know about Grandpa. You know: the old policy of *ignore it and maybe it'll go away*. Do you believe that?"

"Nyo, I don't. If one hides his head like a *skura*, one only finds the situation worse when he comes up for air. You must meet things head-on."

"Exactly!" Donovan exclaimed, then let his shoulders sag. "But . . ."

"But what?" asked the Llralan anxiously.

"How does one fight a bloodthirsty phantom?" He looked up. "Do *you* know?"

"You blast 'em!" The soldier's hand dropped to his gun.

"But how can you blast what you can't see? Why . . . old Grandpa might show up any minute—he could be standing behind you right now, breathing down your neck, and you'd never know until"—he drew a finger significantly across his throat—"*zzzzk!*"

The Llralan flinched as if already feeling the blood splashing down his tunic-front. "But I have done nothing . . ."

Somewhere in the cellblock a door slammed and a nerve-shattering shriek echoed down the corridor. Donovan nearly jumped out of his skin; the Llralan whipped around in a fighter's crouch, gun out. He presented a perfect opportunity for a quick bash over the head and a break for freedom, but Donovan didn't take it. To run now would be to refute his carefully constructed scare-campaign.

Heavy boots tramped toward his cell, accompanied by a snuffling, shuffling sound. Came a sharp humming, a static crackle, another ululating cry. The guard straightened; his gun moved uncertainly.

"*Vaga, frambule!*" sounded a terse command. "*Ber!*"

"I'm goin', you orange-faced scarecrow. But just you wait, heathen son of Sirri—you'll get yours . . ."

Kewhack!

"Insolent Rekk! You dare to profane the name of Sirri with your filthy mouth?"

"You're just askin' for it, Larry. Just *askin'* . . ."

"Silence!'

The procession passed his open door and Donovan sat up very straight. That was a Terran! Dragged along by a neck chain, heavily-manacled, cowering defiantly before a lektro-whip in the hands of a muscular sergeant. The voice had told him as much, but to actually *see* another human after all that had happened . . .

The guard lowered his gun, baffled. This was obviously as unexpected to him as it was to Donovan. The mood of the moment was broken; imagination-conjured ghosts fled back to their chimney corners and reality returned.

Two troopers paused before the cell, moved apart to allow three officers entrance. One was Sa-Dzalla Sarak; the other two were lieutenants wearing the comets of the air force.

"This is the other one," said Sarak. "He and Shey are to be taken to the *Risstaixil* by direct order of General Sarno."

Donovan's ears fairly twitched at the utterance of two

familiar names—Sarno and *Risstaixil.* Sarno—not Martak Sarno, surely—that pompous windbag was probably still pushing papers around a desk on Risstair. And *Risstaixil*—Flower of Risstair, in a language known to very few beyond Risstair's atmosphere. Two familiar names in one sentence. Hell of a coincidence, if it *was* coincidence.

"*Risstaixil?*" he repeated dumbly.

"That's right—the general's flagship. You're coming up in the world for one so busy as Sarno to notice you."

"The order was directly from him?"

"That's right. He wants to talk to you, the message said, about 'phantoms and old times'." Sarak nodded at the troopers and they stepped forward, quickly bedecked him with chains and hustled him into the corridor. He was ranged alongside the other Terran and the procession got into motion toward the intraship cars. Donovan moved in a daze.

"Phantoms and old times." That had torn it. Phantoms, of course, alluded to Grandpa, but old times—old times had torn it. And just when Rumjet and he had been making admirable headway in the problem of giving various and sundry of the enemy the galloping jitters and trying to make it spread through the fleet. Given time, stimulated imaginations might have appreciably deteriorated morale and efficiency—sent soldiers chasing after shadows instead of going about an orderly Conquest Duty. Time was what he needed for his moonbeam-weaving to prey upon their minds; and time was what the Federation needed to beat its brains and come up with something to get Larry off Terra.

Time—his, at least—had just run out.

Twenty years ago, on Risstair, his actions had been rash to say the least. A case in point: when Sarno's hirelings had come to collect the customary thirty per cent of all profits paid by off-world trappers to avoid police harassment, Donovan had thrown a flamer on the group and promised to flame Capital City if any of them so much as darkened his doorway again. Sarno had been all set to extinguish this spark of rebellion when Navy beam-radio reminded the Llralan Supreme Council that Donovan was, after all, a Federation citizen. The Supreme Council, thus reminded had muzzled their minion.

Sarno had been very, very angry. And Sarno had a long memory—his message to Sarak had proved that. Sarno was about to enjoy a hearty last laugh on him, twenty years later.

The car deposited them on the floor of an empty, deserted cargo hold and Donovan and his companion were pulled roughly to the gangplank. En route, the other received another blow from the lektro-whip. It didn't seem to dampen his spirits in the least.

They left the ship and headed through the chill of late afternoon toward an area guarded by a force-fence and patrolling sentries. Within, the *Kalistra's* brood of aircraft stood in neat rows. They went through an insulated gate, pulled up beside a longish, bullet-shaped ship with opened hatch The pilots climbed up, disappeared. Then came a soldier who turned and waited for the Terrans.

Inside was a compartment with metal benches lining both walls, a short ladder up front that led to the cockpit. The Terrans were taken to the rear, their neck chains snapped to inset steel rings. The big sergeant and four troopers went forward; two others left the craft and closed the hatch.

Engines murmured. There was movement. The ship leaped away like a scalded cat, wobbled, leveled off while Donovan clutched handholds and tried to keep from bashing his skull against the wall. The ship seemed to be hanging motionless. That was illusion; through an unshielded port he could see blue water and streaky cloud cover racing beneath. The ship was flying after the sun as though intent on catching up to it—and at this rate it would. Calculating rapidly, Donovan figured they would be across the Atlantic in an hour—and it would be noon on the North American Continent.

"Damn hot-rodder," muttered the other Terran. "Acts like an Overseas taxi driver. Kill us all."

Donovan regarded him curiously. "Who're you?"

"Donald Shey. Say . . . where were you picked up, Donovan?" Shey looked cautiously at the cluster of guards. They were passing around a *walsos* flask, paying no attention to the prisoners.

"London. You?"

"Paris. I hear you got some of them before they finally grabbed you. That right?"

"Seven lousy soldiers. What about you?"

"None, dammit. Everything happened too fast. First thing I knew about Larrys within fifty parsecs was when they kicked in the door of my shelter. They were as surprised as I was—only they had guns and I had a bottle. But the way I hear it, you got six soldiers and a colonel—not just seven soldiers."

"What does rank matter? He was killed. That's enough, isn't it?"

"Yeah . . . I guess. Every little drop fills the bucket."

"That's right."

"Is that why"—Shey gave him a peculiar, unfathomable glance—"you're feeding them this line about spooks? Trying to throw 'em off guard, bollix up the works?"

"What are you talking about?"

"You know what I'm talking about. You've been giving them a hard time about vengeful ghosts and bloodthirsty spooks—got a few sweating, too. But what happens when nothing materializes? When nobody gets chopped down like you said they would. Why build up such a whopper? To get leniency for yourself as a ward of the spooks?"

Donovan regarded the other's expectant face closely. Suspicion reared its ugly head. "You're just full of questions, aren't you? Why should you care *what* I say?"

"I don't." The words seemed to pop out of their own accord. Shey shunted his eyes around, seemed to be groping for words. His gaze fell on the muscular sergeant. "It's just . . . it's just that I'm gettin' sick of being caught one

with that lektro-whip ever' time I turn around. If"—he paused, seemed to gather his thoughts—"you could give me an idea of what you're plannin', maybe I could help. If two of us came up with the same story, it'd carry more weight, seem more believable. And maybe that sergeant would lay off if he thought his hair might get lifted by a spook . . ." He leaned forward eagerly. "How about it?"

That put the ball right back in Donovan's lap. Shey was waiting and evincing pathetic eagerness. And yet . . . and yet, behind that excited exterior, he seemed to be waiting, watching—weighing the truck driver's response, judging the effect of the offer on him.

Keeping his own countenance carefully composed, Donovan replied, "But if your ancestors haven't contacted you yet, you would be lying if you said they had . . . and the Larrys are very good at detecting a liar. It would only make them doubt the truth of my story."

"If the Larrys can detect liars, how did *you* convince them?" This sharply.

"Because I wasn't lying," said Donovan righteously.

"Aw, come *on*, now! This is Donald Shey you're talking to, remember? Not some stupid Larry." Shey gave him a man-of-the-cosmos look. "Who're you trying to kid?"

"I'm trying to make the Larrys believe in Grandpa."

"Why?"

"Because I hate to see them slaughtered without a prayer. Even they deserve some kind of fighting chance."

"Oh, for . . ." began Shey in exasperation.

Donovan cut in with, "Hold up your hand."

"Whaa . . . ?"

"Hold up your hand where I can see it. You're asking too many questions—if you've got four fingers instead of five, I'm going to pull this chain loose and beat you to death with it."

"Don't be silly." Shey exhibited a perfectly-formed, five-fingered hand. "Satisfied?"

"Not entirely. Clench it. Make a fist. I want to see knuckles whiten . . ."

Shey complied, looking bored. A fairly large, rock-steady fist protruded from his loose sleeve.

Abruptly, its steadiness evaporated. It began to tremble violently, as with the ague. The clenched fingers spread, began to jerk convulsively.

"Hours too late," Donovan told him. "Years. A man beaten repeatedly with a lektro-whip has had his nerves chivvied around good and plenty. He resembles nothing so much as a wino after a week's teetotaling. He shakes, he quivers, he drools; he is miserable, feverish, nearly incoherent." He tugged at his neck-chain. "Get ready to play whipping boy, Larry."

The mocker shrank back against the wall. A silver-blue gun glinted in his hand. "Don't try it!" He raised his voice. "Sergeant!"

The noncom came back to him. "Yes, sir?"

"Get me out of this hardware. He knows who I am."

"Yes, sir."

"And tell your stinking mocker to join his aromatic friends at the front of the cabin," appended Donovan as the sergeant unfastened Shey. "I'm getting nauseated back here."

"I hold your life in the crook of my finger," warned Shey.

"Then take it. You'll only be hurrying the inevitable—and hastening your own doom."

"That's what you think."

"That's what I *know*. Grandpa promised me."

"Grandpa, Grandpa," mimicked the other. "When will you get tired of this children's game and realize there is no help for you?" He dumped his chains on the bench, stood up. "What do you really hope to accomplish by all this? What . . . ?"

"Changing course," grated a nearby intraship communicator. Thus warned, Shey and the sergeant braced themselves. The ship rolled, began a long, dropping arc.

Shey worked his way via handholds to the communicator, spoke into it. "This is Drelig Sjilla. What's the meaning of our change in course?"

"Sir," responded a metallic voice, "we have received word from the flagship that the Spook of Baxter has been cornered. It was General Sarno's order that we proceed there so that you might view the capture firsthand. I was about to inform you when you . . ."

"Never mind that! Who's in charge of operations?"

"Colonel Vargir Zowal, Imperial Armies."

"How's it going?"

"Sir, the Spook has already killed five troopers and wounded another; he has survived the crash-landing of an airship and a groundcar smashup. Countless shots have been fired at him with no visible effect, but he has finally been trapped in a village store. There is no way out."

"I see. Please inform the colonel that I am on my way, will you? And hold this thing steady so I can come forward."

"Yes, sir."

Shey-Sjilla and the noncom went forward. Sjilla continued on into the cockpit and the sergeant rejoined his men. Donovan, ignored, had nothing to do but stare out the nearest porthole. The ship was still in its falling bank. A coastline appeared and swept beneath. Donovan recognized Florida's distinctive peninsula and realized that the Atlantic had been crossed while he bandied words with mocker. He was thousands of miles and six time-zones from London. Here the overtaken sun was shining with the brightness of high noon.

The ship continued its fall until it was only several hundred feet aboveground, then leveled off, decreased speed and changed course. After another ten minutes, it dropped to a soft landing among the pastel structures of a small town. Donovan was taken outside and shoved against the wall of the nearest building—a drugstore. Shey went to converse with a stiff-faced officer sitting in a pennant-flut-

tering command car, causing momentary consternation over his Terran appearance on the part of the colonel's personal guards. The noncom and four troopers stayed aboard and began to unfasten porthole windows and hook them back.

Shading his eyes against the sun, Donovan peered owlishly about. Though the sun was straight up, a chill was in the air.

Baxter lay spread before him, eerily silent and tranquil but for this one street. Along it, gray-clad troopers were flattened against walls, hunkered behind groundcars and refuse cans and utility poles, crouched in alley mouths. Not two hundred yards away a Llralan body sprawled on an exposed section of sidewalk. No one made any effort to reach it. Calculating the range and angle from the beleaguered building to the corpse, Donovan whistled. No wonder the Larrys were standoffish. Whoever was up there had one thing going for him: he knew how to handle a gun.

The flivver that had brought him here took on four more riflemen, lifted away and circled high above. *Like a silver vulture,* Donovan thought.

Zowal raised a hand-mike to his lips and his magnified voice—in English—thundered forth like a pronouncement of doom:

"YOUR FIVE MINUTES ARE UP."

A current of anticipation ran all through the waiting soldiers. Guns were looked over nervously. The flivver checked, dove past the building at a shallow angle. Its ports vomited searfire and then it was climbing away, glinting in the sun.

". . . Flivvers back at the *Molegenaro* for refueling and repairs," Zowal was telling the mocker. "They've been in the air around the clock since Landing Day. The crews are worn out and there are other duties for the air force to perform that are being neglected, but we've received no aid from other ships." He gestured in disgust. "As to troops, I've been trying to blanket half the state of Georgia with four miserable companies. *Somebody's* got to look after our bomb shelters. And with towns like Atlanta and Jacksonville and Birmingham . . ." He shook his head.

"Things are tight all over," Sjilla told him. "We're on the spot—if we can't back up our brag when the Delegation comes calling, there'll be the devil to pay. Until then, we'll just have to do the best we can with what we've got."

Donovan turned his attention elsewhere, though their gripes were music to his ears, and rattled his manacles irritably.

". . . ONE LAST CHANCE. SURRENDER AT ONCE . . ."

If only he could make a break—but he couldn't, not surrounded as he was. He would be promptly seared and the assault would roll blithely on, uninterrupted. There was no way he could help that other Terran, no way at all.

Zowal had been waiting for some response to his last-chance offer. When there wasn't any, he heaved an unhappy sigh, raised the mike again.

"VERY WELL. AS YOU WOULD HAVE IT, SO IT WILL BE."

Soldiers began to scuttle toward the building, disappear within. The flivver went by a third time, lashed the windows opening off the second floor with fire.

"Why couldn't we," asked Sjilla, "just pull back and lob in a rocket? Or flatten the place with blast-cannon?"

"Because," Zowal explained patiently, "the quarry would smell a trap and run. Besides, it's a point of pride: he has killed kith and kin of these soldiers. They want his blood badly. If Spooks bleed." He chuckled dryly. "The more force we use to bring Mister 'Spook' to bag, the more swollen the importance attributed him—and the more timorous the attack upon any other Unaffecteds we may happen across. And if, just by chance, we did as you say and *didn't* get him . . ." Zowal didn't finish. He didn't have to.

Turning back toward his forces, he began to speak rapidly and earnestly into the mike. More soldiers got into motion. The gun trucks showed signs of activity. All attention and weapons focused on the building with shattered upper windows and smoldering walls.

Donovan stared bleakly at the cryptic structure, feeling his helpnessness like a bitter bile in his throat. Up there, a lone Terran waited for all these to come for him and he, Donovan, couldn't so much as lift a finger to help.

The Spook of Baxter would have to go this one alone.

(To be continued)

April 1964

the analytical laboratory

PLACE	STORY	AUTHOR	POINTS
1.	Spaceman (Conclusion)	*Murray Leinster*	1.64
2.	Sunjammer	*Winston P. Sanders*	2.49
3.	Counter Foil	*George O. Smith*	3.09
4.	Shortsite	*Walt and Leigh Richmond*	3.60
5.	Problem Child	*Arthur Porges*	4.75
6.	The Spy	*Mario Brand*	4.87

THE EDITOR

THE SEA-WATER PAPERS

There's no secret so hard to find
as the one that's the exact opposite
of the one you know for sure
you're looking for.
That'll stop practically anybody . . . !

RAYMOND E. BANKS

ILLUSTRATED BY JOHN SCHOENHERR

You asked me how I make my living, I will tell you frankly. I buy scientific papers and sell them for a profit. This makes you even more curious. "How can this be, Mr. Scott?" you ask. "In the first place, anybody can acquire scientific papers at the nearest library, or buy the most exotic from specialized booksellers. Even scientists. Who would pay you money for what everyone can have?"

Let us take an example. There was a young scientist named Arthur Warren Peabody who turned out to be an authentic genius. Like all true scientists his work was quantum rather than classical. His main home was in the fields of chemistry, but he maintained apartments in physics, mathematics and biology, and at least a well-furnished room in psychology.

He was a bouncy, pink-cheeked blond young fellow with a great deal of zest for life. You'd expect me to tell you that Arthur Warren Peabody wore glasses, was thin-chested and belonged to the high school chess club.

As a matter of fact, Arthur Warren Peabody won four letters at football in high school, and there was some minor trouble with the daughter of the vice principal. No genius yet. Took math because it was a man's subject. Took Bunsen-burner chemistry and ended up several laps behind the bright minds who learned rules fast from books.

Strangely, his grades were quite good for a bouncy extrovert who loved to tinker with cars. In college, as far as we can determine, an early injury on the football field ended his career in that endeavor; he majored in girls after that.

This ended up, as might be expected, with his marriage to the daughter of the Dean of Languages. He also managed to end up with a mangled degree, mostly in chemistry, good enough to support his wife and a deluge of children, by working as a research chemist for a commercial firm.

When he was supposed to be fussing with enzymes, he was caught playing with matrices. At a time when his employer was trying to develop something usefully foolish in which to clothe the human body, Peabody was giving papers at a convention of the American Physical Society. His inability to stay a chemist gave him positive protection against promotion to the head of his department. Yet, strangely, Arthur Warren Peabody was highly regarded in his firm. At the last minute, or sometimes beyond the last minute, he could always be counted upon to produce a suggestion that would save the product. He was guarded carefully by the company through the device of a high salary.

I first met him—at a meeting of the Institute of Navigation. "You have, perhaps, some material never published?" I asked. "An idea that will not come to the surface? I will pay you five hundred dollars to look at a reasonable sample of this material."

We sat in a bar with a bubble of polite, slightly drunken scientists about us. He peered at me over a glass of golden beer.

"Just what would you do with this look-see?" he asked, glowing at me with his full health.

"Why, I might hire you to make a project of one or more of them."

He shook his head. "All the things that make sense to me I publish," he said. "Like my paper here. What has navigation to do with chemistry? Well, I'm giving a paper on the uses of drugs for humans who navigate. Almost every aspect of navigation has been probed to death. But all of the navigation experts start with the same basis —a sober mind in the head of the navigator. It turns out that a drugged mind can be more perceptive under certain circumstances. On some of the planet hops certain navigators with caliphers and a good binge can do things few automatic pilots would dream of doing."

"It might be useful," I said. "It would certainly be illegal."

"Wrong," he said. "Food is a drug—it changes the metabolism of the body. So even water. Every chemical substance introduced into the body which has an effect might be called a drug. Our thinking is sluggish. We fail to realize that it is the use of the substance, that can be evil, not the substance itself."

"I would mistrust a woozy navigator," I protested.

"So will the world," he said, "until it comes to a problem that neither a machine nor a sober-minded human can solve."

After the convention I traveled to his home. What is the home of a genius like? At first it looked to me like any home, full of laughing children, dented furniture, odd scraps of pictures, a wide range of listenable hi-fi music and an attractive wife. But there was a difference. The Peabody's didn't talk; they sang. Not literally, but there was an underbeat of life accepted, a harmony.

"You've seen all my dry-run papers," he said to me after the third day. "Have I earned my money?"

"Yes. I'm only interested in the sea-water papers. May I option them? Say, five thousand dollars when they're done?"

"The company wouldn't like that."

"They aren't interested in sea-water conversion."

"They might be."

"I'm not looking for patents," I said. "Bright pink pills that convince people the sun rides high in the sky. I want concepts."

He studied me carefully. "Few do."

"This permits me to make a living."

He was the only man who ever looked at me and saw me wholly. "You really do!" he said in surprise. "You enjoy it. You aren't frightened at the loss of dignity that concepts bring."

"You saw me play on the floor with your children."

"Harrison Scott," he said, "you may have the sea-water papers for five thousand dollars—if I finish them—if my company doesn't want them."

He did finish them and his company didn't want them. He also finished himself in his thirty-fifth year of life, mainly due to his zest. It was skin-diving that accounted for him—great minds are capable of making mistakes beyond the reach of mortals.

Now you understand how I make a living and also can see my predicament. I had a five-thousand-dollar investment in sea-water conversion that was definitely a frozen asset.

No one understood Peabody's work. In his lab at the company there had been other chemists who could carry his basic work to a point and then go ask questions of him. But you can't get answers from a graveyard.

After a decent interval, I went to Mrs. Peabody and explained my troubles. She was gravely sweet in her sorrow and properly compassionate.

"You've tried his logic on all possible sources?" she asked.

I ticked them off on my fingers. "The government agencies," I said. "Private research labs. Isolated chemists of great reputation. Even smart-aleck graduate students in the hope they might stumble blindly into it. They all think the paper exceedingly curious."

Mrs. Peabody frowned. "Whenever Art finished something, it always worked, Mr. Scott."

"This doesn't. They keep bringing me bright yellow tablets. These tablets don't dissolve in sea water. Nor in plain water."

"Changed to a gas?"

"Makes pretty bubbles in the sea water. No result."

"Suspension?"

"I've tried it in every possible combination of suspensions including boysenberry jelly. Besides, it isn't the form. They sometimes bring me a pink paste. This paste hardens into a kind of fudge. Not as good as chocolate fudge, but not bad. Besides, it would have to sell at about fifty dollars the ounce."

She looked at me narrowly to see if I were joshing her, but with the ten thousand dollars so far spent I wasn't.

"I'll speak to Mr. Lockhart," she said. "He often worked with Art."

"Lockhart? I don't know the name in chemistry."

"He's a gardener," she said. "A very intelligent gardener."

Lockhart was indeed intelligent, an older man with the old-fashioned steel-rimmed glasses, a few white strands on a bald head, a vigorous figure and a grasshopper mind. In his gardening truck he carried stacks of the *Scientific American* and a huge amount of foreign language scientific tracts.

"Mr. Lockhart translates to the French for me," said Mrs. Peabody. "Now that poor Art is dead, I have to make my own living. My field is language so I translate, mostly scientific papers."

In resignation I handed Mr. Lockhart the paper and a one hundred dollar bill.

"You do agree with me on the importance of converting sea water," I said.

He nodded abruptly, handed back my bill. "I only take percentages," he said. "Ten per cent of all we make, Mr. Scott."

I had a hollow feeling that I was getting nowhere even though Mrs. Peabody with a toss of her brass-colored hair insisted that Mr. Lockhart thought long and hard while he trimmed hedges and cut grass.

The first thing that Mr. Lockhart brought me was a large yellow tablet. He spilled several of them out over my desk in a rushing heap.

"His math was a little fuzzy. I rounded off some quantities."

I nodded, went to the icebox and pulled out my pitcher of iced sea water that I had been accustomed to keeping there. I put one of Lockhart's tablets in the murky pitcher, where it hung like an evil marble.

"His solubility is lousy," Lockhart apologized.

I obtained my mortar and pestle and ground up the Lockhart tablets. I poured some sea water in a glass and put the powder in. I drank it. I went to the sink.

"I hope you don't mind by spitting," I said afterwards.

'Of course not," he said. "There was one ambiguous equation in it—" He gathered up the bright yellow tablets slowly.

"You'll come back with a pink paste," I said accusingly.

"I have to stick to the formulae," he said. "Was that you who took the widow, Mrs. Peabody, to the movies last night?"

"I'm interested in her translation service," I said. "I'm always interested in things that make money."

"I'm glad you're interested in the service," he said, and went off.

Lockhart came back triumphantly with a pink paste. "At least you had the intelligence to use certified food coloring pills," I said.

He blushed at the compliment. "I may also have discovered a new way to make peanut butter," he said.

This time it wasn't bad. I could hold down the sea water for about three minutes after mixing the solution.

"I think we're on the verge of a breakthrough," I told Lockhart.

"I like you," said Lockhart. "I really do. You encourage people. You bring out the best in them."

"For money," I said sharply.

"Of course," he said. "For money."

He went away again, and I didn't hear from him. I took Mrs. Peabody to the movies, to a play and we had several dinners together. Still I didn't hear from Lockhart. Finally I went directly to the small nursery that he ran and which also served as his laboratory. I found him busy potting geraniums.

"I haven't heard from you, Lockhart."

He smiled at me in a manner that told me he really wished I hadn't come.

I waited for him to say something but he didn't. I started to scold him for keeping the project waiting, but he suddenly grabbed a shovel and turned on me, smile gone.

"Get out of here!" he shouted. "Leave! Scat! Don't come back!"

To say that I was startled was to put it in the mildest terms. I was astonished to the point of incredibility. But a human learns at least as early as one's childhood to understand the sound and the tone of another human voice when it's genuinely angry—Lockhart was genuinely angry.

I left. I sought Mrs. Peabody and told her about his odd actions. She shook her head. "Poor Don! I'm afraid you won't get anything further from him, Mr. Scott. When he fails, he feels so bad. That's what kept him a gardener. He couldn't stand failure. When it comes he goes all to pieces, scolds the people in charge of the project. The vegetable kingdom has been much kinder to him. People expect to be scolded by their nurseryman. No one ever expects to satisfy one's nurseryman."

"But I gave him a percentage," I said, still feeling like a man who thought he stood on firm ground, then felt a

trap door open beneath him. "I gave him a percentage!"

She let me have her delightful smile. "That's your weakness," she said. "Everyone doesn't feel the same about money that you do. Let me ask you this: Is it really so essential that you solve the riddle of Arthur's sea-water papers?

"Yes, I think it is."

"But everyone knows already how to make fresh water out of sea water. For one thing, you can just distill it, and leave the salt cake on the walls of the container, or something."

I had to smile at that. "A few people have done a little work," I said. "There's the distillation process, that you more or less mentioned, with specialized twists of thin-film vapor compression, wiped films, or fluidized beds. There are also humidification systems, membrane systems, freezing systems, gas-hydrate systems and solvent extraction systems.

"If I wanted to build an evaporation plant, I might use solar cells for heat and make a solar still. I might use a diffusion system across an air gap. I might use electrodialysis, osmosis, reverse osmosis or ion exchange, using various compounds such as resin or even the gas, CO_2. I might crystallize my sea water by freezing, leaving the salt out, or I might use propane which combines with water, but not salt, and gives me a gas-hydrate with which to work. I might use solvent glycols, low molecular weight glycols with glycol ethers to capture the pure water from salt, give it up again when heated—"

She raised a hand in defense. "Why don't you?" she asked. "Why bother with single tablets when you can do all these other things?"

"One simple reason, my dear. They are all large-scale fixed plant operations costing millions of dollars. Beginning way back in 1961 the Office of Saline Waters, Department of Interior, set up five plants to test various types of methods, ranging from the one in Freeport, Texas, which used the falling film method to the one in Wrightsville Beach, North Carolina, which used direct freezing. We've been stuck with the plant concept ever since. These plants cost upwards of ten million dollars in just a couple of years back then. They're still producing—and doing well. But you can't build a plant like that on a spaceship or an asteroid or some far-off planet like Mars. Not economically."

"I wouldn't try," she murmured.

"You can't build a plant even on Earth to take care of one hundred and fifty people, or fifteen hundred or fifteen thousand," I went on. "You have to make a lot of water for a lot of people so that the rate is low, or else you might as well carry around bottled water. No, it needs a tablet that you drop in a gallon, or a glass of sea water, like Peabody suggested in his papers. Something that could service a community of fifteen hundred, like on Viralglio near Alpha Centauri, where they have a small land mass and heavily salt seas. A tablet that could service twenty thousand or twenty or even one person. Arthur's problem wasn't just one of conversion. It was mainly one of use and ease."

"What now?" she asked with a sigh.

What now indeed? I had my investment to protect, it was true. But I might lose even more. The money I had invested was hurtful but not fatal. It was more of a feeling that I'd failed, when I might've succeeded. That I'd bet on Arthur Warren Peabody and had bet wrong. He was authentic genius, and he shouldn't be wrong. He couldn't be wrong. There were some fuzzy, ambivalent sentences in his papers, that was all.

"Then let me translate the paper for you," said Diane. "Say into French or Italian or even German or Russian. Sometimes you can get a different slant on things by shifting languages."

I'm afraid I curled my lip at that. "If it doesn't make sense in English, it'll hardly make sense in Spanish," I said and left.

I guess about six weeks passed during which time I was so upset by my failure with the Peabody papers that I didn't even call up Diane for social reasons. At the end of that time I received a mass of manuscripts in the mail.

"I feel personally involved in the sea-water struggle," Diane wrote. "Therefore I've translated his papers into French, German, Italian and Russian, not necessarily in that order. In addition, I translated it back into English again, not that it needed it, but because my Russian translator is such a temperamental type that he sometimes loses things. He lost the paper in its original English. Anyway, here are versions of it, from my staff, in all major languages. You could now have it tried out by a Frenchman, an Italian, a German or a Russian, if you want."

I took the mass of papers and tossed them into the wastebasket. Then I thought of Lockhart and took them out again and sent them to various contacts I had in various universities and other scientific spots across the country. I did, in fact know individuals who spoke or at least read all of these languages. I sent a hundred dollar check to each of them and wrote: "Send me back a tablet."

The last version, the English one, I sent to Lockhart. "This paper has been translated into French, Italian, German and Russian and back into the original English," I wrote. "Maybe there is some magic here. Anyway, here's a check for a hundred dollars. Care to try again? Regards to the geranium world!"

I made a bet with my housekeeper that I would get back two yellow tablets, two vials of pink paste and a bouquet of nosegays. I was wrong, as I am about half the time. I got back three yellow tablets and one vial of pink paste, as well as four letters whopping it up with thanks for letting them sell me a single tablet—vial—for such a healthy price. I tested them all. None worked.

I went to the cabinet where I kept my unfinished projects and removed the Peabody papers and made sure I got all of them in all languages. I slashed a big "x" on

the brown paper envelope and wrote on it. "Genius, hell!"

Nothing else happened until Saturday when I found the envelope resurrected from the wastebasket with the following note fixed in the rounded handwriting of my housekeeper. "Science evolves, it does not erupt!"

I got nothing from Lockhart, but I did get an invitation to dinner from Diane Peabody which I planned not to keep—it was getting too painful to have further contact with her, after my failures—but an hour before my expected time of arrival, I remembered that I had failed to tell her I wouldn't be coming, so I dressed and went.

Lockhart was there, too, and Diane had prepared an excellent spread, even gotten the children out of sight for a comfortable evening. I was curious, but I could see that they had something up their sleeves, so I played along and sat down to dinner without once mentioning the sea-water project.

The food was terrible—the food was awful. It was too heavily salted and after a few mouthfuls, I put down my fork and stared at them. Lockhart unconcernedly munched some Brussels sprouts. Diane dug into her roast beef with zeal.

"You two are up to something," I said. "The meal stinks!"

The two of them smiled at each other but Diane only said: "You haven't taken your vitamin, Harry."

"I never take vitamins. And I never eat food as bad as this. What is this . . . what kind of a joke?"

Lockhart, his mouth full of food, pushed a plate at me upon which rested a small red tablet. I felt a growing tingle as I stared at the tablet which was a pill. I felt that this was the brink of discovery—a breakthrough. I seized the pill and gulped it down with my glass of water and almost gagged because the water in the glass was pure Atlantic sea water.

Almost at once I felt a strange sensation in my stomach. An edginess that was not like sickness but that suggested some subtle change in my gastro-intestinal regions. I began to feel a cold sensation all over, one that spread throughout my body. I had just begun to feel alarmed when the spreading sense of coldness suddenly reversed into a surge of warmth, like sitting next to an oven on a cold night. I felt sweat on my forehead. I felt a glow within. The sensation spread, easing, so that from uncomfortable warmth it settled into a glow of well-being.

Then and only then I caught up my glass of sea water and drank.

It went down easily. The same water that had made me gag five minutes before. It went down like the freshest spring water ever to come from the treasure house of nature, cool and refreshing, deep from the ground. Soft and gentle in my mouth, tingling in my throat, satisfying to my stomach. It was the freshest, softest water I'd ever tasted.

Then I picked up my fork and dug into the food which had obviously been cooked in sea water. The Brussels sprouts were fine. The potatoes were delicious. The roast beef almost melted in my mouth.

"Peabody's pills!" I cried in delight, and we all were laughing . . .

Then later—

"But how—I don't understand!" I said.

"It was the translation," smiled the gardener. "Peabody's papers in the original were ambiguous. In his usual to heck with tradition let's-get-to-a-fresh-approach he turned sea-water conversion on its ear. He said 'If I can't turn sea water into fresh water easily, maybe I can turn humans into sea-water-using creatures, at least temporarily. By doing things with the body's saline balance. The tablets we were making earlier weren't meant to be dissolved in sea water. They were meant to be taken by the drinker and then he was to drink sea water."

"But how did you know this? I'm sure it wasn't in the original. Nor in the translations. None of my friends who worked with the translated paper caught the secret."

It was Diane's turn to take over. "It must've happened in the final translation, from Russian back to English. This has happened before, you know. A paper which is ambiguous in its original can sometimes gain in translation. In fact, a Foundation project once showed this conclusively. A paper written in English was put into French, Italian, German and Russian. Then back into the original English. The project was designed to see how many mistakes might be made, and one major mistake was made but the rest of the errors were minor, in grammar. However, the scientists noticed a most unexpected result. The final version was much more clearly written than the original. Probably because each translator tried to preserve carefully the original, and added his own deep perceptions to it."

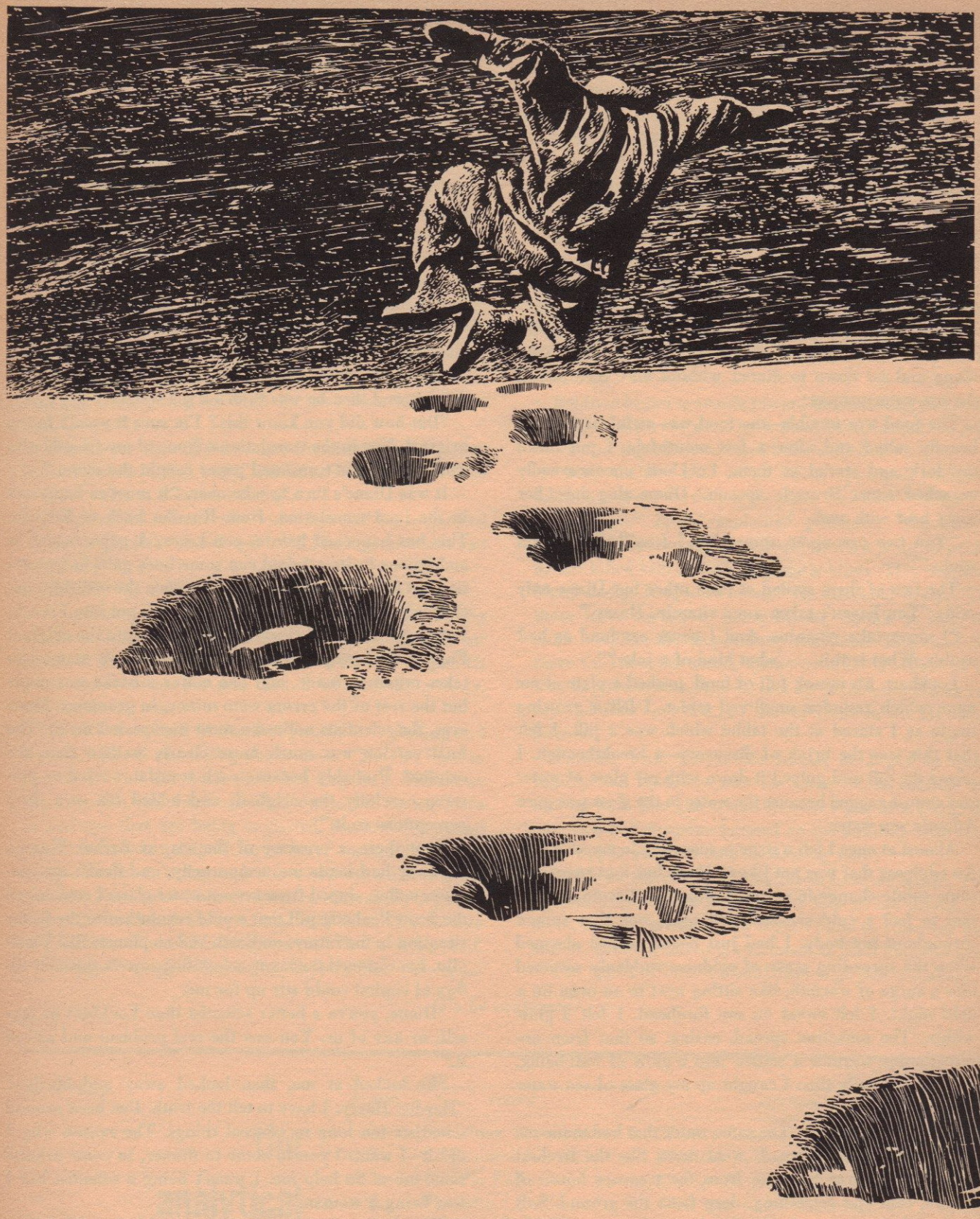
I sat there, a creature of the sea, as Arthur Warren Peabody had made me, temporarily, and drank my sea-water coffee, sipped from my sea-water glass. I envisioned the Scott-Peabody pill that would revolutionize the water situation in the future, on Earth and on planets like Viralglio. I envisioned the many scientific projects this new influx of capital could stir up for me.

"Diane, you're a better scientist than Lockhart or myself, or any of us. You saw the real problem and solved it."

She looked at me, then looked away and blushed. "Hardly, Harry. I have to tell the truth. I've been around scientists too long to conceal things. The reason why I did it—I wanted you to come to dinner, to come around some more. So help me. I wasn't being a scientist but I was being a woman."

Then it was that Lockhart showed his true likability, a sub-genius, if not a genius.

"I'll do the dishes," said the old man. "Why don't you two kids go to the movies?" ■



Mr. R. A. J. Phillips—who happens to be Director of Northern Affairs for the Canadian Government—passes on these somewhat mysterious letters and memoranda of the now-missing Kelvin Throop.

Where Throop has gone is unknown, but it is our belief that he will appear elsewhere. Any readers who run across Mr. Throop's further letters or memoranda, are urgently invited to send them in to Analog. Whatever name Throop has adopted, we are sure he will reveal himself in the outrageously, intolerable and antisocial attitude toward truth he so clearly displays in these notes. He actually states it! Obviously this is not to be allowed in a polite society.

It is our hope we will be able to track him down by gathering further memoranda from his acid pen. Our readers are asked to be on the lookout, and send in any pieces they encounter.

ILLUSTRATED BY JOHN SCHOENHERR

A DAY IN THE LIFE OF KELVIN THROOP

R. A. J. PHILLIPS

This is the sad story of a day—the last day—in the life of Kelvin Throop. Throughout his distinguished career as an engineer building in the far reaches of the Arctic, Kelvin Throop had always been the model of a scientist, administrator and professional. He was known for his unruffled calm in the face of every natural and human adversity, as much as for his houses, schools and roads spread across the rim of the continent.

It was not until his final day of respected service that Kelvin Throop allowed something taut within him to snap. To an astonished secretary he dictated the week's mail just as he had, unconsciously, always wished. Here was the true, though unsuspected Throop.

He dictated and departed.

Memorandum for Mr. Middlemas:

It's a fool idea and you may as well know it. It may be no worse than the fool ideas I've been getting from the front office these twenty-three years, but this time—if you will forgive me—I will not tell you what an interesting suggestion you have made, and that we will study it further.

It's going in that big wastebasket with all the rest.

In the first place, what makes you think it would ignite at a reasonable temperature? You don't seriously suggest it's going to produce a hot enough flame to vaporize all the water content from the stockpiles awaiting combustion? Where do you expect to store it? What if the houses are unoccupied—then, where's your fuel supply?

I am perfectly aware that heat and sewage disposal are two of the biggest problems of northern life, but Joe, believe me, it isn't that simple.

Try it on the next guy.

K. T.

Dear Madam:

That's tough about the leak in your bathroom. Did you know that, according to a recent survey, you are the one hundred thirteenth Arctic housewife to complain of a leak in her bathroom. There's a design problem here, and as soon as we discovered it we found a solution: we worked out a form letter for Arctic housewives.

For you, though, I have a better idea, so listen carefully.

If you will observe the outer wall about eighteen inches above where the window should have been placed, you will find a point where the manufacturers had fondly hoped to bring together three interlocking sandwich panels of plywood and rigid plastic foam insulation. All you have to do is get a more permanent form of bonding that is more resistant than the manufacturer's materials to changes in temperature and humidity and to the rhythmic heaving of the permafrost.

Therefore, poke into that space some of that chocolate cake you served me the last time you invited me into your home for three hours of unrelieved whining. Hit it with a hammer. Poke it with a screwdriver. Bang it with an ax, but get it in the crack.

Archeologists will find it long after the house has withered away.

Glad to be of help.

Yours sincerely,
Kelvin Throop

Your Excellency:

I appreciate your keen desire, as Consul-General of Inner Mongolia, to fly over the North Pole, but I cannot think why you are writing to me about it. Are you angling for a free ride? Well, look here Ex, you can't get blood out of a stone, so I suggest you see your travel agent. I wouldn't tell him my name if I were you, or he'll want cash on the line this time.

Accept, Excellency, the renewed assurances of my highest consideration,
Kelvin Throop

Dear Sir:

I got your letter asking for a job on behalf of Joe Blow, a young man who seems to have not the remotest qualification for working anywhere. Nor could I conceive of anyone with less interest in the Arctic. I must deduce that you seek employment on his behalf only because every other employer in America has given him the only sensible answer that a sensible employer could give to such an applicant.

In other words, no go for Joe Blow.

Yours sincerely,
Kelvin Throop

Memorandum for Mr. Thorgelsson:

I have read with the keenest interest your long and thoughtful memorandum setting forth the many difficulties which you and your staff are encountering in discharging your responsibilities.

Drop dead.

K. T.

Dear Senator:

You asked when it would be convenient for your investigating committee to inspect our Arctic installations.

Frankly, never.

There's not a thing there you would understand, and my men are rather busy. Just tell your committee it's cold and we've run out of booze.

Yours respectfully
Kelvin Throop

Mr. Bittlesby:

You are perfectly correct in your observation upon the statement of our March operations that we omitted to list the fuel consumpion for each vehicle in the western sector, as required under some subsection or other of your tiresome regulations. You might think this was a terrible omission, but the explanation is quite simple, and I want you to follow it carefully.

My men were worried about spending all that money on fuel and keeping you, Mrs. Bittlesby and all your kids awake at night worrying about it. So all through the month of February, we just ran the vehicles backward. Then in March they were able to spring forward for the whole month without a drop of gas.

Wasn't that clever of us?

K. Throop

Dear Sir:

In your recent letter, you stated that you had heard our new house at Outer Muktuk cost two million dollars, we had shipped five hundred pounds of brass bottle caps to Frigiefrigie Lake and we were installing VHF intercom in all outhouses north of the Arctic Circle. I agree that, as a taxpayer, you are entitled to an explanation.

That's the way the cookie crumbles.

Yours sincerely,
Kelvin Throop

Dear General:

I have your letter complaining that a work crew arrived unannounced at your Dew Line Station in contravention of certain military orders too numerous to mention. You are quite right to be sore, and if I were you, I would simply scream. But the situation was not as it seemed.

You see, it was a day off for my men, and they had decided to go fishing. They had been searching the country for bait, and had very little success until they got to a certain parallel of latitude which only my keen sense of military security prevents me from divulging. There they suddenly found dew worms by the hundreds. My men naturally gathered them avidly, not realizing that they had inadvertently stumbled upon the DEW Line. It was, as you can see a natural mistake, and they did not intend to interrupt you while you were angling.

It will never happen again out of season.

Yours faithfully,
Kelvin Throop

Dear Mr. Editor:

It is beyond my comprehension why I should be told to use my valuable time writing to you, when anything I say will be given the customary distortion by your so-called newspaper, which very few people outside the editor's minute circle of friends read anyway. So let me just say that in your last article about me you were lying in your teeth.

So what else is new?

Yours truly,

Dear Mr. Abernethy:

I have your letter asking for a reference on behalf of Elmer Appletree who is seeking employment with your firm. It gives me pleasure to comply.

To say that Mr. Appletree is lazy does an injustice to the diligence with which he seeks to escape any responsibility. To infer dishonesty overlooks the transparency of his schemes for distortion from his employers, his acquaintances—I do not say friends—and all unlucky enough to cross his crooked path. To state that he is stupid seems to fly in the face of the ingenuity which he shows in avoiding the toil of an honest day. I should think it only fair to overlook such minor faults as body odor, halitosis and the stubborn repetition of a disease not usually discussed in the circles where I move.

I do not highly regard Mr. Appletree, but do not let me prejudice you.

Yours faithfully,
Kelvin Throop

My dear Elmer:

How kind it was of your teacher to suggest that you write to me about a project your whole class might undertake when you are studying the Arctic this winter. Of course I shall be glad to help, for I have little else to do except write letters to classes which have Arctic projects.

You must all go outside when it is very cold and there is lots of snow. Get some long butcher knives, and cut big blocks of snow like in the picture of the igloo attached to this letter. Then your teacher must stand very still while you lay the blocks firmly one at a time in a spiral going up, up, up. When you reach the top, throw pails of water on it, so it will be very, very strong. Then leave it.

How many days do you think it will be before they start to look for teacher?

Happy playtime,
Kelvin Throop

Dear Mr. Manic:

I think you have a truly brilliant idea when you suggest taking planeloads of people by jet each morning through six time zones from east to west above the Arctic Circle. As you say, all those people will be able to add days to their lives. Then, as I understand it, they would not go back: they would walk up to the north pole and down again to their starting point. This would be terrific, but I think you should keep it secret from the Russians. They live just poles apart.

We did have a similar experience ourselves which didn't work out very well, and perhaps you should know about it. A few years back I got some big airplanes and a very long rope. We tied all the planes to the north pole and flew them around in a clockwise direction. At first it worked marvelously, and the pilots reached the year 2064 quickly. Unfortunately, however, they got very dizzy, and before we could question them about life in the century ahead, we had to fly them counterclockwise. Naturally they lost time this way. We abandoned the project when all the crews emerged wearing doublets and pantaloons, and claiming that airplanes were not invented yet.

Can I come and live with you?

Yours ever,
Kelvin Throop

Dear Mr. Nightsbridge:

Thank you so much for your interesting sketches of the proposed low-cost Arctic home. It is so heartening to have distinguished architects applying their minds to our problems. May I make just one or two suggestions?

With building costs so low in the polar regions, I think it clever of you to include what I take to be a large art gallery just outside the kitchen. Would it not be nice to include a music room as well? The thatched roof is quite original and charming; the fireplace will be a welcome addition everywhere above the tree-line. That picture window will certainly give a splendid opportunity to observe the cellular structure of the snow which is piled against it. Should there not be a door?

You are so right about color dynamics in the Arctic landscape. I would suggest painting your house dead white, for reasons too subtle to explain.

Otherwise, it's fine.

Yours gratefully,
Kelvin Throop

Memorandum for Mr. Mandible:

Your recent memorandum drew attention to certain costs in our new school complex, and you were kind enough to explain to me in some detail how you had constructed a sewage system for your cottage for $27.18.

You are quite right, and I have had the working drawings amended to produce very substantial savings indeed. It is all a question of sitting. By putting the complex about two hundred eighteen feet north northwest, and slewing the back of house towards the sea, you will find all our problems are solved by the provision of an ice chisel in the room in question.

Perhaps you would like to build it yourself.

K. T.

Dear Mr. Dado:

I cannot imagine why no one had ever hit upon your idea for exporting the permafrost from the Arctic. I'm sure you will find it very permanent, and in no time at all your company could make all refrigerators obsolete.

It so happens I have an option on a large tract of excellent permafrost and I would be willing to consider sale at quite a reasonable price. If you would care to send me a check as evidence of good faith, just address it to me c/o Arctic Ventures Limited. Like most Arctic enthusiasts, I shall be living in Florida.

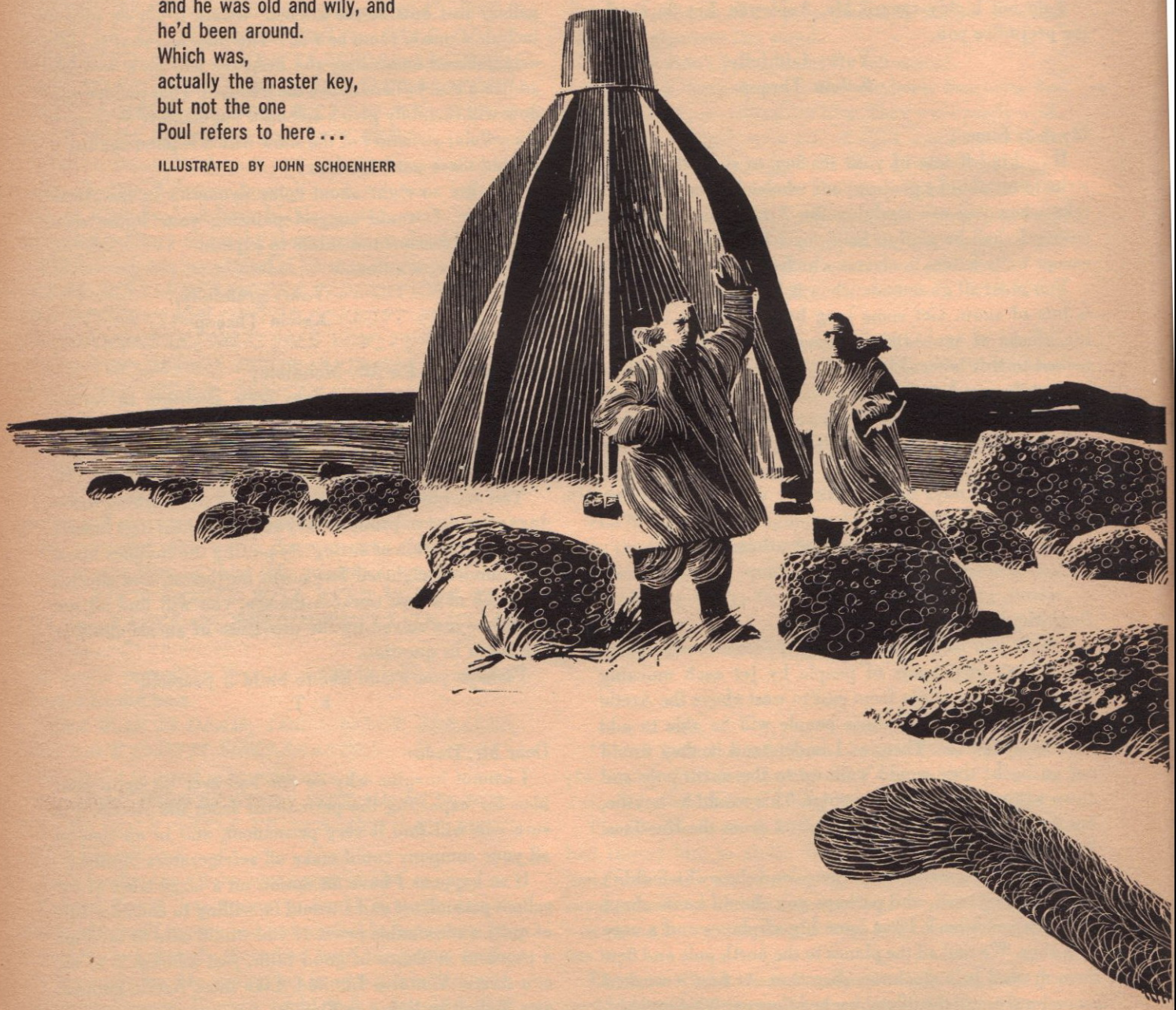
Yours, believe me,
Kelvin Throop

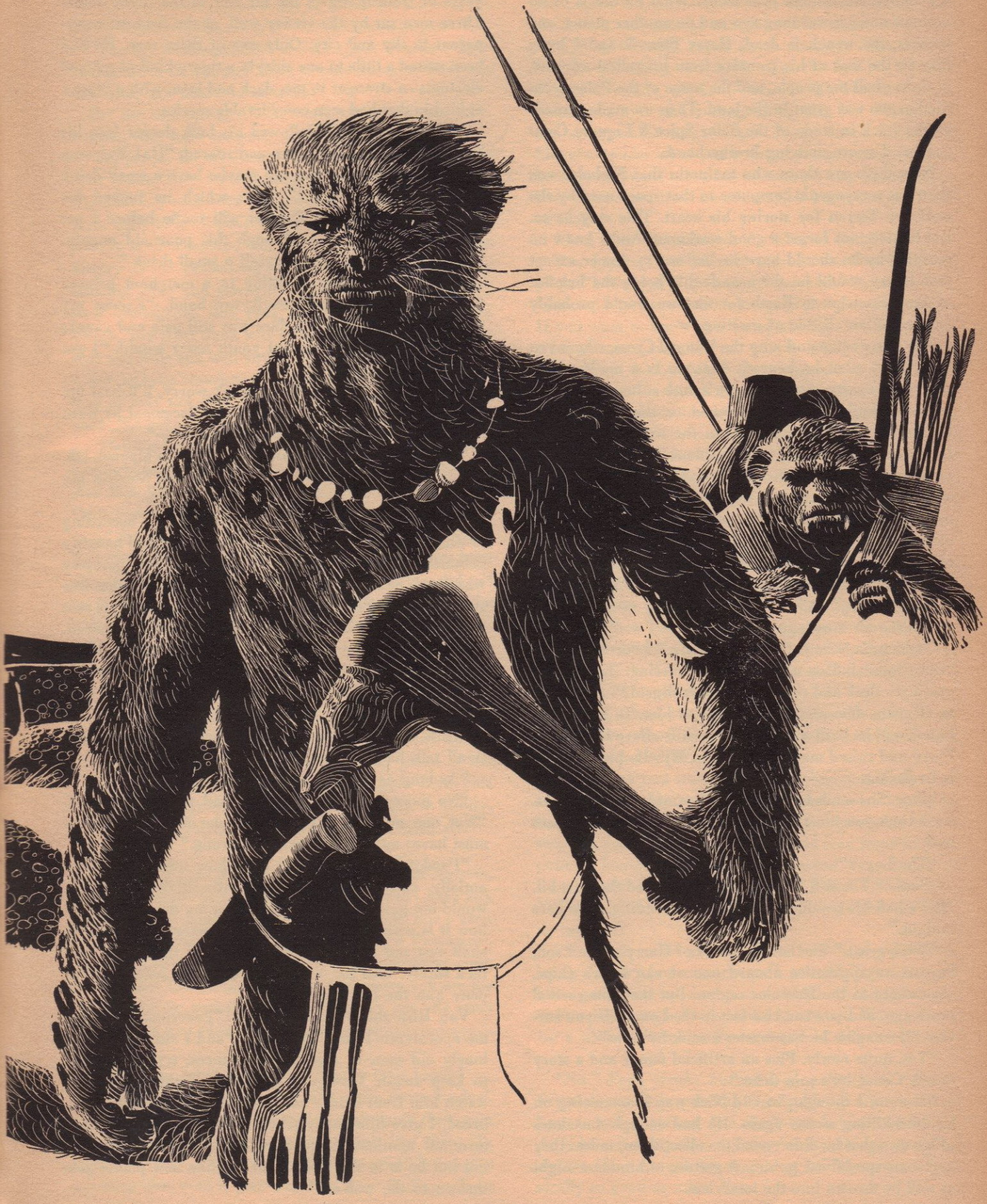
THE MASTER KEY

POUL ANDERSON

Van Rijn was a Trader—
and he was old and wily, and
he'd been around.
Which was,
actually the master key,
but not the one
Poul refers to here...

ILLUSTRATED BY JOHN SCHOENHERR





Once upon a time there was a king who set himself above the foreign merchants. What he did is of no account now; it was long ago and on another planet, and besides, the wench is dead. Harry Stenvik and I hung him by the seat of his trousers from his tallest minaret, in sight of all the people, and the name of the Polesotechnic League was great in the land. Then we made inroads on the stock in trade of the Solar Spice & Liquors Company and swore undying brotherhood.

Now there are those who maintain that Nicholas van Rijn has a cryogenic computer in that space used by the ordinary Terran for storing his heart. This may be so. But he does not forget a good workman. And I know no reason why he should have invited me to dinner except that Harry would be there and—this being the briefest of business trips to Earth for me—we would probably have no other chance of meeting.

The flitter set me off atop the Winged Cross, where van Rijn keeps what he honestly believes is a modest little penthouse apartment. A summer's dusk softened the mass of lesser buildings that stretched to the horizon and beyond; Venus had wakened in the west and Chicago Integrate was opening multitudinous lights. This high, only a low machine throb reached my ears. I walked among roses and jasmine to the door. When it scanned me and dilated, Harry was waiting. We fell into each other's arms and praised God with many loud violations of one of His commandments.

Afterward we stood apart and looked. "You haven't changed much," he lied. "Mean and ugly as ever. Methane in the air must agree with you."

"Ammonia, where I've been of late," I corrected him. "Occasional bullets and endless dickering. *You're* disgustingly sleek and contented. How's Sigrid?" As it must to all men, domesticity had come to him. In his case it lasted, and he built a house on the cliffs above Hardanger Fjord and raised mastiffs and sons. Myself—but that also is irrelevant.

"Fine. She sends her love and a box of her own cookies. Next time you must wangle a longer stay and come see us."

"The boys?"

"Same." The soft Norse accent roughened the least bit. "Per's had his troubles, but they are mending. He's here tonight."

"Well, great." The last I'd heard of Harry's oldest son, he was an apprentice aboard one of van Rijn's ships, somewhere in the Hercules region. But that was several years ago, and you can rise fast in the League if you survive. "I imagine he has master's rank by now."

"Yes, quite newly. Plus an artificial femur and a story to tell. Come, let's join them."

Hm-m-m, I thought, so Old Nick was economizing on his bird-killing stones again. He had enough anecdotes of his own that he didn't need to collect them, unless they had some special use to him. A gesture of kindness might as well be thrown into the interview.

We passed through the foyer and crossed a few light-years of trollcat rug to the far end of the living room. Three men sat by the viewer wall, at the moment transparent to sky and city. Only one of them rose. He had been seated a little to one side, in a tigery kind of relaxed alertness—a stranger to me, dark and lean, with a blaster at his hip that had seen considerable service.

Nicholas van Rijn wallowed his bulk deeper into his lounger, hoisted a beer stein and roared, "Ha! Welcome to you, captain, and you will maybe have a small drink like me before dinner?" After which he tugged his goatee and muttered, "Gabriel will tootle before I get your bepestered Anglic through this poor old noggin. I think I have just called myself a small drink."

I bowed to him as is fitting to a merchant prince, turned, and gave Per Stenvik my hand. "Excuse my staying put," he said. His face was still pale and gaunt; health was coming back, but youth never would. "I got a trifle clobbered."

"So I heard," I answered. "Don't worry, it'll heal up. I hate to think how much of me is replacement by now, but as long as the important parts are left—"

"Oh, yes, I'll be O.K. Thanks, of course, to Manuel. Uh, Manuel Felipe Gomez y Palomares of Nueva Mexico. My ensign."

I introduced myself with great formality, according to what I knew of the customs of those poor and haughty colonists from the far side of Arcturus. His courtesy was equal, before he turned to make sure the blanket was secure around Per's legs. Nor did he go back to his seat and his glass of claret before Harry and I were chaired. A human servant—male, in this one van Rijn establishment—brought us our orders, akvavit for Harry and a martini for me. Per fiddled with a glass of Ansan vermouth.

"How long will you be home?" I asked him after the small talk had gone by.

"As long as needful," Harry said quickly.

"No more, though," van Rijn said with equal speed. "Not one millimoment more can he loaf than nature must have; and he is young and strong."

"Pardon, señor," Manuel said—how softly and deferentially, and with what a clang of colliding stares. "I would not gainsay my superiors. But my duty is to know how it is with my captain, and the doctors are fools. He shall rest not less than till the Day of the Dead; and then surely, with the Nativity so near, the señor will not deny him the holidays at home?"

Van Rijn threw up his hands. "Everyone, they call me apocalyptic beast," he wailed, "and I am only a poor lonely old man in a sea of grievances, trying so hard to keep awash. One good boy with promises I find, I watch him from before his pants dry out for I know his breed, I give him costly schooling in hopes he does not turn out another curdlebrain, and no sooner does he not but he is in the locker and my fine new planet gets thrown to the wolves!"

"Lord help the wolves," Per grinned. "Don't worry, sir, I'm as anxious to get back as you are."

"Hoy, hoy, I am not going. I am too old and fat, ah, you think you have troubles now but wait till time has gnawed you down to a poor old wheezer like me who has not even any pleasures left. Abdul! Abdul, you jelly-legs, bring drink, you want we should dry up and puff away? What, only me ready for a refill?"

"Do you really want to see that Helheim again?" Harry asked, with a stiff glance at van Rijn.

"Judas, yes," Per said. "It's just waiting for the right man. A whole *world*, Dad! Don't you remember?"

Harry looked through the wall and nodded. I made haste to intrude on his silence. "What were you after, Per?"

"Everything," the boy said. "I told you it's an entire planet. Not one per cent of the land surface has been mapped."

"Huh? Not even from orbit?"

Manuel's expression showed me what they thought of orbital maps.

"But for a starter, what attracted us in the first place, furs and herbs," Per said. Wordlessly, Manuel took a little box from his pocket, opened it, and handed it to me. A bluish-green powder of leaves lay within. I tasted. There was a sweet-sour flavor with wild overtones, and the odor went to the oldest, deepest part of my brain and roused memories I had not known were lost.

"The chemicals we have not yet understood and synthesized," van Rijn rumbled around the cigar he was lighting. "Bah! What do my chemists do all day but play happy fun games in the lab alcohol? And the furs, *ja*, I have Lupescu of the Peltery volcanomaking that he must buy them from me. He is even stooping to spies, him, he has the ethics of a paranoid weasel. Fifteen thousand he spent last month alone, trying to find where that planet is."

"How do you know how much he spent?" Harry asked blandly.

Van Rijn managed to look smug and hurt at the same time. Per said with care: "I'd better not mention the co-ordinates myself. It's out Pegasus way. A G9 dwarf star, about half as luminous as Sol. Eight planets, one of them terrestroid. Brander came upon it in the course of survey, thought it looked interesting, and settled down to learn more. He'd really only time to tape the language of the locality where he was camped, and do the basic-basic planetography and bionics. But he did find out about the furs and herbs. So I was sent to establish a trading post."

"His first command," Harry said, unnecessarily on anyone's account but his own.

"Trouble with the natives, eh?" I asked.

"Trouble is not the word," van Rijn said. "The word is not for polite ears." He dove into his beer stein and came up snorting. "After all I have done for them, the saints keep on booting me in the soul like this."

"But we seem to have it licked," Per said gravely.

"Ah. You think so?" Van Rijn waggled a hairy forefinger at him. "That is what we should like to be more sure of, boy, before we send out and maybe lose some expensive ships."

"Y *algunos hombres buenos*," Manuel muttered, so low he could scarcely be heard. One hand dropped to the butt of his gun.

"I have been reading the reports from Brander's people," van Rijn said. "Also your own. I think maybe I see a pattern. When you have been swindling on so many planets like me, new captain, you will have analogs at your digits for much that is new . . . Ah, pox and pity it is to get jaded!" He puffed a smoke ring that settled around Per's bright locks. "Still, you are never sure. I think sometimes God likes a little practical joke on us poor mortals, when we get too cockish. So I jump on no conclusions before I have heard from your own teeth how it was. Reports, even on visitape, they have no more flavor than what my competition sells. In you I live again the fighting and merrylarks, everything that is now so far behind me in my doting."

This from the single-handed conqueror of Borthu, Diomedes, and t'Kela!

"Well—" Per blushed and fumbled with his glass. "There really isn't a lot to tell, you know. I mean, each of you freemen has been through so much more than, uh, one silly episode—"

Harry gestured at the blanketed legs. "Nothing silly there," he said.

Per's lips tightened. "I'm sorry. You're right. Men died."

Chiefly because it is not good to dwell overly long on those lost from a command of one's own, I said, "What's the planet like? 'Terrestroid' is a joke. They sit in an Earthside office and call it that if you can breathe the air."

"And not fall flat in an oof from the gravity for at least half an hour, and not hope the *whole* year around you have no brass monkey ancestors." Van Rijn's nod sent the black ringlets swirling around his shoulders.

"I generally got assigned to places where the brass monkeys melted," Harry complained.

"Well, Cain isn't too bad in the low latitudes," Per said. His face relaxed and his hands came alive, in quick gestures that reminded me of his mother. "It's about Earth size, average orbital radius a little over one A.U. Denser atmosphere, though, by around fifteen per cent, which makes for more greenhouse effect. Twenty-hour rotation period; no moons. Thirty-two degrees of axial tilt, which does rather complicate the seasons. But we were at fifteen-forty north, in fairly low hills, and it was summer. A nearby pool was frozen every morning, and snowbanks remained on the slopes—but really, not bad for the planet of a G9 star."

"Did Brander name it Cain?" I asked.

"Yes. I don't know why. But it turned out appropri-

ate. Too appropriate." Again the bleakness. Manuel took his captain's empty glass and glided off, to return in a moment with it filled. Per drank hurriedly.

"Always there is trouble," van Rijn said. "You will learn."

"But the mission was going so well!" Per protested. "Even the language and the data seemed to . . . to flow into my head on the voyage out. In fact, the whole crew learned easily." He turned to me. "There were twenty of us, on the *Miriam Knight.* She's a real beauty, Cheland class transport, built for speed rather than capacity, you know. More wasn't needed, when we were only supposed to erect the first post and get the idea of regular trade across to the autochthones. We had the usual line of goods, fabrics, tools, weapons, household stuff like scissors and meat grinders. Not much ornament, because Brander's xenologists hadn't been able to work out any consistent pattern for it. Individual Cainites seemed to dress and decorate themselves any way they pleased. In the Ulash area, at least, which, of course, was the only one we had any details on."

"And few there," Harry murmured. "Also as usual."

"Agriculture?" I inquired.

"Some primitive cultivation," Per said. "Small plots scratched out of the forest, tended by the Lugals. In Ulash a little metallurgy has begun, copper, gold, silver, but even they are essentially neolithic. And essentially hunters—the Yildivans, that is, along with such Lugals as they employ to help. The food supply is mainly game. In fact, the better part of what farming is done is to supply fabric."

"What do they look like, these people?"

"I've a picture here." Per reached in his tunic and handed me a photograph. "That's old Shivaru. Early in our acquaintance. He was probably scared of the camera but he wouldn't admit it. You'll notice the Lugal he has with him is frankly in a blue funk."

I studied the image with an interest that grew. The background was harsh plutonic hillside, where grass of a pale yellowish turquoise grew between dark boulders. But on the right I glimpsed a densely wooded valley. The sky overhead was wan, and the orange sunlight distorted colors.

Shivaru stood very straight and stiff, glaring into the lens. He was about two meters tall, Per said, his body build much like that of a long-legged, deep-chested man. Tawny, spotted fur covered him to the end of an elegant tail. The head was less anthropoid: a black ruff on top, slit-pupilled green eyes, round mobile ears, flat nose that looked feline even to the cilia around it, full-lipped mouth with protruding tushes at the corners, and jaw that tapered down to a V. He wore a sort of loincloth, gaudily dyed, and a necklace of raw semi-precious stones. His left hand clutched an obsidian-bladed battle ax and there was a steel trade knife in his belt.

"They're mammals, more or less," Per said, "though with any number of differences in anatomy and chemistry, as you'd expect. They don't sweat, however. There's a complicated system of exo- and endothermic reactions in the blood to regulate temperature."

"Sweating is not so common on cold terrestroids," van Rijn remarked. "Always you find analogs to something you met before, if you look long enough. Evolution makes parallels."

"And skew lines," I added. "Uh, Brander got some corpses to dissect, then?"

"Well, not any Yildivans," Per said. "But they sold him as many dead Lugals as he asked for, who're obviously of the same genus." He winced. "I hope they didn't kill the Lugals especially for that purpose."

My attention had gone to the creature that cowered behind Shivaru. It was a squat, short-shanked, brown-furred version of the other Cainite. Forehead and chin were poorly developed and the muzzle had not yet become a nose. The being was nude except for a heavy pack, a quiver of arrows, a bow and two spears, piled on its muscular back. I could see that the skin there was rubbed naked and calloused by such burdens. "This is a Lugal?" I pointed.

"Yes. You see, there are two related species on the planet, one further along in evolution than the other. As if Australopithecus had survived till today on Earth. The Yildivans have made slaves of the Lugals—certainly in Ulash, and as far as we could find out by spot checks, everywhere on Cain."

"Pretty roughly treated, aren't they, the poor devils?" Harry said. "*I* wouldn't trust a slave with weapons."

"But Lugals are completely trustworthy," Per said. "Like dogs. They do the hard, monotonous work. The Yildivans—male and female—are the hunters, artists, magicians, everything that matters. That is, what culture exists is Yildivan." He scowled into his drink. "Though I'm not sure how meaningful 'culture' is in this connection."

"How so?" van Rijn lifted brows far above his small black eyes.

"Well . . . they, the Yildivans, haven't anything like a nation, a tribe, any sort of community. Family groups split up when the cubs are old enough to fend for themselves. A young male establishes himself somewhere, chases off all comers, and eventually one or more young females come join him. Their Lugals tag along, naturally—like dogs again. As near as I could learn, such families have only the most casual contact. Occasional barter, occasional temporary gangs formed to hunt extra-large animals, occasional clashes between individuals, and that's about it."

"But hold on," I objected. "Intelligent races need more. Something to be the carrier of tradition, something to stimulate the evolution of brain, a way for individuals to communicate ideas to each other. Else intelligence hasn't got any biological function."

"I fretted over that, too," Per said. "Had long talks with Shivaru, Fereghir, and others who drifted into camp whenever they felt like it. We really tried hard to understand each other. They were as curious about us as we about them, and as quick to see the mutual advantage in trade relations. But what a job! A whole different planet—two or three billion years of separate evolution—and we had only pidgin Ulash to start with, the limited vocabulary Brander's people had gotten. We couldn't go far into the subtleties. Especially when they, of course, took everything about their own way of life for granted.

"Toward the end, though, I began to get a glimmering. It turns out that in spite of their oafish appearance, the Lugals are not stupid. Maybe even as bright as their masters, in a different fashion; at any rate, not too far behind them. And . . . in each of these family groups, these patriarchal settlements in a cave or hut, way off in the forest, there are several times as many Lugals as Yildivans. Every member of the family, even the kids, has a number of slaves. Thus you may not get Yildivan clans or tribes, but you do get the numerical equivalent among the Lugals.

"Then the Lugals are sent on errands to other Yildivan preserves, with messages or barter goods or whatever, and bring back news. And they get traded around; the Yildivans breed them deliberately, with a shrewd practical grasp of genetics. Apparently, too, the Lugals are often allowed to wander off by themselves when there's no work for them to do—much as we let our dogs run loose—and hold pow-wows of their own.

"You mustn't think of them as being mistreated. They are, by our standards, but Cain in a brutal place and Yildivans don't exactly have an easy life either. An intelligent Lugal is valued. He's made straw boss over the others, teaches the Yildivan young special skills and songs and such, is sometimes even asked by his owner what he thinks ought to be done in a given situation. Some families let him eat and sleep in their own dwelling, I'm told. And remember, his loyalty is strictly to the masters. What they may do to other Lugals is nothing to him. He'll gladly help cull the weaklings, punish the lazy, anything.

"So, to get to the point, I think that's your answer. The Yildivans do have a community life, a larger society—but indirectly, through their Lugals. The Yildivans are the creators and innovators, the Lugals the communicators and preservers. I daresay the relationship has existed for so long a time that the biological evolution of both species has been conditioned by it."

"You speak rather well of them," said Harry grimly, "considering what they did to you."

"But they were very decent people at first." I could hear in Per's voice how hurt he was by that which had happened. "Proud as Satan, callous, but not cruel. Honest and generous. They brought gifts whenever they arrived, with no thought of payment. Two or three offered to assign us Lugal laborers. That wasn't necessary or feasible when we had machinery along, but they didn't realize it then. When they did, they were quick to grasp the idea, and mightily impressed. I think. Hard to tell, because they couldn't or wouldn't admit anyone else might be superior to them. That is, each individual thought of himself as being as good as anyone else anywhere in the world. But they seemed to regard us as their equals. I didn't try to explain where we were really from. 'Another country' looked sufficient for practical purposes.

"Shivaru was especially interested in us. He was middle-aged, most of his children grown and moved away. Wealthy in local terms, progressive—he was experimenting with ranching as a supplement to hunting—and his advice was much sought after by the others. I took him for a ride in a flitter and he was happy and excited as any child; brought his three mates along next time so they could enjoy it, too. We went hunting together occasionally. Lord, you should have seen him run down those great horned beasts, leap on their backs and brain them with one blow of that tremendous ax! Then his Lugals would butcher the game and carry it home to camp. The meat tasted good, believe me. Cainite biochemistry lacks some of our vitamins, but otherwise a human can get along all right there.

"Mainly, though, I remember how we'd talk. I suppose it's old hat to you freemen, but I had never before spent hour after hour with another being, both of us at work trying to build up a vocabulary and an understanding, both getting such a charge out of it that we'd forget even to eat until Manuel or Cherkez—that was his chief Lugal, a gnarly, droll old fellow, made me think of the friendly gnomes in my fairy tale books when I was a youngster—until one of them would tell us. Sometimes my mind wandered off and I'd come back to earth realizing that I'd just sat there admiring his beauty. Yildivans are as graceful as cats, as pleasing in shape as a good gun. And as deadly, when they want to be. I found that out!

"We had a favorite spot, in the lee of a cottage-sized boulder on the hillside above camp. The rock was warm against our backs; seemed even more so when I looked at that pale shrunken sun and my breath smoking out white across the purplish sky. Far, far overhead a bird of prey would wheel, then suddenly stoop—in the thick air I could hear the whistle through its wing feathers—and vanish into the treetops down in the valley. Those leaves had a million different shades of color, like an endless autumn.

"Shivaru squatted with his tail curled around his knees, ax on the ground beside him. Cherkez and one or two other Lugals hunkered at a respectful distance. Their eyes never left their Yildivan. Sometimes Manuel joined us, when he wasn't busy bossing some phase of construction. Remember, Manuel? You really shouldn't have kept so quiet."

"Silence was fittting, captain," said Nueva Mexican.

"Well," Per said, "Shivaru's deep voice would go on and on. He was full of plans for the future. No question of a trade treaty—no organization for us to make a treaty with—but he foresaw his people bringing us what he wanted in exchange for what we offered. And he was bright enough to see how the existence of a central mart like this, a common meeting ground, would affect them. More joint undertakings would be started. The idea of close co-operation would take root. He looked forward to that, within the rather narrow limits he could conceive. For instance, many Yildivans working together could take real advantage of the annual spawning run up the Mukushyat River. Big canoes could venture across a strait he knew of, to open fresh hunting grounds. That sort of thing.

"But then in a watchtick his ears would perk, his whiskers vibrate, he'd lean forward and start to ask about my own people. What sort of country did we come from? How was the game there? What were our mating and child-rearing practices? How did we ever produce such beautiful things? Oh, he had the whole cosmos to explore! Bit by bit, as my vocabulary grew, his questions got less practical and more abstract. So did mine, naturally. We were getting at each other's psychological foundations now, and were equally fascinated.

"I was not too surprised to learn that his culture had no religion. In fact, he was hard put to understand my questions about it. They practiced magic, but looked on it simply as a kind of technology. There was no animism, no equivalent of anthropomorphism. A Yildivan knew he was superior to any plant or animal. I think, but I'm not sure, that they had some vague concept of reincarnation. But it didn't interest them much, apparently, and the problem of origins hadn't occurred. Life was what you had, here and now. The world was a set of phenomena, to live with or master or be defeated by as the case might be.

"Shivaru asked me why I've asked him about such a self-evident thing."

Per shook his head. His glance went down to the blanket around his lap and quickly back again. "That may have been my first mistake."

"No, captain," said Manuel most gently. "How could you know they lacked souls?"

"Do they?" Per mumbled.

"We leave that to the theologians," van Rijn said. "They get paid to decide. Go on, boy."

I could see Per brace himself. "I tried to explain the idea of God," he said tonelessly. "I'm pretty sure I failed. Shivaru acted puzzled and . . . troubled. He left soon after. The Yildivans of Ulash use drums for long-range communication, have I mentioned? All that night I heard the drums mutter in the valley and echo from the cliffs. We had no visitors for a week. But Manuel, scouting around in the area, said he'd found tracks and traces. We were being watched.

"I was relieved, at first, when Shivaru returned. He had a couple of others with him, Fereghir and Tulitur, important males like himself. They came straight across the hill toward me. I was supervising the final touches on our timber-cutting system. We were to use local lumber for most of our construction, you see. Cut and trim in the woods with power beams, load the logs on a grav-sled for the sawmill, then snake them directly through the induration vats to the site, where the foundations had now been laid. The air was full of whine and crash, boom and chug, in a wind that cut like a laser. I could hardly see our ship or our sealtents through dust, tinged bloody in the sun.

"They came to me, those three tall hunters, with a dozen armed Lugals hovering behind. Shivaru beckoned. 'Come,' he said. 'This is no place for a Yildivan.' I looked him in the eyes and they were filmed over, as if he'd put a glass mask between me and himself. Frankly, my skin prickled. I was unarmed—everybody was except Manuel, you know what Nueva Mexicans are—and I was afraid I'd precipitate something by going for a weapon. In fact, I even made a point of speaking Ulash as I ordered Tom Bullis to take over for me and told Manuel to come along uphill. If the autochthones had taken some notion into their heads that we were planning harm, it wouldn't do for them to hear us use a language they didn't know.

"Not another word was spoken till we were out of the dust and racket, at the old place by the boulder. It didn't feel warm today. Nothing did. 'I welcome you,' I said to the Yildivans, 'and bid you dine and sleep with us.' That's the polite formula when a visitor arrives. I didn't get the regular answer.

"Tulitur hefted the spear he carried and asked—not rudely, understand, but with a kind of shiver in the tone—'Why have you come to Ulash?'

" 'Why?' I stuttered. 'You know. To trade.'

" 'No, wait, Tulitur,' Shivaru interrupted. 'Your question is blind.' He turned to me. 'Were you sent?' he asked. And what I would like to ask you sometime, freemen, is whether it makes sense to call a voice black.

"I couldn't think of any way to hedge. Something had gone awry, but I'd no feeblest notion what. A lie or a stall was as likely *a priori* to make matters worse as the truth. I saw the sunlight glisten along that dark axhead and felt most infernally glad to have Manuel beside me. Even so, the noise from the camp sounded faint and distant. Or was it only that the wind was whittering louder?

"I made myself stare back at him. 'You know we are here on behalf of others like us at home,' I said. The muscles tightened still more under his fur. Also . . . I can't read nonhuman expressions especially well. But Fereghir's lips were drawn off his teeth as if he confronted an enemy. Tulitur had grounded his spear point

down. Brander's reports observed that a Yildivan never did that in the presence of a friend. Shivaru, though, was hardest to understand. I could have sworn he was grieved.

" 'Did God send you?' he asked.

"That put the dunce's cap on the whole lunatic business. I actually laughed, though I didn't feel at all funny. Inside my head it went click-click-click. I recognized a semantic point. Ulash draws some fine distinctions between various kinds of imperative. A father's command to his small child is entirely different—in word and concept both—from a command to another Yildivan beaten in a fight, which is different in turn from a command to a Lugal, and so on through a wider range than our psycholinguists have yet measured.

"Shivaru wanted to know if I was God's slave.

"Well, this was no time to explain the history of religion, which I'm none too clear about anyway. I just said no. I wasn't; God was a being in Whose existence some of us believed, but not everyone, and He had certainly not issued me any direct orders.

"That rocked them back! The breath hissed between Shivaru's fangs, his ruff bristled aloft and his tail whipped his legs. 'Then who did send you?' he nearly screamed. I could translate as well by: 'So who *is* your owner?'

"I heard a slither alongside me as Manuel loosened his gun in the holster. Behind the three Yildivans, the Lugals gripped their own axes and spears at the ready. You can imagine how carefully I picked my words. 'We are here freely,' I said, 'as part of an association.' Or maybe the word I had to use means 'fellowship'—I wasn't about to explain economics either. 'In our home country,' I said, 'none of us is a Lugal. You have seen our devices that work for us. We have no need of Lugalhood.'

" 'Ah-h-h,' Fereghir sighed, and poised his spear. Manuel's gun clanked free. 'I think best you go,' he said to them, 'before there is a fight. We do not wish to kill.'

"Brander had made a point of demonstrating guns, and so had we. No one stirred for a time that went on eternally, in that Fimbul wind. The hair stood straight on the Lugals. They were ready to rush us and die at a word. But it wasn't forthcoming. Finally the three Yildivans exchanged glances. Shivaru said in a dead voice, 'Let us consider this thing.' They turned on their heels and walked off through the long, whispering grass, their pack close around them.

"The drums beat for days and nights.

"We considered the thing ourselves at great length. What was the matter, anyhow? The Yildivans were primitive and unsophisticated by Commonwealth standards, but not stupid. Shivaru had not been surprised at the ways we differed from his people. For instance, the fact that we lived in communities instead of isolated families had only been one more oddity about us, intriguing rather than shocking. And, as I've told you, while large-scale co-operation among Yildivans wasn't common, it did happen once in a while; so what was wrong with our doing likewise?

"Igor Yuschenkoff, the captain of the *Miriam*, had a reasonable suggestion. 'If they have gotten the idea that we are slaves,' he said, 'then our masters must be still more powerful. Can they think we are preparing a base for invasion?'

" 'But I told them plainly we are not slaves,' I said.

" 'No doubt.' He laid a finger alongside his nose. 'Do they believe you?'

"You can imagine how I tossed awake in my sealtent. Should we haul gravs altogether, find a different area and start afresh? That would mean scrapping nearly everything we'd done. A whole new language to learn was the least of the problems. Nor would a move necessarily help. Scouting trips by flitter had indicated pretty strongly that the same basic pattern of life prevailed everywhere on Cain, as it did on Earth in the paleolithic era. If we'd run afoul, not of some local taboo, but of some fundamental—I just didn't know. I doubt if Manuel spent more than two hours a night in bed. He was too busy tightening our system of guards, drilling the men, prowling around to inspect and keep them alert.

"But our next contact was peaceful enough on the surface. One dawn a sentry roused me to say that a bunch of natives were here. Fog had arisen overnight, turned the world into wet gray smoke where you couldn't see three meters. As I came outside I heard the drip off a trac parked close by, the only clear sound in the muffledness. Tulitur and another Yildivan stood at the edge of camp, with about fifty male Lugals behind. Their fur sheened with water and their weapons were rime-coated. 'They must have traveled by night, captain,' Manuel said, 'for the sake of cover. Surely others wait beyond view.' He led a squad with me.

"I made the Yildivans welcome, ritually, as if nothing had happened. I didn't get any ritual back. Tulitur said only, 'We are to trade. For your goods we will return those furs and plants you desire.'

"That was rather jumping the gun, with our post still less than half built. But I couldn't refuse what might be an olive branch. 'That is well,' I said. 'Come, let us eat while we talk about it.' Clever move, I thought. Accepting someone's food puts you under the same sort of obligation in Ulash that it used to on Earth.

"Tulitur and his companion—Bokzahan, I remember the name now—didn't offer thanks, but they did come into the ship and sit at the mess table. I figured this would be more ceremonious and impressive than a tent; also, it was out of that raw cold. I ordered stuff like bacon and eggs that the Cainites were known to like. They got right to business. 'How much will you trade to us?'

" 'That depends on what you want, and on what you have to give in exchange,' I said, to match their curtness.

" 'We have brought nothing with us,' Bokzahan said, 'for we knew not if you would be willing to bargain.'

" 'Why should I not be?' I answered. 'That is what I came for. There is no strife between us.' And I shot at him: 'Is there?'

"None of those ice-green eyes wavered. 'No,' Tulitur said, 'there is not. Accordingly, we wish to buy guns.'

" 'Such things we may not sell,' I answered. Best not to add that policy allowed us to as soon as we felt reasonably sure no harm would result. 'However, we have knives to exchange, as well as many useful tools.'

"They sulked a bit, but didn't argue. Instead, they went right to work, haggling over terms. They wanted as much of everything as we'd part with, and really didn't try to bargain the price down far. Only they wanted the stuff on credit. They needed it now, they said, and it'd take time to gather the goods for payment.

"That put me in an obvious pickle. On the one hand, the Yildivans had always acted honorably and, as far as I could check, always spoken truth. Nor did I want to antagonize them. On the other hand—but you can fill that in for yourself. I flatter myself I gave them a diplomatic answer. We did not for an instant doubt their good intentions, I said. We knew the Yildivans were fine chaps. But accidents could happen, and if so, we'd be out of pocket by a galactic sum.

"Tulitur slapped the table and snorted, 'Such fears might have been expected. Very well, we shall leave our Lugals here until payment is complete. Their value is great. But then you must carry the goods where we want them.'

"I decided that on those terms they could have half the agreed amount right away."

Per fell silent and gnawed his lip. Harry leaned over to pat his hand. Van Rijn growled, "*Ja*, by damn, no one can foretell everything that goes wrong, only be sure that some bloody-be-plastered thing will. You did hokay, boy . . . Abdul, more drink, you suppose maybe this is Mars?"

Per sighed. "We loaded the stuff on a gravsled," he went on. "Manuel accompanied in an armed flitter, as a precaution. But nothing happened. Fifty kilometers or so from camp, the Yildivans told our men to land near a river. They had canoes drawn onto the bank there, with a few other Yildivans standing by. Clearly they intended to float the goods further by themselves, and Manuel called me to see if I had any objections. 'No,' I said. 'What difference does it make? They must want to keep the destination secret. They don't trust us any longer' Behind him, in the screen, I saw Bokzahan watching. Our communicators had fascinated visitors before now. But this time, was there some equivalent of a sneer on his face?

"I was busy arranging quarters and rations for the Lugals, though. And a guard or two, nothing obtrusive. Not that I really expected trouble. I'd heard their masters say, 'Remain here and do as the *Erziran* direct until we come for you.' But nevertheless it felt queasy, having that pack of dog-beings in camp.

"They settled down in their animal fashion. When the drums began again that night they got restless, shifted around in the pavilion we'd turned over to them and mewled in a language Brander hadn't recorded. But they were quite meek next morning. One of them even asked if they couldn't help in our work. I had to laugh at the thought of a Lugal behind the controls of a five hundred kilowatt trac, and told him no, thanks, they need only loaf and watch us. They were good at loafing.

"A few times, in the next three days, I tried to get them into conversation. But nothing came of that. They'd answer me, not in the deferential style they used to a Yildivan but not insolently either. However, the answers were meaningless. 'Where do you live?' I would say. 'In the forest yonder,' the slave replied, staring at his toes. 'What sort of tasks do you have to do at home?' 'That which my Yildivan sets for me.' I gave up.

"Yet they weren't stupid. They had some sort of game they played, involving figures drawn in the dirt, that I never did unravel. Each sundown they formed ranks and crooned, an eerie minor-key chant, with improvisations that sometimes sent a chill along my nerves. Mostly they slept, or sat and stared at nothing, but once in a while several would squat in a circle, arms around their neighbors' shoulders, and whisper together.

"Well . . . I'm making the story too long. We were attacked shortly before dawn of the fourth day.

"Afterward I learned that something like a hundred male Yildivans were in that party, and heaven knows how many Lugals. They'd rendezvoused from everywhere in that tremendous territory called Ulash, called by the drums and, probably, by messengers who'd run day and night through the woods. Our pickets were known to their scouts, and they laid a hurricane of arrows over those spots, while the bulk of them rushed in between. Otherwise I can't tell you much. I was a casualty." Per grimaced. "What a fool thing to happen. On my first command!"

"Go on," Harry urged. "You haven't told me any details."

"There aren't many," Per shrugged. "The first screams and roars slammed me awake. I threw on a jacket and stuffed feet into boots while my free hand buckled on a gun belt. By then the sirens were in full cry. Even so, I heard a blaster beam sizzle past my tent.

"I stumbled out into the compound. Everything was one black, boiling hell-kettle. Blasters flashed and flashed, sirens howled and voices cried battle. The cold stabbed at me. Starlight sheened on snowbanks and hoarfrost over the hills. I had an instant to think how bright and many the stars were, out there and not giving a curse.

"Then Yuschenkoff switched on the floodlamps in the

Miriam's turret. Suddenly an artificial sun stood overhead, too bright for us to look at. What must it have been to the Cainites? Blue-white incandescence, I suppose. They swarmed among our tents and machines, tall leopard-furred hunters, squat brown gnomes, axes, clubs, spears, bows, slings, our own daggers in their hands. I saw only one man—sprawled on the earth, gun still between his fingers, head a broken horror.

"I put the command mike to my mouth—always wore it on my wrist as per doctrine—and bawled out orders as I pelted toward the ship. We had the atom itself to fight for us, but we were twenty, no, nineteen or less, against Ulash.

"Now our dispositions were planned for defense. Two men slept in the ship, the others in sealtents ringed around her. The half dozen on guard duty had been cut off, but the rest had the ship for an impregnable retreat. What we must do, though, was rally to the rescue of those guards, and quick. If it wasn't too late.

"I saw the boys emerge from their strong point under the landing jacks. Even now I remember how Zerkowsky hadn't fastened his parka, and what a low-comedy way it flapped around his bottom. He didn't use pajamas. You notice the smallest things at such times, don't you? The Cainites had begun to mill about, dazzled by the light. They hadn't expected that, nor the siren, which is a terrifying thing to hear at close range. Quite a few of them were already strewn dead or dying.

"Then—but all I knew personally was a tide that bellowed and yelped and clawed. It rolled over me from behind. I went down under their legs. They pounded across me and left me in the grip of a Lugal. He lay on my chest and went for my throat with teeth and hands. Judas, but that creature was strong! Centimeter by centimeter he closed in against my pushing and gouging. Suddenly another one got into the act. Must have snatched a club from some fallen Cainite and attacked whatever part of me was handiest, which happened to be my left shin. It's nothing but pain and rage after that, till the blessed darkness came.

"The fact was, of course, that our Lugal hostages had overrun their guards and broken free. I might have expected as much. Even without specific orders, they wouldn't have stood idle while their masters fought. But doubtless they'd been given advance commands. Tulitur and Bokzahan diddled us very nicely. First they got a big consignment of our trade goods, free, and then they planted reinforcements for themselves right in our compound.

"Even so, the scheme didn't work. The Yildivans hadn't really comprehended our power. How could they have? Manuel himself dropped the two Lugals who were killing me. He needed exactly two shots for that. Our boys swept a ring of fire, and the enemy melted away.

"But they'd hurt us badly. When I came to, I was in the *Miriam's* sickbay. Manuel hovered over me like an anxious raven. 'How'd we do?' I think I said.

" 'You should rest, señor,' he said, 'and God forgive me that I made the doctor rouse you with drugs. But we must have your decision quickly. Several men are wounded. Two are dead. Three are missing. The enemy is back in the wilderness, I believe with prisoners.'

"He lifted me into a carrier and took me outside. I felt no physical pain, but was lightheaded and half crazy. You know how it is when you're filled to the cap with stimulol. Manuel told me straight out that my legbone was pretty well pulverized, but that didn't seem to matter at the time . . . What do I mean, 'seem'? Of course it didn't! Gower and Muramoto were dead. Bullis, Cheng, and Zerkowsky were gone.

"The camp was unnaturally quiet under the orange sun. My men had policed the grounds while I was unconscious. Enemy corpses were laid out in a row. Twenty-three Yildivans—that number's going to haunt me for the rest of my life—and I'm not sure how many Lugals, a hundred perhaps. I had Manuel push me along while I peered into face after still, bloody face. But I didn't recognize any.

"Our own prisoners were packed together in our main basement excavation. A couple of hundred Lugals, but only two wounded Yildivans. The rest who were hurt had been carried off by their friends. With so much construction and big machines standing around for cover, that hadn't been too hard to do. Manuel explained that he'd stopped the attack of the hostages with stun beams. Much the best weapon. You can't prevent a Lugal fighting for his master with a mere threat to kill him.

"In a corner of the pit, glaring up at the armed men above, were the Yildivans. One I didn't know. He had a nasty blaster burn, and our medics had given him sedation after patching it, so he was pretty much out of the picture anyway. But I recognized the other, who was intact. A stun beam had taken him. It was Kochihir, an adult son of Shivaru, who'd visited us like his father a time or two.

"We stared at each other for a space, he and I. Finally, 'Why?' I asked him. 'Why have you done this?' Each word puffed white out of my mouth and the wind shredded it.

" 'Because they are traitors, murderers, and thieves by nature, that's why,' Yuschenkoff said, also in Ulash. Brander's team had naturally been careful to find out whether there were words corresponding to concepts of honor and the reverse. I don't imagine the League will ever forget the Darborian Semantics!

"Yuschenkoff spat at Kochihir. 'Now we shall hunt down your breed like the animals they are,' he said. Gower had been his brother-in-law.

" 'No,' I said at once, in Ulash, because such a growl had risen from the Lugals that any insane thing might have happened next. 'Speak thus no more.' Yuschenkoff shut his mouth and a kind of ripple went among those packed, hairy bodies, like wind dying out on an ocean.

'But Kochihir,' I said, 'your father was my good friend. Or so I believed. In what wise have we offended him and his people?'

"He raised his ruff, the tail lashed his ankles, and he snarled, 'You must go and never come back. Else we shall harry you in the forests, roll the hillsides down on you, stampede horned beasts through your camps, poison the wells and burn the grass about your feet. Go, and do not dare return!'

"My own temper flared—which made my head spin and throb, as if with fever—and I said, 'We shall certainly not go unless our captive friends are returned to us. There are drums in camp that your father gave me before he betrayed us. Call your folk on those, Kochihir, and tell them to bring back our folk. After that, perhaps we can talk. Never before.'

"He fleered at me without replying.

"I beckoned to Manuel. 'No sense in stalling unnecessarily,' I said. 'We'll organize a tight defense here. Won't get taken by surprise twice. But we've got to rescue those men. Send flitters aloft to search for them. The war party can't have gone far.'

"You can best tell how you argued with me, Manuel. You said an airlift was an utter waste of energy which was badly needed elsewhere. Didn't you?"

The Nueva Mexican looked embarrassed. "I did not wish to contradict my captain," he said. His oddly delicate fingers twisted together in his lap as he stared out into the night that had fallen. "But indeed I thought that aerial scouts would never find anyone in so many, many hectares of hill and ravine, water and woods. They could have dispersed, those devils. Surely, even if they traveled away in company, they would not be in such a clump that infrared detectors could see them through the forest roof. Yet I did not like to contradict my captain."

"Oh, you did, you," Per said. A corner of his mouth bent upward. "I was quite daft by then. Shouted and stormed at you eh? Told you to jolly well obey orders and get those flitters in motion. You saluted and started off, and I called you back. You musn't go in person. Too valuable here. Yes, that meant I was keeping back the one man with enough wilderness experience that he might have stood a chance of identifying spoor, even from above. But my brain was spinning down and down the sides of a maelstrom. 'See what you can do to make this furry individual co-operate,' I said."

"It pained me a little that my captain should appoint me his torturer," Manuel confessed mildly. "Although from time to time, on various planets, when there was great need—No matter."

"I'd some notion of breaking down morale among our prisoners," Per said. "In retrospect, I see that it wouldn't have made any difference if they had co-operated, at least to the extent of drumming for us. The Cainites don't have our kind of group solidarity. If Kochihir and his buddy came to grief at our hands, that was their hard luck. But Shivaru and some of the others had read our psychology shrewdly enough to know what a hold on us their three prisoners gave.

"I looked down at Kochihir. His teeth gleamed back. He hadn't missed a syllable or a gesture, and even if he didn't know any Anglic, he must have understood almost exactly what was going on. By now I was slurring my words as if drunk. So, also like a drunk, I picked them with uncommon care. 'Kochihir,' I said, 'I have commanded our fliers out to hunt down your people and fetch our own whom they have captured. Can a Yildivan outrun a flying machine? Can he fight when its guns flame at him from above? Can he hide from its eyes that see from end to end of the horizon? Your kinfolk will dearly pay if they do not return our men of their own accord.

" 'Take the drums, Kochihir, and tell them so. If you do not, it will cost *you* dearly. I have commanded my man here to do whatever may be needful to break your will.'

"Oh, that was a vicious speech. But Gower and Muramoto had been my friends. Bullis, Cheng, and Zerkowsky still were, if they lived. And I was on the point of passing out. I did, actually, on the way back to the ship. I heard Doc Leblanc mutter something about how could he be expected to treat a patient whose system was abused with enough drugs to bloat a camel, and then the words kind of trailed off in a long gibber that went on and on, rising and falling until I thought I'd been turned into an electron and was trapped in an oscilloscope . . . and the darkness turned green and . . . and they tell me I was unconscious for fifty hours.

"From there on it's Manuel's story."

At this stage, Per was croaking. As he sank back in his lounger, I saw how white he had become. One hand picked at his blanket, and the vermouth slopped when he raised his glass. Harry watched him, with a helpless anger that smoldered at van Rijn. The merchant said, "There, there, so soon after his operation and I make him lecture us, ha? But shortly comes dinner, no better medicine than a real *rijstaffel*, and so soon after that he can walk about, he comes to my place in Djakarta for a nice old-fashioned orgy."

"Oh, hellfire!" the boy exploded in a whisper. "Why're you trying to make me feel good? I ruined the whole show!"

"Whoa, son," I ventured to suggest. "You were in good spirits half an hour ago, and half an hour from now you'll be the same. It's only that reliving the bad moments is more punishment that Jehovah would inflict. I've been there, too." Blindly, the blue gaze sought mine. "Look, Per," I said, "if Freeman van Rijn thought you'd botched a mission through your own fault, you wouldn't be lapping his booze tonight. You'd be selling meat to the cannibals."

A ghost of a grin rewarded me.

"Well, Don Manuel," van Rijn said, "now we hear from you, *nie?*"

"By your favor, señor, I am no Don," the Nueva Mexican said, courteously, academically, and not the least humbly. "My father was a huntsman in the Sierra de los Bosques Secos, and I traveled as a mercenary with Rogers' Rovers, becoming sergeant before I left them for your service. No more." He hesitated. "Nor is there much I can relate of the happenings on Cain."

"Don't make foolishness," van Rijn said, finished his third or fourth liter of beer since I arrived and signaled for more. My own glass had been kept filled too, so much so that the stars and the city lights had begun to dance in the dark outside. I stuffed my pipe to help me ease off. "I have read the official reports from your expeditioning," van Rijn continued. "They are scum-dreary. I need details—the little things nobody thinks to record—I need to make a planet real for me before this cracked old pot of mine can maybe find a pattern. For it is my experience of many other planets, where I, even I, Nicholas van Rijn, got my nose rubbed in the dirt—which, ho, ho! takes a lot of dirt—it is on that I draw. Evolutions have parallels, but also skews, like somebody said tonight. Which lines is Cain's evolution parallel to? Talk, Ensign Gomez y Palomares. Brag. Pop jokes, sing songs, balance a chair on your head if you want—but talk!"

The brown man sat still a minute. His eyes were steady on us, save when they moved to Per and back.

"As the señor wishes," he began. Throughout his tone was level, but the accent could not help singing.

"When they bore my captain away I stood in thought, until Igor Yuschenkoff said, 'Well, who is to take the flitters?'

" 'None,' I said.

" 'But we have orders,' he said.

" 'The captain was hurt and shaken. We should not have roused him,' I answered, and asked of the men who stood near: Is this not so?'

"They agreed, after small argument. I leaned over the edge of the pit and asked Kochihir if he would beat the drums for us. 'No,' he said, 'whatever you do.'

" 'I shall do nothing, yet,' I said. 'We will bring you food presently.' And that was done. For the rest of the short day I wandered about among the snows that lay in patches on the grass. Ay, this was a stark land, where it swooped down into the valley and then rose again at the end of sight in saw-toothed purple ranges. I thought of home and of one Dolores whom I had known, a long time ago. The men did no work, they huddled over their weapons, saying little, and toward evening the breath began to freeze on their parka hoods.

"One by one I spoke to them and chose them for those tasks I had in mind. They were all good men with their hands, but few had been hunters save in sport. I myself could not trail the Cainites far, because they had crossed a broad reach of naked rock on their way downward and once in the forest covered their tracks. But Hamud ibn Rashid and Jacques Ngolo had been woodsmen in their day. We prepared what we needed. Then I entered the ship and looked on my captain—how still he lay!

"I ate lightly and slept briefly. Darkness had fallen when I returned to the pit. The four men we had on guard stood like deeper shadows against the stars which crowd that sky. 'Go now,' I said, and took out my own blaster. Their footfalls crunched away.

"The shapes that clotted the blackness of the pit stirred and mumbled. A voice hissed upward, 'Ohé, you are back. To torment me?' Those Cainites have eyes that see in the night like owls. I had thought before that they snickered within themselves when they watched us blunder about after sunset.

" 'No,' I said, 'I am only taking my turn to guard you.'

" 'You alone?' he scoffed.

" 'And this.' I slapped the blaster against my thigh.

"He fell silent. The cold gnawed deeper into me. I do not think the Cainites felt it much. As the stars wheeled slowly overhead, I began to despair of my plan. Whispers went among the captives, but otherwise I stood in a world where sound was frozen dead.

"When the thing happened, it went with devil's haste. The Lugals had been shifting about a while, as if restless. Suddenly they were upon me. One had stood on another's shoulders and leaped. To death, as they thought—but my shot missed, a quick flare and an amazed gasp from him that he was still alive. Had I not missed, several would have died to bring me down.

"As it was, two fell upon me. I went under, breaking hands loose from my throat with a judo release but held writhing by their mass. Hard fists beat me on head and belly. A palm over my mouth muffled my yells. Meanwhile the prisoners helped themselves out and fled.

"Finally I worked a leg free and gave one of them my knee. He rolled off with pain rattling in his throat. I twisted about on top of the other and struck him below the skull with the blade of my hand. When he went limp, I sprang up and shouted.

"Siren and floodlights came to life. The men swarmed from ship and tents. 'Back!' I cried. 'Not into the dark!' Many Lugals had not yet escaped, and those retreated snarling to the far side of the pit as our troop arrived. With their bodies they covered the wounded Yildivan from the guns. But we only fired, futilely, after those who were gone from sight.

"Guards posted themselves around the cellar. I scrabbled over the earth, seeking my blaster. It was gone. Someone had snatched it up: if not Kochihir, then a Lugal who would soon give it to him. Jacques Ngolo came to me and saw. 'This is bad,' he said.

" 'An evil turn of luck,' I admitted, 'but we must proceed anyhow.' I rose and stripped off my parka. Below were the helmet and spacesuit torso which had protected me in the fight. I threw them down, for they would only hinder me now, and put the parka back on. Hamud ibn

Rashid joined us. He had my pack and gear and another blaster for me. I took them, and we three started our pursuit.

"By the mercy of God, we had never found occasion to demonstrate night-seeing goggles here. They made the world clear, though with a sheen over it like dreams. Ngolo's infrared tracker was our compass, the needle trembling toward the mass of Cainites that loped ahead of us. We saw them for a while, too, as they crossed the bare hillside, in and out among tumbled boulders; but we kept ourselves low lest they see us against the sky. The grass was rough in my face when I went all-fours, and the earth sucked heat out through boots and gloves. Somewhere a hunted beast screamed.

"We were panting by the time we reached the edge of trees. Yet in under their shadows we must go, before the Cainites fled further than the compass would reach. Already it flickered, with so many dark trunks and so much brake to screen off radiation. But thus far the enemy had not stopped to hide his trail. I moved through the underbrush more carefully than him—legs brought forward to part the stems that my hands then guided to either side of my body—reading the book of trampled bush and snapped branch.

"After an hour we were well down in the valley. Tall trees gloomed everywhere about, the sky was hidden and I must tune up the photomultiplier unit in my goggles. Now the book began to close. The Cainites were moving at a natural pace, confident of their escape, and even without special effort they left little spoor. And since they were now less frantic and more alert, we must follow so far behind that infrared detection was of no further use.

"At last we came to a meadow, whose beaten grass showed that they had paused here a while. And that was seen which I feared. The party had broken into three or four, each bound a different way. 'Which do we choose?' Ngolo asked.

" 'Three of us can follow three of them,' I said.

" '*Bismillah!*' Hamud grunted. 'Blaster or no, I would not care to face such a band alone. But what must be, must be.'

"We took so much time to ponder what clues the forest gave that the east was gray before we parted. Plainly, the Lugals had gone toward their masters' homes, while Kochihir's own slaves had accompanied him. And Kochihir was the one we desired. I could only guess that the largest party was his, because most likely the first break had been made under his orders by his own Lugals, whose capabilities he knew. That path I chose for myself. Hamud and Ngolo wanted it too, but I used my rank to seize the honor, that folk on Nueva Mexico might never say a Gomez lacked courage.

"So great a distance was now between that there was no reason not to use our radios to talk with each other and with the men in camp. That was often consoling, in the long time which was upon me. For it was slow, slow, tracing those woods-wily hunters through their own land. I do not believe I could have done it, had they been only Yildivans and such Lugals as are regularly used in the chase. But plain to see, the attack had been strengthened by calling other Lugals from fields and mines and household tasks, and those were less adept.

"Late in the morning, Ngolo called. 'My gang just reached a cave and a set of lean-tos,' he said. 'I sit in a tree and watch them met by some females and half-grown Yildivans. They shuffle off to their own shed. This is where they belong, I suppose, and they are not going farther. Shall I return to the meadow and pick up another trail?'

" 'No,' I said, 'it would be too cold by now. Backtrack to a spot out of view and have a flitter fetch you.'

"Some hours later, the heart leaped in my breast. For I came upon a tree charred by unmistakable blaster shots. Kochihir had been practicing.

"I called Hamud and asked where he was. 'On the bank of a river,' he said, 'casting about for the place where they crossed. That was a bitter stream to wade!'

" 'Go no further,' I said. 'My path is the right one. Have yourself taken back to camp.'

" 'What?' he asked. 'Shall we not join you now?'

" 'No,' I said. 'It is uncertain how near I am to the end. Perhaps so near that a flitter would be seen by them as it came down and alarm them. Stand by.' I confess it was a lonely order to give.

"A few times I stopped to eat and rest. But stimulants kept me going in a way that would have surprised my quarry who despised me. By evening his trail was again so fresh that I slacked my pace and went on with a snake's caution. Down here, after sunset, the air was not so cold as on the heights; yet every leaf glistened hoar in what starlight pierced through.

"Not much into the night, my own infrared detector began to register a source, stronger than living bodies could account for. I whispered the news into my radio and then ordered no more communication until further notice, lest we be overheard. Onward I slipped. The forest rustled and creaked about me, somewhere far off a heavy animal broke brush in panic flight, wings whirred overhead, yet *Santa María*, how silent and alone it was!

"Until I came to the edge of a small clearing.

"A fire burned there, throwing unrestful shadows on the wall of a big, windowless log cabin which nestled under the trees beyond. Two Yildivans leaned on their spears. Light glimmered from the smokehole in the roof.

"Most softly, I drew my stun gun. The bolt snicked twice, and they fell in heaps. At once I sped across the open ground, crouched in the shadow under that rough wall, and waited.

"But no one had heard. I glided to the doorway. Only a leather curtain blocked my view. I twitched it aside barely enough that I might peer within.

"The view was dimmed by smoke, but I could see that

there was just one long room. It did not seem plain, so beautiful were the furs hung and draped everywhere about. A score or so of Yildivans, mostly grown males, squatted in a circle around the fire, which burned in a pit and picked their fierce flat countenances out of the dark. Also there were several Lugals hunched in a corner. I recognized old Cherkez among them, and was glad he had outlived the battle. The Lugals in Kochihir's party must have been sent to barracks. He himself was telling his father, Shivaru, of his escape.

"As yet the time was unripe for gladness, but I vowed to light many candles for the saints. Because this was as I had hoped: Kochihir had not gone to his own home, but sought an agreed rendezvous. Zerkowsky, Cheng, and Bullis were here. They sat in another corner at the far end of the room, coughing from the smoke, skins drawn around them to ward off the cold.

"Kochihir finished his account and looked at his father for approval. Shivaru's tail switched back and forth. 'Strange that they were so careless about you,' he said.

" 'They are like blind cubs,' Kochihir scoffed.

" 'I am not so sure,' the old Yildivan murmured. 'Great are their powers. And . . . we know what they did in the past.' Then suddenly he grew stiff, and his whisper struck out like a knife: 'Or did they do it? Tell me again, Kochihir, how the master ordered one thing and the rest did another.'

" 'No, now, that means nothing,' said a different Yildivan, scarred and grizzled. 'What we must devise is a use for these captives. You have thought they might trade our Lugals and Gumush, whom Kochihir says they still hold, for three of their own. But I say, Why should they? Let us instead place the bodies where the *Erziran* can find them, in such condition that they will be warned away.'

" 'Just so,' said Bokzahan, whom I now spied in the gloom. 'Tulitur and I proved they are weak and foolish.'

" 'First we should try to bargain,' said Shivaru. 'If that fails—' His fangs gleamed in the firelight.

" 'Make an example of one, then, before we talk,' Kochihir said angrily. 'They threatened the same for me.'

"A rumble went among them, as from a beast's cage in the zoo. I thought with terror of what might be done. For my captain has told you how no Yildivan is in authority over any other. Whatever his wishes, Shivaru could not stop them from doing what they would.

"I must decide my own course immediately. Blaster bolts could not destroy them all fast enough to keep them from hurling the weapons that lay to hand upon me—not unless I set the beam so wide that our men must also be killed. The stun gun was better, yet it would not overpower them either before I went down under axes and clubs. By standing to one side I could pen them within, for they had only the single door. But Bullis, Cheng, and Zerkowsky would remain hostages.

"What I did was doubtless stupid, for I am not my captain. I sneaked back to the edge of the woods and called the men in camp. 'Come as fast as may be,' I said, and left the radio going for them to home on. Then I circled about and found a tree overhanging the cabin. Up I went, and down again from a branch to the sod roof, and so to the smokehole. Goggles protected my eyes, but nostrils withered in the fumes that poured forth. I filled my lungs and leaned forward to see.

"Best would have been if they had gone to bed. Then I could have stunned them one by one as they slept, without risk. But they continued to sit about and quarrel over what to do with their captives. How hard those poor men tried to be brave, as that dreadful snarling broke around them, as slit eyes turned their way and hands went stroking across knives!

"The time felt long, but I had not completed the Rosary in my mind when thunder awoke. Our flitters came down the sky like hawks. The Yildivans roared. Two or three of them dashed out the door to see what was afoot. I dropped them with my stunner, but not before one had screamed, 'The *Erziran* are here!'

"My face went back to the smokehole. It was turmoil below. Kochihir screeched and pulled out his blaster. I fired but missed. Too many bodies in between, señores. There is no other excuse for me.

"I took the gun in my teeth, seized the edge of the smokehole, and swung myself as best I could before letting go. Thus I struck the dirt floor barely outside the firepit, rolled over and bounced erect. Cherkez leaped for my throat. I sent him reeling with a kick to the belly, took my gun and fired around me.

"Kochihir could not be seen in the mob which struggled from wall to wall. I fought my way toward the prisoners. Shivaru's ax whistled down. By the grace of God, I dodged it, twisted about and stunned him point blank. I squirmed between two others. A third got on my back. I snapped my head against his mouth and felt flesh give way. He let go. With my gun arm and my free hand I tossed a Lugal aside and saw Kochihir. He had reached the men. They shrank from him, too stupefied to fight. Hate was on his face, in his whole body, as he took unpracticed aim.

"He saw me at his sight's edge and spun. The blaster crashed, blinding in that murk. But I had dropped to one knee as I pulled trigger. The beam scorched my parka hood. He toppled. I pounced, got the blaster, and whirled to stand before our people.

"Bokzahan raised his ax and threw it. I blasted it in midair and then killed him. Otherwise I used the stunner. And in a minute or two more, the matter was finished. A grenade brought down the front wall of the cabin. The Cainites fell before a barrage of knockout beams. We left them to awaken and returned to camp."

Again silence grew upon us. Manuel asked if he might smoke, politely declined van Rijn's cigars and took a vicious-looking brown cigarette from his own case. That

was a lovely, grotesque thing, wrought in silver on some planet I could not identify.

"Whoof!" van Rijn gusted. "But this is not the whole story, from what you have written. They came to see you before you left."

Per nodded. "Yes, sir," he said. A measure of strength had re-arisen in him. "We'd about finished our preparations when Shivaru himself arrived, with ten other Yildivans and their Lugals. They walked slowly into the compound, ruffs erect and tails held stiff, looking neither to right nor left. I guess they wouldn't have been surprised to be shot down. I ordered such of the boys as were covering them to holster guns, and went out on my carrier to say hello with due formality.

"Shivaru responded just as gravely. Then he got almost tongue-tied. He couldn't really apologize. Ulash doesn't have the phrases for it. He beckoned to Cherkez. 'You were good to release our people whom you held,' he said." Per chuckled. "Huh! What else were we supposed to do, keep feeding them? Cherkez gave him a leather bag. 'I bring a gift,' he told me, and pulled out Tulitur's head. 'We shall return as much of the goods he got from you as we can find,' he promised, 'and if you will give us time, we shall bring double payment for everything else.'

"I'm afraid that after so much blood had gone over the dam, I didn't find the present as gruesome as I ought. I only sputtered that we didn't require such tokens.

" 'But we do,' he said, 'to cleanse our honor.'

"I invited them to eat, but they declined. Shivaru made haste to explain that they didn't feel right about accepting our hospitality until their debt was paid off. I told them we were pulling out. Though that was obvious from the state of the camp, they still looked rather dismayed. So I told them we, or others like us, would be back, but first it was necessary to get our injured people home.

"Another mistake of mine. Because being reminded of what they'd done to us upset them so badly that they only mumbled when I tried to find out why they'd done it. I decided best not press that issue—the situation being delicate yet—and they left with relief branded on them.

"We should have stuck around a while, maybe, because we've got to know what the trouble was before committing more men and equipment to Cain. Else it's all too likely to flare up afresh. But between our being shorthanded, and having a couple of chaps who needed first-class medical treatment, I didn't think we could linger. All the way home we wondered and argued. What had gone wrong? And what, later, had gone right? We still don't know."

Van Rijn's eyes glittered at him. "What is your theory?" he demanded.

"Oh—" Per spread his hands. "Yuschenkoff's, more or less. They were afraid we were the spearhead of an invasion. When we acted reasonably decently—refraining from mistreatment of prisoners, thanks to Manuel, and using stunners rather than blasters in the rescue operation—they decided they were mistaken."

Manuel had not shifted a muscle in face or body, as far as I could see. But van Rijn's battleship prow of a nose swung toward him and the merchant laughed, "You have maybe a little different notion, ha? Come, spew it out."

"My place is not to contradict my captain," said the Nueva Mexican.

"So why you make fumblydiddles against orders, that day on Cain? When you know better, then you got a duty, by damn, to tell us where to stuff our heads."

"If the señor commands. But I am no learned man. I have no book knowledge of studies made on the psychonomy. It is only that . . . that I think I know those Yildivans. They seem not so unlike men of the barranca country on my home world, and again among the Rovers.

"They live very near death, their whole lives. Courage and skill in fighting, those are what they most need to survive, and so are what they most treasure. They thought, seeing us use machines and weapons that kill from afar, seeing us blinded by night and most of us clumsy in the woods, hearing us talk about what our life is like at home —they thought we lacked *cojones*. So they scorned us. They owed us nothing, since we were spiritless and could never understand their own spirit. We were only fit to be the prey, first of their wits and then of their weapons." Manuel's shoulders drew straight. His voice belled out so that I jumped in my seat. "When they found how terrible men are, that they themselves are the weak ones, we changed in their eyes from peasants to kings!"

Van Rijn sucked noisily on his cigar. "Any other shipboard notions?" he asked.

"No, sir, those were our two schools of thought," Per said.

Van Rijn guffawed. "So! Take comfort, freemen. No need for angelometrics on pinheads. Relax and drink. You are both wrong."

"I *beg* your pardon," Henry rapped. "You were not there, may I say."

"No, not in the flesh." Van Rijn slapped his paunch. "Too much flesh for that. But tonight I have been on Cain up here, in this old brain, and it is rusty and afloat in alcohol but it has stored away more information about the universe than maybe the universe gets credit for holding. I see now what the parallels are. Xanadu, Dunbar, Tametha, Disaster Landing . . . oh, the analog is never exact and on Cain the thing I am thinking of has gone far and far . . . but still I see the pattern, and what happened makes sense.

"Not that we have to have an analog. You gave us so many clues here that I could solve the puzzle by logic alone. But analogs help, and also they show my conclusion is not only correct but possible."

Van Rijn paused. He was so blatantly waiting to be coaxed that Harry and I made a long performance out of refreshing our drinks. Van Rijn turned purple, wheezed a while, decided to keep his temper for a better occasion, and chortled.

"Hokay, you win," he said. "I tell you short and fast, because very soon we eat if the cook has not fallen in the curry. Later you can study the formal psychologics.

"The key to this problem is the Lugals. You have been calling them slaves, and there is your mistake. They are not. They are domestic animals."

Per sat bolt upright. "Can't be!" he exclaimed. "Sir. I mean, they have language and—"

"*Ja, ja, ja,* for all I care they do mattress algebra in their heads. They are still tame animals. What is a slave, anyhows? A man who has got to do what another man says, willy-billy. Right? Harry said he would not trust a slave with weapons, and I would not either, because history is too pocked up with slave revolts and slaves running away and slaves dragging their feet and every such foolishness. But your big fierce expensive dogs, Harry, you trust them with their teeth, *nie?* When your kids was little and wet, you left them alone in rooms with a dog to keep watches. There is the difference. A slave may or may not obey. But a domestic animal has got to obey. His genes won't let him do anything different.

"Well, you yourselves figured the Yildivans had kept Lugals so long, breeding them for what traits they wanted, that this had changed the Lugal nature. Must be so. Otherwise the Lugals would be slaves, not animals, and could not always be trusted the way you saw they were. You also guessed the Yildivans themselves must have been affected, and this is very sleek thinking only you did not carry it far enough. Everything you tell about the Yildivans goes to prove, by nature they are *wild* animals.

"I mean wild, like tigers and buffalos. They have no genes for obediences, except to their parents when they are little. So long have they kept Lugals to do the dirty work—before they really became intelligent, I bet, like ants keeping aphids; for remember, you found no Lugals that was not kept—any gregarious-making genes in the Yildivans, any inborn will to be led, has gone foof. This must be so. Otherwise, from normal variation in ability, some form of Yildivan ranks would come to exist, *nie?*

"This pops your fear-of-invasion theory, Per Stenvik. With no concept of a tribe or army, they can't have any notions about conquest. And wild animals don't turn humble when they are beat, Manuel Gomez y Palomares, the way you imagine. A man with a superiority complexion may lick your boots when you prove you are his better; but an untamed carnivore hasn't got any such pride in the first place. He is plain and simple independent of you.

"Well, then, what did actual go on in their heads?

"Recapitalize. Humans land and settle down to deal. Yildivans have no experience of races outside their own planet. They natural assume you think like them. In puncture of fact, I believe they could not possible imagine anything else, even if they was told. Your findings about their culture structure shows their half symbiosis with the Lugals is psychological too; they are specialized in the brains, not near so complicated as man.

"But as they get better acquaintanced, what do they see? People taking orders. How can this be? No Yildivan ever took orders, unless to save his life when an enemy stood over him with a sharp thing. Ah, ha! So some of the strangers is Lugal type. Pretty soon, I bet, old Shivaru decides all of you is Lugal except young Stenvik, because in the end all orders come from him. Some others, like Manuel, is straw bosses maybe, but no more. Tame animals.

"And then Per mentions the idea of God."

Van Rijn crossed himself with a somewhat irritating piety. "I make no blasfuming," he said. "But everybody knows our picture of God comes in part from our kings. If you want to know how Oriental kings in ancient days was spoken to, look in your prayer book. Even now, we admit He is the Lord, and we is supposed to do His will, hoping He will not take too serious a few things that happen to anybody like anger, pride, envy, gluttony, lust, sloth, greed, and the rest what makes life fun.

"Per said this. So Per admitted he had a master. But then he must also be a Lugal—an animal. No Yildivan could possible confess to having even a mythical master, as shown by the fact they have no religion themselves though their Lugals seem to.

"Give old boy Shivaru his credits, he came again with some friends to ask further. What did he learn? He already knew everybody else was a Lugal, because of obeying. Now Per said he was no better than the rest. This confirmed Per was also a Lugal. And what blew the cork out of the bottle was when Per said he nor none of them had any owners at home!

"Whup, whup, slow down, youngster. You could not have known. Always we make discoveries the hard way. Like those poor Yildivans.

"They was real worried, you can imagine. Even dogs turn on people now and then, and surely some Lugals go bad once in a while on Cain and make big trouble before they can get killed. The Yildivans had seen some of your powers, knew you was dangerous—and your breed of Lugal must have gone mad and killed off its own Yildivans. How else could you be Lugals and yet have no masters?

"So. What would you and I do, friends, if we lived in lonely country houses and a pack of wild dogs what had killed people set up shop in our neighborhood?"

Van Rijn gurgled beer down his throat. We pondered for a while. "Seems pretty far-fetched," Harry said.

"No." Per's cheeks burned with excitement. "It fits. Freeman van Rijn put into words what I always felt as I got to know Shivaru. A, a single-mindedness about him. As if he was incapable of seeing certain things, grasping certain ideas, though his reasoning faculties were intrinsically as good as mine. Yes—"

I nodded at my pipe, which had been with me when I clashed against stranger beings than that.

"So two of them first took advantage of you," van Rijn said, "to swindle away what they could before the attack because they wasn't sure the attack would work. No shame there. You was outside the honor concept, being animals. Animals whose ancestors must have murdered a whole race of true humans, in their views. Then the alarmed males tried to scrub you out. They failed, but hoped maybe to use their prisoners for a lever to pry you off their country. Only Manuel fooled them."

"But why'd they change their minds about us?" Per asked.

Van Rijn wagged his finger. "Ha, there you was lucky. You gave a very clear and important order. Your men disobeyed every bit of it. Now Lugals might go crazy and kill off Yildivans, but they are so bred to being bossed that they can't stand long against a leader. Or if they do, it's because they is too crazy to think straight. Manuel, though, was thinking straight like a plumber line. His strategy worked five-four-three-two-one-zero. Also, your people did not kill more Yildivans than was needful, which crazy Lugals would do.

"So you could not be domestic animals after all, gone bad or not. Therefore you had to be wild animals. The Cainite mind—a narrow mind like you said—can't imagine any third horn on that special bull. If you had proved you was not Lugal type, you must be Yildivan type. Indications to the contrariwise, the way you seemed to take orders or acknowledge a Lord, those must have been misunderstandings on the Cainites' part.

"Once he had time to reason this out, Shivaru saw his people had done yours dirty. Partway he felt bad about it in his soul, if he has one stowed somewhere; Yildivans do have some notion about upright behavior to other Yildivans. And besides, he did not want to lose a chance at your fine trade goods. He convinced his friends. They did what best they could think about to make amendments."

Van Rijn rubbed his palms together in glee. "Oh, ho, ho, what customers they will be for us!" he roared.

We sat still for another time, digesting the idea, until the butler announced dinner. Manuel helped Per rise. "We'll have to instruct everybody who goes to Cain," the boy said. "I mean not to let on that we aren't wild animals, we humans."

"But, captain," Manuel said, and his head lifted high, "we are."

Van Rijn stopped and looked at us a while. Then he shook his own head violently and shambled bearlike to the viewer wall. "No," he growled. "Some of us are."

"How's that?" Harry wondered.

"We here in this room are wild," van Rijn said. "We do what we do because we want to or because it is right. No other motivation, *nie?* If you made slaves of us, you would for sure not be wise to let us near a weapon.

"But how many slaves has there been, in Earth's long history, that their masters could trust? Quite some! There was even armies of slaves, like the Janissaries. And how many people today is domestic animals at heart? Wanting somebody else should tell them what to do, and take care of their needfuls, and protect them not just against their fellow men but against themselves? Why has every free human society been so short-lived? Is this not because the wild-animal men are born so heart-breaking seldom?"

He glared out across the city, where it winked and glittered beneath the stars, around the curve of the planet. "Do you think they yonder is free?" he shouted. His hand chopped downward in scorn. ■

in times to come

Next month—in addition to more details concerning Grandfather's Ghost, and the troubles the Llralan invaders have—we can offer some other examples of "wild men", in van Rijn's terms.

"Genus Traitor," by Mack Reynolds, has the cover—Jack Schoenherr's done a beautiful job on a Martian landscape—and a lovely little idea. Some men have been cheated by Nature; they look like rats, their voices sound untrustworthy, and people automatically disbelieve them—no matter how honest, trustworthy, wise, and well-intentioned they may be. This makes it a bit difficult for such a man to convince people that the World's Greatest Living Hero is a fraud, a coward, a cheat and a menace. And that Martians aren't what he has fully reported them to be . . .

Also . . . several faithful readers report that after the Transphonemator editorial they tried diligently to look up papers by Dr. Dwight W. Batteau, and found that Dr. Dwight Batteau had no papers listed in the literature, that, moreover, they couldn't find that any Batteau had anything in the literature. For some ten years I've been trying to get Batteau to do something for Analog.

I'm happy to announce that next month we will have an article by Dr. Batteau —with pictures of some of his fascinatingly weird gadgets! ■ *The Editor.*

Origin of the Solar System

continued from page 16

Call them *embryo stars.*

So the observational evidence for planetary systems is not going to be of much help to us. Of course, considering how difficult it would be to detect planets near other stars—the vast distances involved, and the inherent dimness of planetary bodies—it is not surprising that only the embryo stars have been found. Even if Proxima Centauri sported an exact replica of our solar system, we would be unable to detect it.

The world-acknowledged expert on these dark companions of stars is Professor Peter van de Kamp, director of Sproul Observatory. He lists five small stars within fifteen light-years of the sun as having embryo-star companions orbiting around them. It has been impossible, to date, to detect similar bodies near stars that are farther away; distance makes the observational difficulties overwhelming. In fact, van de Kamp's most recent announcement concerned the second-nearest star to the sun. Barnard's Star, about six light-years from us, was found last year to have a dark companion, with a mass computed to be about 1.5 times the mass of Jupiter. This is roughly equal to the combined masses of all the planets and lesser objects of our solar system.

Now then: putting together known, observable facts, what do we find?

1. Stars are being formed continuously from interstellar gas and dust.
2. Many stars form in pairs or multiple groups.
3. Some stars are accompanied by dark companions of masses analogous to the combined mass of the solar system's solid bodies.
4. It is impossible to detect planetary systems similar to our own, even if they exist on other stars.

Perhaps the first three points are all we need to explain the origin of the solar system. The solid bodies circling the sun today might be the remnants of a single body, originally similar in size to the embryo stars observed near Barnard's Star, 61 Cygni, and three other stars within fifteen light-years of the sun.

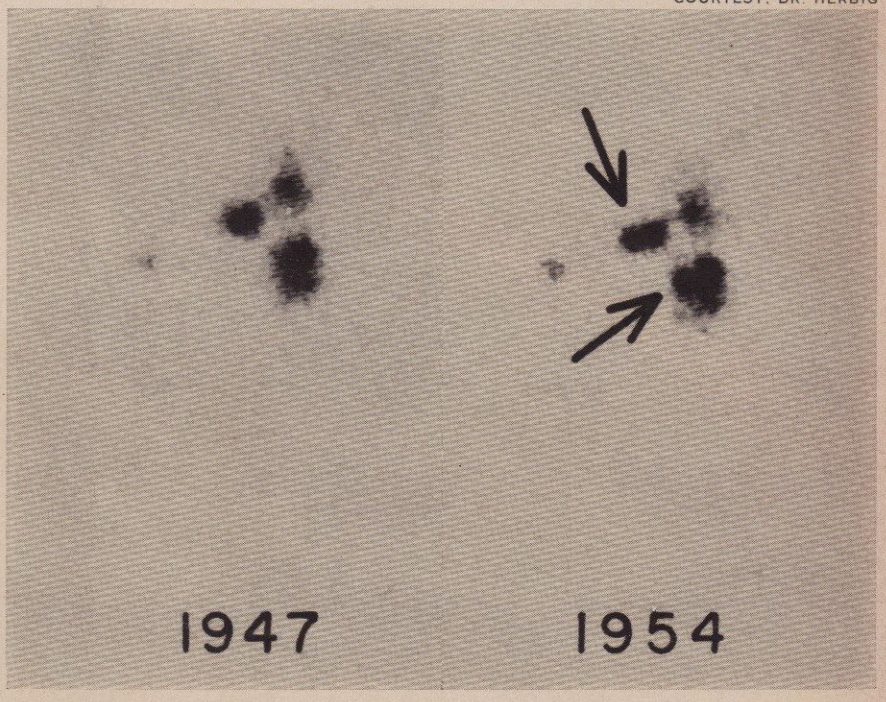
The sun could have originated as a double star. Or perhaps the sun was born in a cluster of stars. Apparently many stars are formed in clusters, with close spacings between stars at the outset. Gradually the cluster spreads apart and disperses under the gravitational influence of the rest of the Milky Way's 100 billion stars. The Pleiades are a prime example of a tightly-knit youngish cluster; the Hyades nearby are older and much looser. In a few billion years, the Hyades will be completely dispersed. Today, the sun is moving through the midst of the Ursa Major Cluster, a very loose—and therefore very aged—group that includes most of the stars of the Big Dipper, plus Sirius and several others. It might be that the sun is actually a member of this cluster, and was born in it some five billion years ago.

There is more than one way, then, that the sun could have been closely associated with a dark embryo star. The present vast distances between the sun and its nearest stellar neighbors are a feature of today's sky—the picture was probably very different a few billion years ago.

Now let us examine the sequence of events that might have led to the present shape of the solar system, as deduced from the "embryo star theory."

First, the sun condensed directly from interstellar gas and dust, either as the major component of a double star, or as a member of a star cluster. The sun did not spin off a huge planetary disk, but it did remain enmeshed in considerable gas and dust even after it had begun to glow as a star. There is solid observational evidence for this—very young T Tauri stars, for example, are invariably imbedded in such clouds.

COURTESY, DR. HERBIG



Birth of New Stars may have been captured in these photographs. In these negative prints, three young T-Tauri type of stars have increased to five stars over the seven-year lapse between pictures. Dr. George H. Herbig of Lick Observatory states: "Perhaps what was observed here is something that takes place early in the career of a T Tauri star." Star images appear fuzzy because stars are still enmeshed in considerable gas and dust.

Origin of the Solar System

YERKES OBSERVATORY PHOTO

Morehouse's Comet, as seen in 1908. Note resemblance to pellets in laboratory ballistic range, as comet "re-enters" through thin gas pervading solar system.

The embryo star also coalesced from the interstellar material. It began just as any other star, but it never attained the mass necessary to cause its internal temperature to reach nuclear fusion heat. It did not become a true star, but remained a cold spherical body.

Since there were no nuclear reactions to keep the embryo's star's materials stirred up in a homogeneous mass, the elements within it began to separate gravitationally. The heaviest materials—the earthy metals and silicates — naturally sank toward the center. The lighter gases—predominantly hydrogen and helium—formed a spherical shell around this core.

This embryo star was the raw material out of which the solid bodies of the solar system were formed. But how did the embryo star break up?

There are two possibilities, depending on whether the embryo star was born as the sun's companion in a double-star arrangement, or whether it brushed past the sun on a one-time encounter. If it were the sun's companion, it would have been in an elliptical orbit around the sun. If it were an intruder, the embryo star most likely would have approached the sun on a hyperbolic trajectory, as some comets do; a trajectory that comes in from infinity, swings close to the sun, and then whips out again toward infinity. We shall consider the hyperbolic trajectory first.

Consider the situation as it might have existed some four or five billion years ago. The very young sun, still swaddled in a thin cloud of gas and dust. The embryo star, cool and dark, falling toward the sun, accelerating rapidly as the sun's gravitational field begins to exert an increasingly powerful force on it. The embryo star could be considered as a superplanetary-sized "nose cone" falling into the gaseous cloud surrounding the sun. If there is one thing that studies of missile re-entry have impressed on physicists, it is the tremendous kinetic energy available to a re-entering object.

As the embryo star plows into the cloud surrounding the sun, it sets up a tremendous shock wave. Even though the gas cloud would be considered a good vacuum by terrestrial standards, it still represents a highly-resistant medium to the invading body. Remember, meteoroids entering Earth's atmosphere heat to incandescence at altitudes of about sixty miles—a very good vacuum by terrestrial standards.

As the embryo star falls inward it begins to encounter serious heating. Its surface starts to ablate—layers of hydrogen and helium literally boil off and stream back into the intruder's wake. Perhaps masses the size of small planets scrub off in single chunks.

The embryo star's plunge toward the sun is being slowed down by immense frictional forces. In essence, the invader is trading its kinetic energy for heat. The fragments that are spalling off from its surface are thrown out into the wake, where they take up independent trajectories. Some of these bodies might be of the proper size and density to allow further frictional interaction with the surrounding gases to slow them from hyperbolic velocity to elliptical. They would then take up planetary orbits around the sun.

These huge globs of gaseous material would begin to cool off as soon as they left the vicinity of the ablating embryo star. The larger fragments might even attract gravitationally some of the surrounding gases to themselves, thereby adding mass. The fragments that would add the most mass, of course, are those that have the most nearly-circular orbits, and are closest to the sun. This is because they would spend the most time within the thickest region of gases—assuming the cloud's density increased with proximity to the sun.

Thus we can begin to visualize the formation of the giant planets—Jupiter, Saturn, Uranus, and Neptune. The original fragments of the embryo star acted as nuclei that scooped up mass from the gas cloud around the sun. The largest of these outer planets is, of course, Jupiter; largest, and closest to the sun. Pluto is probably not a giant planet, but might have been formed in the same way. However, at the distance from the sun of Pluto's orbit, the solar gas cloud might have been so thin—or entirely absent—that Pluto had no chance to add much to itself.

Now the explanation for Uranus' "flat on its back" rotation becomes quite simple. Uranus began as a fragment that was thrown off with that peculiar spin. As the fragments scrubbed off the fast-ablating star, they must have peeled away with many different spin-orientations. For example: Earth's poles are tilted 23°27′ away from the perpendicular to the orbital plane around the sun; Jupiter's are tilted only 3°4′; Uranus' 98°.

Most of the fragments boiled off the embryo star's surface, of course, would most likely be thrown into parabolic or hyperbolic trajectories. The hyperbolic fragments escaped from the solar system altogether; the fragments in parabolic orbits may well be what we know today as comets. Astronomers suspect there is a vast shell of comets orbiting beyond Pluto, perhaps as far as a light-year or more away, but still gravitationally tethered to the sun. Such a cometary shell would fit the embryo star theory nicely.

The satellites of the outer planets, which are apparently composed of the same materials as the giant planets themselves, simply represent smaller fragments spalled off the intruder. Too small to attract much gas or dust to themselves, they were pulled into satellite orbits by their larger and fast-growing neighbors. The rings of Saturn obviously represent a special case; but one of the strengths of this theory is that special cases can be handled separately. There is no need to generate a single grand principle that accounts for every detailed feature of the solar system!

Now to consider the formation of the inner planets.

By the time the embryo star penetrated Jupiter's orbit, most of its mass must have been stripped away. The outer layers of hydrogen and helium had gone to form the giant planets. The embryo star's core — predominantly rocky and metallic materials—was no longer compressed by the weight of the gases around it. Whether

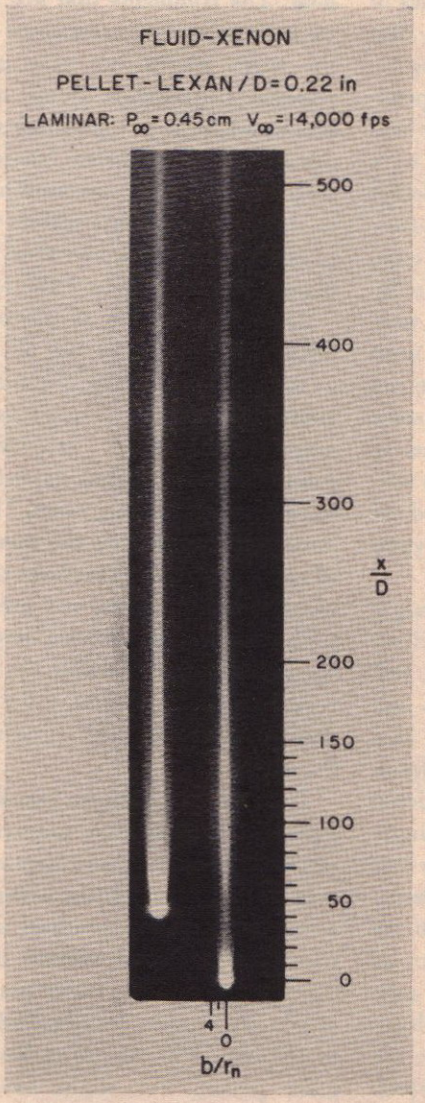
Origin of the Solar System

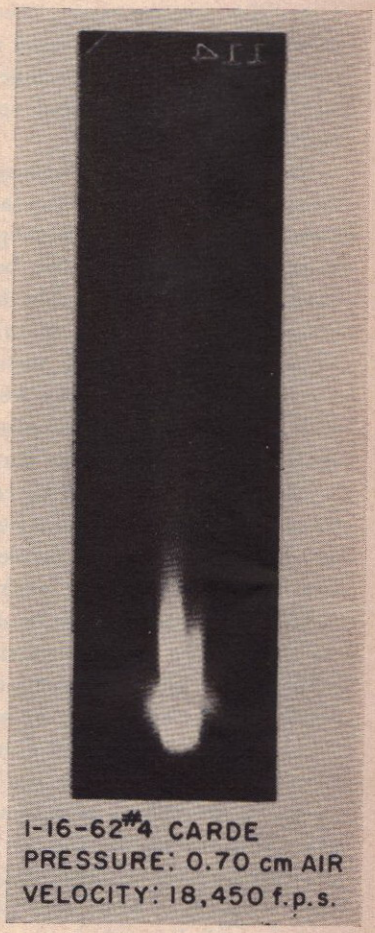
the core expanded and broke apart in a relatively gradual manner, or simply exploded, the results were eventually the same. Stony and metallic fragments were hurled into millions of separate orbits around the sun.

The largest of these fragments represent the four inner planets—Mercury, Venus, Earth and Mars. It is no accident that the two smallest members of the quartet fall at the extreme ends of the grouping. Simple physics dictates that the largest bodies would remain in an intermediate position while the smaller bodies are hurled to the extremes. One of the large chunks of matter thrown out in this breakup of the embryo star's core was captured eventually by our own Earth, and became our Moon. Myriads of smaller pieces were thrown farther out than Mercury and Mars. The particles beyond Mars are still there—the planetoid belt. Those beyond Mercury were swallowed, no doubt, by the sun.

Did the inner planets draw some of the sun's gas cloud to themselves? Perhaps so, but not to the degree that the outer, larger planets could. The inner planets were never big enough to pull much mass to themselves. Also, once the sun attained its full strength and

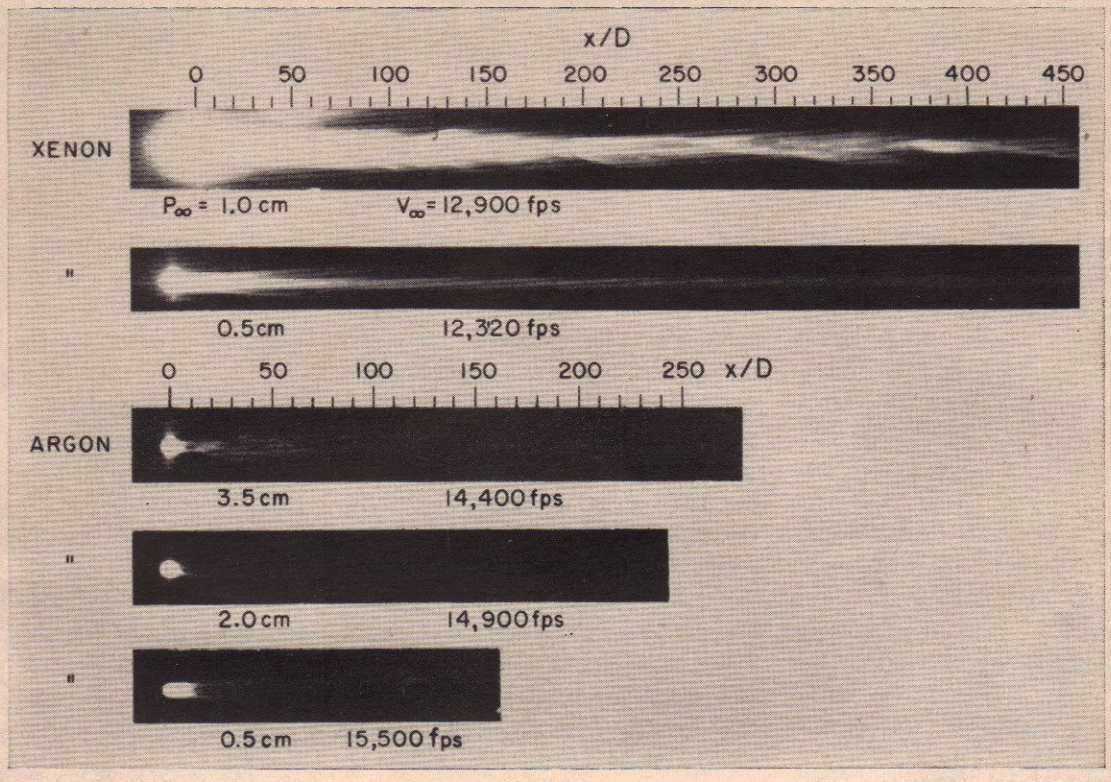
continued

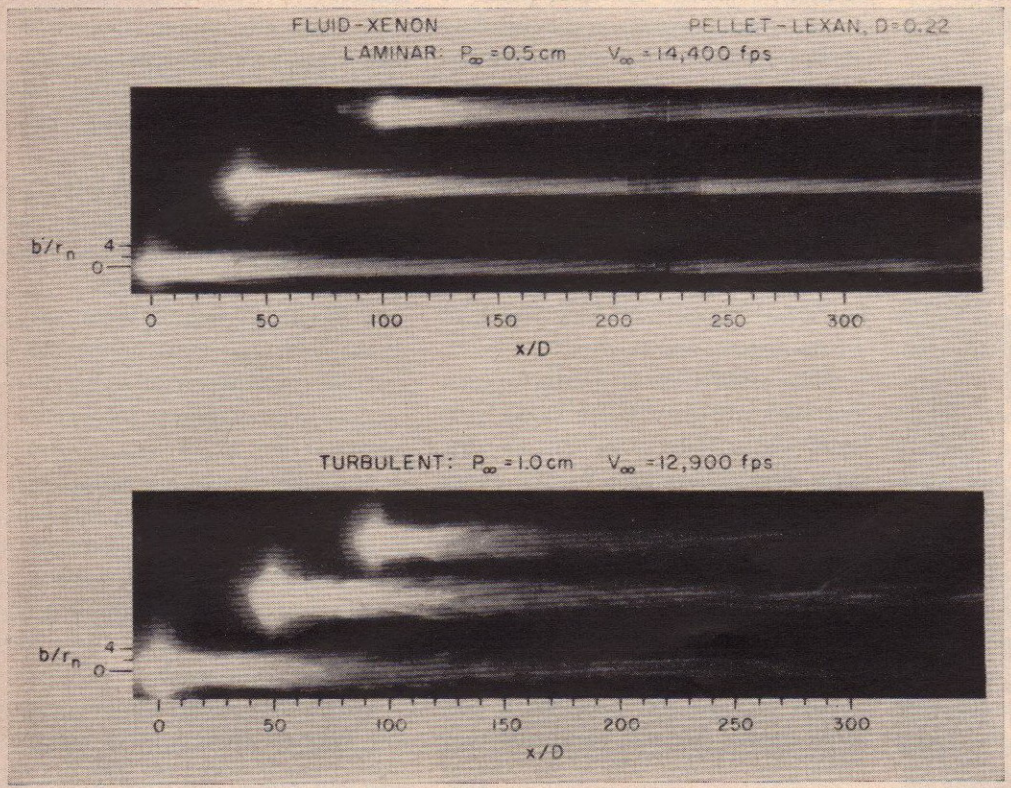




These photographs show pellets fired in ballistic ranges by research staff members of Avco-Everett Research Laboratory. These experiments are intended for studies of the physical characteristics of re-entering bodies. They suggest a striking similarity to photographs of comets, and might be used in conjunction with the "re-entry" concept of the embryo star's interaction with the gas cloud surrounding the young sun.

COURTESY
AVCO-EVERETT RESEARCH LABORATORY,
DIVISION OF
AVCO CORPORATION


x/D
0 50 100 150 200 250 300 350 400 450
XENON
P∞ = 1.0 cm
V∞ = 12,900 fps
"
0.5cm
12,320 fps
0 50 100 150 200 250 x/D
ARGON
3.5cm
14,400 fps
"
2.0cm
14,900 fps
"
0.5cm
15,500 fps


FLUID-XENON
PELLET-LEXAN, D=0.22
LAMINAR: P∞ = 0.5 cm
V∞ = 14,400 fps
b/rn
4
0
0 50 100 150 200 250 300
x/D
TURBULENT: P∞ = 1.0 cm
V∞ = 12,900 fps
b/rn
4
0
0 50 100 150 200 250 300
x/D

started beaming out energy at its current rate, temperatures on the inner planets rose to the point where they could not retain hydrogen and helium in their atmospheres.

The inner regions of the newly-created solar system must have been swarming with smaller fragments of rock and metal. In time, either the sun itself or the planets would have swept up this debris. The surface of the Moon certainly bears witness to that fact. Geophysicists have also begun to realize that the Earth itself bears the ancient scars of titanic meteoritic impacts. Called *astroblemes*, these mammoth craters have been worn down and disguised by eons of weathering and camouflaged by vegetation. But they show up, startingly, in aerial photographs. George W. Harper also suggests that many of the markings on Mars, including the *canali*, may also be the result of astroblemes (see OBSERVATIONAL DIFFICULTIES, Analog, May 1963).

If the embryo star began as a companion of the sun in an elliptical orbit, then some of the details of the picture change, but the over-all results remain much the same. The problem becomes basically similar to a satellite re-entering Earth's atmosphere.

Satellites undergo heating at higher altitudes than re-entering missiles, because of the flatness of their re-entry angle. The embryo star, then, might have encountered serious heating sooner, and broken up farther away from the sun, than in the hyperbolic trajectory case. However, once the embryo star broke up, most of its fragments would still be in elliptical orbits.

Some of these fragments would spiral in still closer to the sun, only to break up again. The solid core would probably have come the closest to the sun before finally breaking up. Once a fragment had gone below a certain critical size, of course, frictional forces due to the cloud around the sun would have a diminishing effect on it. Thus, these frictional forces could dominate the behavior of the embryo star once it entered the sun's surrounding cloud, but they would have a vanishingly small effect on bodies of the size of Jupiter or the Earth.

This gas cloud around the sun, remember, was never as dense as that postulated in the dust cloud theory. In time, most of the cloud dispersed into interstellar space, just as Maxwell said it should. We are left, then, with a solar system that looks just about like the one we know from observation.

If the embryo star started as a companion of the sun, the chances are strong that its original orbit was in the plane of the sun's rotation. When the embryo star broke apart, the resulting planets and debris remained in the same plane, by and large. However, if the embryo star was an invader, it could have approached the sun from any angle. Regardless of the sun's original plane of rotation, though, the infall of debris into the sun would have almost certainly been enough to change the sun's plane of rotation into the plane of the invading star's trajectory. After all, the sun has only two per cent of the angular momentum of the solar system. The infall of debris could have been sufficient to literally force the sun to rotate in the same plane as its newly-acquired planets.

Incidentally, another curiosity of the solar system might be explained by the embryo star theory.

Meteorites come in several species, but basically they break down into stony and metallic types. The metallic ones seem to have been formed under tremendous pressures, such as those found in the core of a planet. But the rocky types apparently aggregated from smaller particles in space. How can you explain them both with one concept?

The embryo star provides a possible answer. Metallic meteorites may have been formed within the core of the embryo star itself. Assuming the core exploded, the metallic fragments were hurled into independent orbits. Some escaped the solar system entirely, some are whirling between the planets. The stony fragments, though, may have been largely melted or fragmented into microscopic-sized particles by the force of the explosion of the embryo star's core. In space, these droplets—called chondrules—may have coalesced into meteoroid-sized particles.

Thus we can account, qualitatively, for the major features of the solar system through the embryo star theory. The theory still leaves many questions unanswered, and is a long way from offering any quantitative proof of its suppositions. At this date, it is more a speculation than a theory, and a bout with mathematics may destroy it completely. On the other hand, if a mathematical analysis shows that the major tenets of the theory are within the realm of possibility, then the idea might be seriously considered as a competitor to the dust cloud theory.

Philosophically, the embryo star concept has several strong points:

1. It originates in observational evidence.

2. It permits unique phenomena to take place within the general framework of the same theoretical background — the spin-orientation of Uranus, for example.

3. It recognizes that the interstellar environment at the time of the sun's birth was probably very different from the sun's environment today.

4. Finally, it pictures the formation of the solar system as neither an inevitable consequence of stellar evolution nor as an extremely rare—perhaps unique—event. Stars born in clusters, or as double or multiple stars, stand a reasonably good chance of developing a planetary system. Apparently at least half the Milky Way's stars are members of double or multiple groupings. And it is becoming more evident that many stars are born in clusters.

The chances, then, of finding planetary systems around other stars are neither one hundred per cent nor zero —which sounds very much like the Nature we are familiar with here on Earth. ■

METAMORPHOSIS

In 1958, Ace Books published an original paperback, "Red Alert," by Peter Bryant, subtitled "a novel of the first two hours of World War III." In it a paranoiac Air Force general, convinced of the need for preventive war against Russia, carefully sets up a situation in which he can dispatch his bomber wing against Soviet bases, isolate his own command, and ignore or fight off attempts to stop him until a *de facto* nuclear armageddon is under way.

"Red Alert" has now been metamorphosed into a major motion picture which those of you in larger cities than Pittsburgh may have seen: "Dr. Strangelove, or: How I Learned to Stop Worrying and Love the Bomb," with Peter Sellers playing a President of the United States, a British aide of the crackpot general, and the Nazi scientist for whom the new version is named. Peter George, one of the three writers credited with the script, has also rewritten "Red Alert"—he evidently was Peter "Bryant" in 1958—as a totally new paperback with the same title as the film. It's published by Bantam as their No. F-2679 for 50 cents.

To dispose of the book, "Dr. Strangelove," first, it is totally different from "Red Alert," except in the theme and plot skeleton. It is also far poorer reading material than the original, which was tautly plotted and realistically developed. The film, as you know if you have seen reviews or the movie itself, is a wild burlesque. Characters and places have been given "Li'l Abner"-type names and characters, and the serious treatment of "Red Alert" has become broad comedy. From all accounts, this has been eminently successful in the film. It is eminently *un*successful in the novelization of the script.

But the aspect of "Dr. Strangelove" which is of most interest is the storm of condemnation which has burst over it, especially or primarily in the United States. (I haven't seen the English reviews). Top film reviewers, intellectual leaders, columnists are screaming like stuck pigs—or, more properly, like pigs caught in a fence. The director-producer, Stanley Kubrick, had no right to treat a serious subject ridiculously! He had no right to depict a President of the United States as a bumbling fool with the Dogpatch name of Merkin Muffley, and the grrreat leaders of our grrreat Air Force as crackpots, lechers and professional idiots! Such a film will ruin the Good Name of the American Nation wherever it is shown in the world; it must be barred from export, and it had better be barred from domestic screens, where it will Influence Our Youth and Lead To Discontent! What Is He Doing To Our IMAGE?

Readers of Analog, and science-fiction readers in general, need no introduction to the uses and values of burlesque and satire, either by scalpel or by bludgeon. But some of our intellectual leaders can't take it. Even from the stumbling paperback it is evident that Kubrick is saying clearly and plainly that only a government of idiots in an insane world could start a nuclear war. I have a feeling that there will be no such protest movement in England as there has been here. I am reminded of a three-year-old running home, screaming for Mummy, because Jimmy is laughing at him.

There was no such furor over "Red Alert," which proposed the same possibility in serious fiction—but intellectuals don't read paperbacks, especially original paperbacks. There *has* been a very considerable to do over "Fail-Safe," by Harvey Wheeler and Eugene Burdick — film version not yet released — in which a nuclear war is launched in much the same way, but by failure of an electronic component in the computer controlling our SAC deployment. In that case, it would appear that the Pentagon has been behind the attacks—but there's no room to go into that here.

In an article in last November 9th's *Saturday Review*, "The Politics of Destruction," Wheeler and Burdick list what they consider are sources of hazard which can and may precipitate the world into a nuclear slugging match. One is a technological failure, such as they used for their book. Another is action by a "madman" who is in a position to push the situation beyond the point of no return. General Jack D. Ripper in "Dr. Strangelove" is such a psychopath, haunted by impotency, fear of fluoridation, fear of communists in our midst. General Quinten of the original book was equally, but more subtly, driven to take the fate of the world into his own hands . . . and just recently, in George H. Smith's "Doomsday Wing," we have Quinten's counterpart in Russia acting in exactly

the same way. (Incidentally, in "Dr. Strangelove," Russia has the Doomsday Bomb which the United States has in Smith's book.)

A good job has been done of filming "Seven Days in May," the novel by Fletcher Kuebel and Charles W. Bailey II (Bantam, 95¢) in which an equally righteous general plans to seize the government. I've heard no scream over that; in fact, the military seem to have co-operated by lending equipment, *et al.* Apparently it's just satire that we can't stand. As John Campbell has asked over and over again, "Who says they're intellectuals?"

Correction:

Robert Coulson of Wabash, Indiana, co-editor and publisher of *Yandro,* one of the better fan magazines, has jumped me for repeatedly calling the late SF magazine, *Satellite,* a British publication. It was, of course, New York born and bred, and published by Leo Margulies, no stranger to SF readers. I was carelessly confusing it with the Scottish—not English—*Nebula.* Bob points out, "not *all* the good stories appear in British mags." Nor will any of them, after this, for John Carnell's excellent magazines, which have given a hearing to some of the best new English writers, have succumbed to American paperbacks and commercial TV. Let's hope we see more of some of these writers here in Analog—or it may be that they'll write more original paperbacks.

LOOKING FOR THE GENERAL

By Warren Miller • McGraw-Hill Book Co., New York • 1964 • 203 pp. • $4.95

This novel is not science fiction, but it is about the science-fiction world—or, rather, about that strange world of fanaticism and hallucination which is our lunatic fringe. Its people believe in the arcane secrets of the Ancients, and spend foundation money in modern laboratories to recover the lost mysteries. They believe that they are, some of them, changelings, planted here among ordinary men by the people who ride the flying saucers among the stars. They believe that they can, by insight or revelation, discover what the alchemists meant by their cryptic scribblings and symbols. They believe in Mu and Lemuria and the Shaver mystery.

The general of the title, director of a secret laboratory in or near Pittsburgh, is a believer who disappears, heading west across the country to some strange rendezvous with Space People and cosmic destiny. The narrator, one of his research workers, considers himself a knower rather than a believer. The book is a kind of stream-of-consciousness account of his pursuit, following the general's trail from hive to hive of the Faithful, ending with a bungled dynamiting-cum-kidnaping in the Arizona desert which the General and some Indian friends have planned as a signal to Them and a warning to unbelievers.

The style, braided out of Charles Fort, Jung, Madame Blavatsky, Paracelsus, and the beatniks, is often as exasperating as the people the book presents. The author warns: "the ideas expressed by the characters in this book are to be found in certain magazines and books published in this country, and... are shared by a small army of our countrymen."

These are the people and the ideas which most people — including the country's intellectual elite — identify with science fiction. (This week's *Saturday Evening Post* has an article on L. Ron Hubbard and Scientology which implies the identity.) You may not like the book, and I don't think you will identify with its characters, but reading it will be an experience.

THE WINTER PEOPLE

By Gilbert Phelps • Simon and Schuster, New York • 1964 • 254 pp. • $4.50

Now that any corner of the world that isn't politically walled off is accessible by plane or Landrover, the "lost race" story has dropped out of science fiction. It was, perhaps, most firmly established by H. Rider Haggard and Tarzan made good use of it for a good many years. It contributed a sizable proportion to the science-fiction magazines right up to World War II. Then we learned all about the world, and there were no more far places or lost peoples stranger than ourselves.

It is refreshing, after all this time, to find an English writer who recreates the lost race story of Haggard's time in a deft pastiche of late Victorian style. Indeed, he does more: he creates two symbols of that era. One is the narrator, David Parr, a fusty post-Edwardian solicitor whose mind and manner set in 1914. The other is his great-uncle, Colonel John Parr, whose journal contains the story of the Winter People whom he found in a lost valley in the Andean *puna.*

Colonel Parr is also an individual living long after his proper era. He would have been in his element in the first half of the Nineteenth Century, when curiosity about the world was still wild and free, almost anything seemed possible, and society had not ossified and drawn the blinds. Unfortunately, his adventures in the Peruvian highlands began late in 1895, when the blinds were down and the bars up—so he ended his days locked up in an abandoned farmhouse, where his nephew came at last to read the story of his discredited discoveries.

The people he found were like the landlocked Indians of Wells' "Country of the Blind." Their memories seemed to start with the spring. They lived almost by instinct, cultivating a strange food plant, enacting an intricate ritual, blind to the paved paths and ancient, sealed buildings near their villages. Living with them, Colonel Parr found himself frustrated in a thousand ways. Then he learned the end to which all the ritual was building, and his frustration drove him over into the fringes of insanity.

For when winter came, and the cold air of the uplands drained down to fill the sealed valley, the buildings opened and the Winter People went into hibernation. In spring, when the sun came again and the deep snows melted and drained away, the vault opened and the living dead came out . . . memories

washed away, born anew with the compulsion to go through the formal play of planting and harvesting, fertility and war. And it was, of course, a pageant in which there was no part for a stranger.

You can read the book as an allegory, if you like—mankind condemning itself to a meaningless ritual of work, reproduction and destruction, only to start over again after winter has passed. John Parr the narrator suspects at times that the journal may be a forgery, the romantic madness of an age preserved long after its proper time. Or you can accept Colonel Parr's story of what is back there in the mountains at the border between *puna* and jungle . . . where, in tonight's paper, Indians with bows and arrows are standing off a segment of the Peruvian army.

THE SENTINEL STARS

By Louis Charbonneau • Bantam Books, New York • No. J-2686 • 1963 • 156 pp. • 40¢

The Earth of 2200 A.D. which the author of this book has postulated is disturbingly probable. East and West have grown more and more alike, until they have at last merged in one world-wide Organization that manages Man for his own good and the smooth operation of society. Depending on a variety of things — heredity, family status, talents among them—every individual is born with a debt to the Internal Revenue Department, which he works off for the rest of his life. The lower echelons work five or six days a week and make little headway against the growing debt for food, shelter, clothing, entertainment, sex. With promotion, it is possible to work fewer days at a higher rate. Eventually, a few may graduate as Freemen and work no more. They live in the open air, in the walled-in Freemen's Camps, far from the city machine, their debt to society paid for as long as they and their descendants shall live.

Thomas Robert Hendley—TRH-247—brings the whole structure down upon himself by failing to go to work one day. He picks up a girl of a lower class, a Fiver to his Three, and has a brief but passionate affair on the roof of the city, which is terminated when the Organization closes in on them. As therapy, he is sent to a Freemen's Camp, where an inmate changes places with him—and his problem in that hell of sex, violence and boredom is to get out again. For it becomes clear that the computers that run the Organization maintain harmony by controlling every aspect of every individual's life. It is the only way that a society of billions can be efficiently run and kept from breaking down. But in TRH-247 there was a momentary failure, perhaps in the gene-probing stage when the Machine was designing him. And there are other mavericks like him . . .

It's a familiar enough pattern, of course, though quite well done. I hope no bored technician reads the book to that computer the Internal Revenue Service is installing down in West Virginia, which in a year or so is to keep tabs on the coming and going of every cent we handle. Tax Debts could come a long time before 2200!

THE HAMELIN PLAGUE

By A. Bertram Chandler • Monarch Books, Derby, Conn. • No. 390 • 1963 • 126 pp. • 35¢

This is a fairly routine monster yarn brought to life by the fact that the author—better known here for his space adventure stories about the Rim Worlds at the edge of the Galaxy—is this time writing about the world and life he leads himself. Chandler is an officer on a merchant ship in the Australian coastal trade, and so is Timothy Barrett, the hero of this book. Barrett spends most of his life at sea, and is steadily drifting away from the wife he has in a Sydney suburb. And then a collection of odd and nasty incidents come to a sudden head when the rats of the world, driven and controlled by a hideous lot of mutants, declare war on Man and his works.

The rats steal matches and set fires. They attack babies, dogs, men, singly and in packs. They gnaw through insulation and paralyze power lines and telephone systems. They cut tires to ribbons and undermine walls. They carry disease — probably deliberately. And with Sydney a mass of flame, and every town in Australia going up, Barrett and a few of the crew make it to sea—then start the hunt for an eccentric scientist who may have a weapon against the King Rats and their hordes.

The story never lags.

THE SUPPLEMENTAL CHECKLIST OF FANTASTIC LITERATURE

Compiled by Bradford M. Day • Science-Fiction & Fantasy Publications, Denver, N. Y. • 1963 • 155 pp. Mimeo. • $5.50

It's hard to believe, but sixteen years have elapsed since Shasta published Everett Bleiler's "The Checklist of Fantastic Literature." In spite of errors and omissions — I think most critics would say its most serious fault is the listing of non-fantasies — the "Checklist" is the collector's handbook, and a collector's item itself. In this mimeographed compilation, about the size of an issue of Analog, Brad Day has undertaken to supplement the Bleiler volume by repairing some of the omissions and bringing it down to 1963.

Day is, of course, the compiler-publisher of the equally essential "Index on the Weird & Fantastica in Magazines" (1953), long out of print, and the recent "Complete Checklist of Science-Fiction Magazines" (1961, and still available at $1.50). Like Bleiler, he has had to rely on informants whom he thanks in an introduction, and any errors they made are now perpetuated. He has not tried to correct mistaken entries in the Bleiler "Checklist," feeling that this would be prohibited by copyright. I think he was mistaken in this, and wish, in particular, that he had cleared up some of the mistakes, typographical errors and non-first editions in the older book.

Organization is the same as that of the original "Checklist": a listing of books by author, with publisher and date of publication, followed by a title-and-author listing that does not repeat the bibliographical information. Books are not described or characterized; that would take something the size of the Oxford Dictionary. Separate hard-

paper covers and double side-stapling make the book more durable—an important factor, since it is undoubtedly going to get hard use.

Bibliographical work like this is one of the aspects of SF fandom that is of lasting value. The publishers spend days, nights and years of spare time on the job, publish at their own expense, and rarely get their money back. This is in every sense scholarly work, of a sort that some foundation or university press should underwrite—except that they would insist that a faculty name or at very least a graduate student's appear as author. One problem is that the compiler himself is usually the only person capable of judging his work's completeness and accuracy. Maybe Brad Day can at least have a shiny rocket for his mantle, even if he doesn't get his bank account back.

I should add that only 403 copies of the "Supplemental Checklist" were run off. They shouldn't last long.

BEYOND THE STARS

By Ray Cummings • Ace Books, New York • No. F-248 • 1964 • 160 pp. • 40¢

What Ace doesn't tell you is that this story appeared as a "complete novel" in *Argosy* for February 11, 1928, at the beginning of its author's most popular and prolific period. The Bohr atom with its "planetary" electrons was still new to the public, if not to physicists, and back in 1919 and 1920 Cummings had suggested that they were actually planets, and that the structure of the universe repeated itself—perhaps indefinitely. That was in his "Golden Atom" series.

In this story he looked upward and outward, and made the Earth an electron—really a sub-electron—in an atom of a greater universe. (I believe he had first tested the theme a year before, in a three-part serial for *Weird Tales*, "Explorers Into Infinity.") Whereas a drug has made his people shrink into the world of the Gold Atom and brought them back again—with all the violations of physical, chemical and biological laws *that* involves—he invoked physics this time, in the form of strange rays and forces, to carry a ship from Earth into Bigness. There the visitors immediately found themselves enmeshed in a social revolution, as per the formula that the author worked diligently for many more years.

I suppose you will find this story very dated, but I still find it readable. Purists protest—and protested thirty-odd years ago—that Cummings wasn't writing English. By high school and college classroom standards, he wasn't—but he was pioneering a kind of stream-of-consciousness narration that as far as I know was not tried by anyone else in the popular fiction of that time. This is not, of course, the psychologically or psychiatrically sounder stream of James Joyce, with its layers of symbolism and punning. But it was a stream of choppy, disjointed thoughts, notes and ejaculations that kept the story moving and still do. I don't know whether this was the way Ray Cummings thought and spoke—I muffed my one chance to meet him, at the 1956 science-fiction convention in New York—but he used it to good effect for a long time.

I trust that Ace will rummage through the files for some of the other and better stories Ray Cummings was selling to *Argosy* and *All-Story* in those days.

THE MOON PEOPLE

By Stanton A. Coblentz • Avalon Books, New York • 1964 • 191 pp. • $2.95

In the early days of the Gernsback science-fiction magazines, Stanton Coblentz—poet, philosopher, historian—hacked himself out a niche as Mr. Satire. He used the double-bitted ax and the pick instead of the needle and scalpel, a paint roller instead of a miniaturist's two-hair brush. What was good enough for Jonathan Swift was good enough for him—and still is.

This is, believe it or not, the inhabited world on the hidden side of the Moon. It has atmosphere. It has underground cities. It has little green men with tails, vigorously ruled by little green women with tails and tempers. Where we worship Gold, they worship Water—and with somewhat better reason. They are divided into an Eastern and a Western semi-hemisphere, ideologically poles apart, vigorously engaged in a dry war and longing for the day when it can be made a wet war.

All this, of course, is seen by Earthmen cast away on the Moon in 1999. Neither faction believes that Earth exists, since they can't see it. To the green monkeys of Wott, they are from Mars; to the ditto of Poduk, they come from Saturn. Like Gulliver, they have to fight and finagle their way out.

Matched against this, "Li'l Abner" is subtle. Where are you, Fred Pohl?

THREE STEPS SPACEWARD

By Frank B. Long • Avalon Books, New York • 1963 • 192 pp. • $2.95

Frank Belknap Long is a very competent professional writer and editor, most of whose best work is never credited to him because—as was true of his friend and mentor, H. P. Lovecraft—it consists of rewriting some more prominent person's books to make them publishable. He doesn't seem to have had much energy left for this one of his own.

I am a pushover for stories about strange worlds with stranger critters at large upon them and meaning no good toward Our Guy and/or Our Gal. This time we have Titan, jungle covered satellite of Saturn, where a scientist is lost in the search for a civilized race. Titan, it seems, has the same surface gravity as Earth (Newton, Kepler, Einstein *et al* please note). It has monsters aplenty. It has savages and not-so-savages.

But apart from some appealing little telepathic animals, who wear collars for never-explained reasons, none of it is believable. The virgin forest isn't like any virgin forest I ever saw or read about—after all, it's on Titan, isn't it? The "savages" don't act like real savages, though they do fit the stale old stereotypes pretty well—and they're not savages, and extraterrestrials on top of that.

P.S. If those engraved collars were explained, I apologize. There were times when my eyes wouldn't focus.

THE OTHER WORLD

By J. Harvey Bond • Avalon Books, N. Y. • 1963 • 191 pp. • $2.95

A breezy style keeps this rather ordinary story moving for a while, then bogs down.

National Guard Sergeant George Braderick—does the National Guard have Sergeant Majors, or has this been converted from the British?—is kidnapped into what would once have been called "another dimension"—a parallel world which shares two out of four dimensions with ours, and has had a similar history. However, it now has a world state under the control of a super-computer, and some dissidents want our world's firearms to give a revolution a chance of success.

Familiar? What interest there is, is in Brad's shuttling back and forth from one camp to the other as his sympathies, his ethics and his common sense get in each other's way. It's hardly enough to carry more than a paperback.

THE TREASURE OF THE GREAT REEF

By Arthur C. Clarke • Harper & Row, New York • 1964 • 233 pp. • $4.95

I am including this primarily to tell you what has happened to Arthur C. Clarke. He has been hunting treasure on a reef off the southern tip of Ceylon, where he is now at home, and this book is his account of how it was done. He also bumped his head, was practically paralyzed for a long time, and now writes science fiction and science fact longhand, because his left arm won't perform. The quality of same has in no whit diminished.

The wreck was discovered by a couple of teen-agers diving off the Great Basses Reef with Mr. Clarke's exploring, diving, film-making, writing partner, Mike Wilson. It was well supplied with thirty-pound bags of silver coins, cemented into a husk of silver sulfide on the outside and mint fresh on the inside. You can see one bag in the Smithsonian, in Washington. But to salvage these, and other remains in a reasonably businesslike, scientific way, Clarke and Wilson had to make a two-and-a-half-hour Sinhalese epic film loaded with songs, dances, fighting, magic. They had to delve into maritime law and the law of treasure trove. They had to become shipbuilders, mechanics, and submarine archeologists—they were already divers.

If you've never read any of Clarke's travel stuff, try this. It isn't great, but it's fun and it's Clarke to the last word.

Reprints

DOUBLE STAR

By Robert A. Heinlein • Signet Books, N. Y. • No. D-2419 • 1964 • 128 pp. • 50¢

RED PLANET

By Robert A. Heinlein • Charles Scribner's Sons, N. Y. • No. SL-100 • 211 pp. • $1.25

The first is a reissue of a paperback which you may have read as a serial here in Astounding in 1956. The second is the first paperback edition of one of Heinlein's excellent juveniles, which you probably did *not* read if you're too stuffy about your years to be seen with anything with "YA" on the jacket flap. Heinlein juveniles, in those days at least, were better than "Brand X" adult fare.

THE INVISIBLE MAN

By H. G. Wells • Washington Square Press, N. Y. • RE-104 • 1963 • 150 + 36 pp. 60¢

This "Readers Enrichment" edition of Wells' classic is intended for school use. It consequently has a thirty-six page supplement on Wells, the book, its style, its vocabulary, etcetera.

TALES OF TEN WORLDS

By Arthur C. Clarke • Dell Books, New York • No. 8467 • 1964 • 224 pp. • 50¢

PROFILES OF THE FUTURE

By Arthur C. Clarke • Bantam Books, N. Y. • No. H-2734 • 1964 • 235 pp. • 60¢

Fifteen short stories or nineteen articles about the future—you can't possibly lose.

THE END OF COLONIALISM

continued from page 7

The other way to put it is that the colonies have been ruthlessly abandoned to their fate, since the modern nations no longer have any use for them.

The colonies made Rome powerful by supplying manpower and agriculture.

What are the most upsetting headache-problems the United States—and other industrial powers—face today? Unemployment and farm surpluses.

We want colonies to supply manpower and agricultural land? Ye gods! We haven't the slightest desire to have any more unemployable or unemployed, and certainly we don't need any more agricultural lands! We're trying to get people to stop using all the land we've got now!

Moreover, the situation in both those respects is, clearly, growing steadily more extreme. The Unions are howling already about the menace of automation—i.e., of non-consuming machines replacing human muscle-power. It took immense manpower, for years, to build a Roman military road; America builds roads that would make a Roman engineer's eyes bug out—by using bulldozers, dynamite, and giant earthmovers. We use machines that, by sheer, brute force, sink carbide-tipped steel teeth into solid rock, and, literally, *claw* the stuff out of the way, without even bothering to blast the stone.

Agriculture has been mechanized—and, more subtly, biomechanized by the development of hybrid stocks of immense productive vigor, fantastic disease and blight resistance, and the development of chemical industries that can produce the foods that plants must have for maximum growth. It's not just the tractors, threshers, and reapers—it's also the ammonia-injecting machines, and the phosphate rock operations. The basic energy-transfer mechanism in all terrestrial life forms, plant and animal, seems to be based

THE END OF COLONIALISM

on the high-energy bonds in adenosine triphosphate; that molecule is *the* "medium of exchange," the "money," of biochemical activity. Whether it's used in transferring the solar energy trapped by chlorophyll to synthesize a nitrogen-containing protein in a plant, or to trigger a neurone in your brain that causes more ATP to release energy in a muscle that flips the page you're reading—or your eye-muscle to follow these lines—it's the basic energy-transfer medium.

And life on Earth has been limited through all evolutionary history by the difficulty of getting enough phosphate to make that essential ATP.

Man, and Man's industry, is the first organism to crack the problem of getting all the phosphate we want out of its locked-up form in the Earth's rocks. All it takes is the ability to extract sulfur from deep deposits, or from iron, lead, or copper sulfides, oxidize it to sulfuric acid, transport concentrated sulfuric acid to a supply of calcium phosphate rock, blast loose the rock, crush it, treat it with the acid, free the phosphoric acid, and transport that to areas where plants can be grown.

Simple—once you have achieved the necessary high-level technology. But you can see why it isn't done by low-level cultures.

We don't need colonies any more. And while we have an excess of muscle power, we have a shortage of brain power—which colonies can't supply. (England is complaining bitterly these days that the United States is treating *her* as a "colony" in that we're draining her of brain power.)

The United States has an unusual record as a world power; we have never wanted, nor have we held, any colonies. We have never been a colonial power, aren't now, and don't intend to be.

Isn't that a spendid record for the Liberals to point to with pride?

No, Junior, it's not; it simply means that the United States didn't become a World Power until late in the Nineteenth Century—and then we did so entirely by development of an industrial complex. By the time the United States was a World Power, it was already perfectly clear that colonies were 99 44/100% pure headache. "Thankee kindly, but we don't want some!"

The exact terms to be used in discussing World Power A withdrawing administration from Colony Alpha are somewhat difficult to determine. Should we say "A at last gave Alpha its freedom?" Or should we more accurately describe the situation as "A abandoned Alpha to its fate?"

Consider the African colonies as examples. For a century or so, the European administrators of the African colonies have been maintaining—against the heartfelt pleas of the Liberals—that the Africans "simply aren't ready for self-government," while the Liberals have been insisting that that was purely an excuse for continuing exploitation of the oppressed colonial natives—a vicious lie maintained by those on the spot, in contact with the situation, against their far-removed and therefore, of course, objective and honest evaluation.

The results that have appeared since the African colonies were "given their freedom"—or abandoned to their fate—seem to suggest that the colonial administrators on the spot knew what they were talking about. The British—who had the most extensive colonies—seem to have done somewhat better in educating the Africans during the time they ran the place; the Belgian and French colonies have been somewhat more violently aboil with murder, massacre and genocide.

And not just Africa, by any means! This isn't a racist situation! Most of the major movements of cultural evolution aren't racially selective at all. Since the French abandoned southeast Asia to its fate, its fate has been murder, massacre and genocide, too. Laos — Cambodia — Viet Nam — anywhere you like down that way, the blood-bath is boiling merrily.

On Cyprus, the Turkish and Greek factions seem to be firmly united in their efforts toward a common goal; elimination of the other party.

No—there's nothing racist about it—black, white or in-between makes no difference.

They weren't ready for self-government — just as those nasty, vicious, colonial-powers exploiters kept saying.

The Liberals have at long last won the day! The poor down-trodden natives have achieved their freedom at last!

Either that, or the ex-colonial powers have succeeded in shucking a useless, and highly undesirable and expensive colony. They've either freed the natives, or abandoned them to their fate, whichever way you want to put it.

In any case, Colonialism is ended.

Some time you might try *reading* Kipling's "The White Man's Burden," instead of just hearing Liberals rant about how horrid it is. He gave a really sound appraisal of what Colonialism actually meant, by the 1890s—and why the United States never wanted any colonies.

It's interesting, now, to observe the way the United Nations powers all hold, most nobly, that Somebody should Do Something about Peace Keeping in Ughlstan, or wherever the latest blood-bath has started boiling . . . but none of them seems to want to offer the men, money, and machines it costs to keep the ex-colonial natives adequately oppressed — i.e., policed enough so they don't commit genocide on each other.

Remember the way the United Nations powers hastened forward to volunteer the millions of dollars and thousands of men required to keep the Greeks and Turks from killing each other on Cyprus? The war damn near got started full blast before some of the powers finally undertook the nasty, expensive, and utterly thankless task of playing policeman.

Colonialism! Hah! One of the neatest propaganda dodges in all history was that business of making out like the Liberals had finally persuaded them to free the poor natives.

Let somebody else assume that "White Man's Burden"!

The Editor.

BRASS TACKS

continued from page 5

"Hell! given the proper conditions, a good loud sneeze will initiate a storm!" The question is a matter of initiation energy. Irving Langmuir, and others, in cloud-seeding experiments, caused —or claimed to have caused—precipitation by the use of ice, dry ice, Silver Iodide, and once—possibly apocryphal —a firecracker!

And then there was Hatfield the Rainmaker, who either did—or did not —cause the rain that wiped out San Diego. The city fathers retained him for a fee of $25,000 to cause rain to fill their reservoir. He performed whatever his secret rites were, and rain promptly followed. The reservoir filled, overflowed, burst, and good-by town! When he presented his bill for payment, however, the good city fathers said thus: "Mr. Hatfield, maybe you caused the rain. If you did, we'll pay your bill and sue you for the damage done to the town. Of course, if you didn't, well, it's an act of God, but we don't owe you anything." Hatfield saw the light, confessed he couldn't make rain, and cleared out. That did not prevent his making a good living out of rainmaking, however. He always worked on a C.O.D. basis: no rain, no pay—and the record shows that he lived quite well. *He* didn't have the energy available from nuclear catastrophes, either!

My argument, briefly stated, is this; any time you mess up the atmosphere with *anything*, you're going to get an effect, weatherwise. (How many forest fires are put out by "providential" rainstorms? How many cannonades have been literally drowned out by rain "from nowhere"?)

Here's the point: the ordinary man in the street has as much right to say that nuclear bombs have an effect on the weather as Meteorologists have to say that they don't—because neither one knows what he is talking about!

Nobody—ever—has done any experimental work to see; I strongly doubt that meaningful experiments could be devised in the present state of the art. And you cannot devise an experiment to test a hypothesis if you are convinced beforehand that it will fail. It will. You'll see to it that it does!

It gives me a fundamental pain to see pronunciamentos from learned meteorologists on this subject. It's too bad—because if they'd just admit they don't know everything, and try to study the world-wide weather patterns to discern what effect there *is*, who knows? *Real* weather control just might be "right around the corner." I guess, though, that an ostrich will never pull his head out of the sand until someone kicks him in the butt.

An. Lab. for March:

1. "Spaceman." Leinster is mellowing, but still cranks out a good yarn.

2. "Outward Bound." Spinrad's characterizations save a tired plot.

3. "The Pie-Duddle Puddle." A trifle impossible, a telegraphed ending, but the Richmonds' humor comes through anyway.

4. "Third Alternative." Well done, but it just doesn't quite meet the others!

Article: Walterscheid's explanation of the modern demonology is not as lucid as Asimov's, but he has a lot of data. All in all, excellent.

Editorial. Yes. I made myself somewhat unpopular for a while by predicting the death in office of whoever was elected in 1960—before 1950. I will admit, though, that it was not original, nor yet astrological. It was, in point of fact, a plagiarism. I first came across the concept in a book of Albert Payson Terhune's when I was just a lad (not a dog). When Roosevelt proved it, it assumed for me the status of fact. Not that I'll get the chance, but I would not run for the Presidency in 1980 for all the boodle in Fort Knox.

I would amplify the "dignity—responsibility" bit by the statement: a person *has* responsibility. He may be *granted* dignity if he earns it by discharging his responsibilities. The accident of birth does not *ipso facto* confer something which must be earned, even though our society subscribes to the fiction that it does. In this respect, at least, I believe that the philosophy behind Heinlein's Starship Troopers is a good bit sounder than our present mores, even though it might be a bit rough on the would-be citizen. It might even be worth a serious trial, sometime, somewhere.

Enough. Keep up the good work.

EDWARD G. ROBLES, JR.
1153 Amberwood Road
Sacramento, California 95825

Yes — and meteorologists have known-for-sure for many years that the Moon has no influence on weather! Only a computer analysis proved it did, whether it "can" or not!

Dear Mr. Campbell:

In reference to the criticism of John Schoenherr's interior illustrations:

1. Although judgment of art is a matter of taste, there is good taste, bad taste, worse taste, educated taste and uneducated taste to name but a few types. Permit me to speculate that Mr. Tackett's taste is either bad, worse or uneducated.

2. Having had the opportunity to take several dozen courses concerning several phases of creative art, I believe that I can say that my taste in art, whether good or bad, is at least educated. I think John Schoenherr's illustrations are magnificient.

I tried to think of some other well-known illustrator whose work I could use as a comparison, and I discover that Schoenherr is the best I can think of working in comparable mediums.

My wife likes his illustrations.

My favorite cat likes the forty-ninth page of the April issue.

I do not dislike Mr. Schelling's illustrations, but they suffer in comparison to Schoenherr's.

HANK FONDA
Pier One Slip 47
Dinner Key Yacht Basin
Coconut Grove, Florida

As some may have suspected—I like Schoenherr's work!

Dear Mr. Campbell:

I note with interest your lead story "Sunjammer" in the April issue of

BRASS TACKS

Analog and was surprised to see my son reading a story called "Sunjammer" which is the lead in *Boys Life* for March. They are entirely different tales although the magazine covers look enough alike to fool anyone! Just as a matter of interest, I'd like to know if you were aware of this competition.

A word in passing; I think you might give a word of praise to *Boys Life* for doing a good job in this field for the young people who are just getting into science fiction. Your own work with Analog is tops in my estimation.

ROBERT J. LEFRANK
247 Old Tote Road
Mountainside, New Jersey

The Boys Life *"Sunjammer" was by long-time science-fictioneer Arthur C. Clarke.*

Dear Mr. Campbell:

I would like to take issue with you concerning your April editorial, "God Isn't Democratic." I think the editorial may logically be divided into two parts. That portion dealing with the idea that God is not democratic cannot be faulted, but the other portion, dealing with our Founding Fathers and the Supreme Court, needs a bit of rebuttal.

For the first, the actual Founding Fathers and fighters of this nation were anything but religious. Benjamin Franklin, both in his personal diaries and his private life, was anything but a true believer. Ethan Allan, of course, was an outright atheist. Thomas Jefferson and Alexander Hamilton, whatever their personal differences might have been, at least agreed on agnosticism. And for that matter, we could cast a slight finger of suspicion at George Washington himself. You will perhaps recall that most of these men were Freemasons and that at this time Freemasonry was liberally tinged with agnosticism, though never with atheism. I therefore doubt that any of our Founding Fathers would disagree with the recent Supreme Court decision.

I might also point out that neither the Constitution nor the Bill of Rights makes any mention of reliance upon a God, and even the Declaration of Independence uses only the conventionalized terms of the sort Spinoza or any agnostic philosopher might have used.

In recent years, and in most school texts, we find a rapidly expanding mythos surrounding the Founding Fathers. The rock-bound, fundamentalist conservative, for instance, has wedded himself both to his faith and his opinion of what the past was really like. And as he has committed himself to an adoration of our Founding Fathers, he feels obligated to make them fully as religious as he himself is. There is nothing uncommon about this, but it is certainly a source of error whenever we seek to disentangle myth from fact.

As for the actual Supreme Court decision itself, we must recognize the reasoning behind it. And this, too, is difficult in view of the rather garbled interpretations given by the news media. The very terminology of our Constitution gives the parent absolute right over the religious indoctrination of the juvenile. No court or other arm of the government may infringe this right. By a logical and necessary extension it follows that the use of prayer or other symbols of religion in the public schools *devoted to juveniles* is illegal. A prayer or religious symbol would not be illegal, providing it was on a purely voluntary basis, in a school for adults. Nor would chaplains be illegal in the armed forces, etcetera.

There is one exception to this, and that exception involves "wards of the state," such as delinquents in state institutions, orphans in asylums, etcetera. In such instances the state must act *in loco parentis* and assume the functions of a parent. As such it is then obligated to provide such religious training as seems appropriate in view of the child's background.

I personally feel that this decision by the Supreme Court was wise, necessary, and in accord with the best traditions of our nation. Over the years various school boards, bowing meekly to the inevitable extremist pressures by bigots of one sort or another, have been increasing the amount of indoctrination on students. In some midwestern and southern districts the indoctrination had become so pronounced that children of any dissenting sects were held to the ridicule of their classmates.

In this I submit that there is no middle course. The Supreme Court literally had no choice in the matter if it was to conform with the principles laid down in our Constitution.

GEORGE W. HARPER

The essence of my position is not a legalistic-constitutional problem, but a cultural attitude problem. The Founding Fathers may not have been deistic, in the religious sense, but they had a strong conviction of a disciplined Universe, whether created and ruled by God or not. The current cultural philosophy is strongly at odds with that; today Americans hold that human will, not fundamental law, makes Truth. They resent the concept of any system that judges and evaluates the individual in any terms other than his own personal (and intransigent!) opinions.

Benjamin Franklin was an agnostic, as was Jefferson. No one, however, would ever suggest that either believed that human opinion, rather than fundamental law, did, could, or should determine Truth. The modern attitude tends to be "If the facts don't agree with my theory (opinion), they ought to, and I won't allow those nasty facts to change my mind."

Dear Mr. Campbell:

Permit me to recommend to you the pamphlet "The New Fanatics," by William A. Massey. It was originally published in the October-December 1963 issue of the quarterly, *The Mankind Quarterly*, of Scotland.

It can be obtained from the
National Putnam Letters Committee
P.O. Box 3518 Grand Central Station
New York, N. Y. 10017

price thirty cents.

This is the kind of material which you can use to advantage in your interesting editorials.

Who are the New Fanatics? They are the American Intelligensia according to the author.

In my opinion this article should be required reading in all universities, not only by pupils but by professors, especially those teaching social anthropology.

Referring to your editorial in the April Issue in which you say that God is not democratic, you mean God as the theologians present Him.

It has been God's policy from the beginning of life on earth to permit and require that every living creature and every species of life be independent, free to choose its own course.

This has been limited only by the necessary instinctive restraints which alone could enable the form to survive.

God, unlike we Americans, does not play God to the people of Africa or of Asia. He says, survive or perish. Either grow sufficient food or die. Either form a government which will enable you to prosper, or live in misery.

"You are free," says God. You have freedom of choice, and that means freedom to die as well as to live.

ELBRIGE GATEWOOD
395 Riverside Drive,
New York, N. Y.

As I say—"What's the difference between 'giving him his freedom' and 'abandoning him to his fate'?"

Dear Mr. Campbell:

"The Thirst Quencher" (September, 1963) and your editorial for October, coming so soon after reading Fred Hoyle's address to the University of Hull ("A contradiction in the argument of Malthus") seemed so apt that I must draw your attention to what might be an important statement not to be ignored. Briefly he states that the only break in the exponential population increase was the black death in Fourteenth Century Europe, and that the present trend must terminate in a catastrophic manner. Technology has enabled the population level to pass above the Malthurian starvation limit and that with increased complexity a trigger action must occur, the consequences of which would beggar the imagination.

Mathematically Hoyle predicts a rise to 2.5×10^{10} within 300 years, followed by a collapse to 2×10^{9}; 300 year cycles of growth and collapse are then predicted with biological selection during the upsurge which will put a premium on intelligence and cooperational tendencies.

This is a topic which science-fiction writers have found very fruitful, and they perform a useful duty by depicting possibilities that more orthodox commentators either ignore or cannot face. I feel that we have passed the point of no return, and see no hope of resolving our tribal squabbles before it is too late. The industrial feudalism of Mack Reynolds is all too likely with present trends. Revelation 13, v 16 & 17 is also very apt. As a species we will suffer the fate of all others that destroy their own environment. It could be a barren world we will leave behind, stripped of its natural resources and wildlife, with its only resource a vast accumulation of knowledge. Will this be of any value after a reversion to barbarism or, in the Temple of the Wheel, will the high priest ceremoniously evaluate the $3\sqrt{3}$ on the sacred rule to the chanting of magic numbers by the assembly?

A. F. WHITLOCK
Walnut Bank,
Underhill,
Moulsford,
Berks., England

Malthus considered a quasi-static system; Hoyle apparently is looking into its dynamics.

Dear Sir:

I can't see that logic is served by confusing modern rejection of superstition with the will to avoid unpleasant realities, as you have in your editorial, "God Isn't Democratic." Is there evidence that people are more prone to ignore the requirements of natural processes today than at any other time? You are merely repeating the ancient accusation made against atheists—"You won't admit that the god is there, because you don't want to be good."

I realize that there is no reasoning with a person like you, but I wish you would at least refrain from sneering at democracy by obscuring its realm and implying that morals (such as birth control—or fighting it) are direct dicta given in so many words by Nature.

According to your unfortunate definition of "religious freedom," we, who cannot believe in the existence of gods, are asking more than freedom. Would you call it religious license that we seek?

HARRY E. MONGOLD
807 Ewing Avenue,
Joliet, Illinois.

There are three arguments to induce people to accept that their personal will is not the ultimate Law of the Universe.

#1: A club. This always works; a dead man's personal will causes no trouble. It is, therefore, the final resort of history.

#2: Reason . . . which is NOT simply logic. Logic stems from postulates, and is perfectly logical, though insane, when based on false postulates.

#3: "Superstition," if you prefer that term. Establishing the unproven axiom that "There exists something bigger and more important than your will and opinions."

I wasn't talking about religion as such; I don't deny you religious freedom. I'm talking about Opinionated Freedom; Man does not *have the "right" to his own opinion as a free right. He has a "right" to it only if he is willing to pay for it—up to and including the price of death. (Like the opinion he can drive a car perfectly at 100 M.P.H. even when too drunk to walk straight.)*

The fault in the philosophy of democracy AS NOW TAUGHT is the proposition that because a mass of people say it ought to be true, that makes it true.

All religions unite in denying that Opinionated Freedom. Therefore they are rejected by a growing mass of people.

GET READY FOR THE SPACE and SCIENCE ERA! SEE SATELLITES, MOON ROCKETS CLOSE-UP

AMAZING SCIENCE BUYS for FUN, STUDY or PROFIT

AUTOMATICALLY SHOWS TIME, TIDES, POSITION OF SUN, MOON, STARS

NEW SPILHAUS SPACE CLOCK

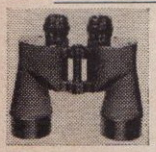
19 DIFFERENT READINGS AT A GLANCE

PERFECT FATHER'S DAY GIFT

Startling scientific achievement, yet completely practical and functional. Designed for the space age by world renowned scientist, Dr. Athelstan Spilhaus, Dean of Technology, University of Minnesota. Handsome conversation piece—constantly up-to-date encyclopedia of the sky. The Spilhaus Space clock has beautiful fruitwood case and 3 sky-blue dials. Blends with decor of any home, office, club room, classroom, museum, hotel, etc. Large dial shows sun position, daily sun rise and set, moon position. moon rise and set. phase of moon. low and high tide time, current stage of tide, day and month of year, current position of stars in sky, time of star rise and star set, relationships of sun, moon and stars, sidereal or star time. Left dial shows local time. Right dial shows world time including major U.S. cities and Universal (Greenwich) time. Operates on house current—requires only one simple setting for any geographic location. Measures 10" high x 11½" wide x 4½" deep. Presentation plaques available. Complete satisfaction guaranteed or money refunded.

Shp. wt. 12 lbs.

STOCK NO. 1201-A .....$175 F.O.B. (+ $5.00 F.E.T.)



War Surplus! American-Made 7x50 Binoculars

Big savings! Brand new! Crystal-clear viewing—7 power. Every optical element is coated. An excellent night glass—the size recommended for satellite viewing. Individual eye focus. Exit pupil 7 mm. Approx. field at 1,000 yds. is 376 ft. Carrying Case included. American 7x50's normally cost $274.50. Our war surplus price saves you real money.

Stock No. 1544-A .....only $74.80 pstpd.

7 x 35 AMERICAN MADE BINOCULARS

Stock No. 964-A .....$60.50 pstpd. (Tax incl.)

8 x 30 Binoculars—similar to above and a terrific bargain.

Stock No. 963-A .....$33.00 pstpd. (Tax included)

RUGGED, LOW-PRICED EXPERIMENTAL ELECTRO-MAGNET

Hobbyists, instructors and industrial lab men will find this well-built Electro-Magnet invaluable. Demonstrate principles of electro-magnetism. Actually lifts 100 lbs. when powered by a single 1½ V flashlight battery. Easily deactivated. Includes instructions for 6 experiments—lifting power, magnetic flux and magnetomotive force, air gap, area of contact, retentivity and field configuration. Unit includes magnet and yoke assembly, battery holder, leads, clips and eyebolts. Steel core and yoke precision ground for max. flatness. About 2½" dia. x 4½" lg. Wt. 2 lbs.

Stock No. 60,435-A .....$10.00 Ppd.

PHOTOGRAPHER'S LOW COST PRECISE LAB BALANCE

Built for hard, daily use. Weighs materials from 100 miligrams to 100 grams, can be used for proportionate measuring. Has removable plastic pans 60mm in dia. Features base of rugged cast iron and adjustable one piece beam for balancing. Overall ht. 5½" x 7" long. Comes complete with set of 12 weights ranging from 100 mg to 50 g and pr. of tweezers in wooden box. Imported.

Stock No. 70,443-A .....$15.00 Postpaid

CRYSTAL GROWING KIT

Do a crystalography project illustrated with large beautiful crystals you grow yourself. Kit includes the book "Crystals and Crystal Growing" and a generous supply of the chemicals you need to grow large display crystals of potassium aluminum sulfate (clear), potassium sulfate (purple), potassium sodium tartrate (clear), nickel sulfate hexahydrate (blue green) or heptahydrate (green), potassium ferricyanide (red), and copper acetate (blue green).

Stock No. 70 336-A .....$9.50 Postpaid

MAIL COUPON for FREE CATALOG "A"

Completely New and Enlarged—
148 Pages—Nearly 4000 Bargains

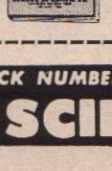
EDMUND SCIENTIFIC CO.,
Barrington, New Jersey

Please rush Free Giant Catalog A

Name .....

Address .....

City .....Zone....State.....



BE READY FOR THE MOON SHOTS

Ranger, Surveyor, Lunar Orbiter unmanned space probes will shed exciting new light on the mystery of the moon and outer space. See the results close-up. Edmund low-cost, top-quality equipment and accessories put you right there—provide valuable and complete information to keep you on target.

Bargain! 3" Astronomical Telescope

See the stars, moon, phases of Venus, planets close up! 60 to 180 power—famous Mt. Palomer Reflecting type. Unusual Buy! Equipped with Equatorial mount; finder telescope; hardwood tripod. Included FREE: "STAR CHART"; 272-page "HANDBOOK OF HEAVENS"; "HOW TO USE YOUR TELESCOPE" book.

Stock No. 85,050-A .....$29.95 Postpaid

4¼" Astronomical Reflector Telescpoe

Stock No. 85,105-A .....$79.50 F.O.B.

Intriguing Low-Cost Moon Model

Exciting outer space display and conversation piece. Exact replica. 30,000 formations—peaks, craters, Ocean of Storms, etc.—in relief. Scaled to size. Accurate distance relationships. Proper lighting shows moon phase; "black light" startling effects. Tough, washable plastic. Three colors. Far side blank—can be used for space data. Excellent gift item. 12" dia., wt. ¾ lb.

Stock No. 70,515-A .....$12.50 postpaid

A SLIDE TRIP TO THE MOON—MOON TOPOGRAPHY STUDY AID

As the universe shrinks, interest in astronomy increases. This highly informative series of 29 black-and-white slides features such topography as the southwestern limb and Mare Imbrium—the "pearl of the moon." Also, full moon taken with Mount Wilson 100-inch reflector and the crater Clavius through the 200-inch.

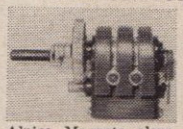
Stock No. 60,348-A .....$5.00 ppd.

BIG DETAILED 35" x 46" MOON MAP

Black and white photo reproduction of full moon with all named lunar formations clearly marked. Complete index to locations and other valuable information.

Stock No. 9297-A .....95¢ Ppd.

WAR SURPLUS ELECTRIC GENERATOR



Brand new Signal Corps Electric Generator for scientific experiments, electrical uses, demonstrations. Generates up to 90 volts by turning crank. Use in high impedance relays. Charge ground and bring up night crawlers for bait or study. 2 Alnico Magnets alone worth original price. Wt. 2 lbs. Cost to Govt. $15.

Stock No. 50.225-A .....$6.95 Postpaid

Same type generator, mtd. with light, as electricity demonstrator.

Stock No. 50.365-A .....$11.95 Postpaid

SPELLBINDING EXPERIMENTS with SILICON SOLAR CELL AND SUN BATTERY

Experience endless fascination in converting sunlight into electricity to power small motors, amplifiers, etc. Ideal for scientific student projects. Silicon Cell has plastic case 1⅛" x 1⅛" x 3/16". Produces .3 to .45 volts—10 to 16 milliamps. 24-page Handbook included. Gives data on 12 experiments.

STOCK NO. 60,216-A .....$2.25 Ppd.

Same as above, but with 2 elements in series.

STOCK NO. 60,396-A .....$3.95 Ppd.

Same as above but with high efficiency type current .5 volts.

STOCK NO. 60,397-A .....$3.95 Ppd.

Same as above but with high efficiency type current .6 to .85 volts.

STOCK NO. 60,398-A .....$4.95 Ppd.

Selenium Photocell. Lower power, lower price.

STOCK NO. 30,411-A .....$1.50 Ppd.

Solar Cell and Photocell Handbook. Fascinating 112-page handbook on Silicon Cell and Selenium projects, demonstrations, etc. Explains photo-voltaic theory, performance. Gives infrared, ultra-violet applications. Paper bd. 6"x9".

STOCK NO. 9230-A .....$2.00 Ppd.

BLACK LIGHT MAGIC-GLOW KIT

With this Kit, you can collect fluorescent rocks, paint with living light, write secret messages, learn invisible detection methods, even make a fluorescent Christmas tree! Kit uses long-wave blacklight, which is completely harmless to eyes, but causes fluorescence in over 3,000 substances. Includes Magic Glow Lamp, universal laboratory lamp stand, invisible water paints and ink, fluorescent crayon, tracer powder, pen, 3 brushes, specimens of fluorescent rocks: wernerite from Canada, fluorite from England, willemite from U.S.A. Plus book of 40 experiments.

Stock No. 70.256-A .....$11.95 postpaid

'FISH' WITH A WAR SURPLUS GIANT MAGNET

Bring Up Under-Water Treasures

Real fun! Profitable, too! Simply trail this powerful 5 lb. Magnet out the stern of your boat—retrieve outboard motors, fishing tackle, anchors, other metal valuables. Alnico V-Type Magnet has terrific lifting power—2000 Gauss rating—lifts over 150 lbs. on land—more under water. Many industrial uses, too; recover tools and parts from inaccessible spots, hold work in place, rid shop floors of metal fragments, pins, etc.

Stock No. 70.571-A 5-lb. Magnet .....$12.50 Pstpd.

Stock No. 70.570-A 3½-lb. Lifts 40 lb. .....$ 8.75 Pstpd.

Stock No. 70.572-A 7½-lb. Lifts 175 lb. .....$18.75 Pstpd.

Stock No. 85.152-A 15¾-lb. Magnet, Lifts 350 lbs. .....$33.60 FOB

SCIENCE TREASURE CHESTS For Boys—Girls—Adults!

Science Treasure Chest — Extra-powerful magnets, polarizing filters, compass, one-way-mirror film, prism, diffraction grating, and lots of other items for hundreds of thrilling experiments, plus a Ten-Lens Kit for making telescopes, microscopes, etc. Full instructions.

Stock No. 70.342-A .....$5.00 Postpaid

Science Treasure Chest DeLuxe—Everything in Chest above plus exciting additional items for more advanced experiments including crystal-growing kit, electric motor, molecular models set, first-surface mirrors, and lots more.

Stock No. 70.343-A .....$10.00 Postpaid

NEW BINOCULAR-TO-CAMERA HOLDER Will Fit Any Camera

For Exciting Telephoto Pictures. Bring distant objects 7 times nearer with a 35mm camera. 7x50 binocular and our NEW BINOCULAR-TO-CAMERA HOLDER. Ideal for long-range shots of wild life, ships, people, vistas. Camera and binoculars attach easily. Use any binocular or monocular—any camera, still or movie. Take color or black and white. Attractive gray crinkle and bright chrome finish. 10" long. Full directions for taking telephotos included.

Stock No. 70,223-A .....$11.50 Postpaid

ENGINEERS! DESIGNERS! HOBBYISTS! SCIENTISTS! SYMBOLIC JEWELRY FOR THE PROFESSIONAL MAN

TIE BARS! CUFF LINKS! TIE TACS!

Distinctive, personal jewelry designed for the professional man or aspiring student. Status symbol of your profession, interest or achievements. Exact duplicate of ship compass (illus.) for sailor or yachtsman actually works. Set in perfect miniature of ship's wheel. Rose floats on red jewel center. Calibrations enlarged by magnifying dome. Others available. Write for complete list. All items listed below are Tie Bars. Prices include Federal Tax and Postage.

STOCK NO. 1846-A	Compass, Silver Finish	**.....$4.95**
STOCK NO. 1845-A	Resistor, Silver Finish	**.....$1.38**
STOCK NO. 1839-A	Microscope, Gold Plate	**.....$1.38**
STOCK NO. 1842-A	Stethoscope, Gold Plate	**.....$1.38**
STOCK NO. 1840-A	Gears, Silver Oxide Fin	**.....$1.38**

ERECT IMAGE LOW POWER MICROSCOPE — 5X, 10X, 20X

$60.00 Value .....Only $19.95

Extremely sturdy with rack and pinion focusing, color corrected optics, turn-table microscope body for inclined viewing. Made from war surplus optical instrument so that you actually get $60.00 of value. Weighs 4 lbs., 13" high. 10-DAY FREE TRIAL!

Accessory objectives available for powers of 15X, 30X, 40X.

Stock No. 70,172-A .....$19.95 Postpaid

THE WORLD OF DINOSAURS ONE HUNDRED MILLION YEARS AGO

In this set of monsters—the dinosaurs that ruled the earth 100,000,000 years ago—you get 45 realistic models molded from unbreakable plastic. Collection includes the bronthosaurus, dimetrodon, and others from the earlier species; the tyrannosaurus and many more from the final eons of the dinosaur rule. Fascinating study for young and old; also novel as off-beat decorations. Average size approximately 4" high. Kit includes ferns, trees, caves and other areas of terrain plus an exciting booklet **Prehistoric Animals.**

Stock No. 70.473-A .....$4.95 Postpaid

Terrific Buy! American Made! OPAQUE PROJECTOR

Projects illustrations up to 3" x 3½" and enlarges them to 35" x 30" if screen is 6½ ft. from projector; larger pictures if screen is further away. No film or negatives needed. Projects charts, diagrams, pictures, photos, lettering in full color or black-and-white. Operates on 115 volt, A.C. current. 6-ft. extension cord and plug included. Operates on 60 watt bulb, not included. Size 12" x 8" x 4½" wide. Weight 1 lb., 2 oz. Plastic case with built-in handle.

Stock No. 70.199-A .....$7.95 Postpaid

ORDER BY STOCK NUMBER . . . SEND CHECK OR MONEY ORDER . . . SATISFACTION GUARANTEED!

EDMUND SCIENTIFIC CO. BARRINGTON, NEW JERSEY

Adieux de Napoléon à La Garde Impériale à Fontainebleau. Détail de la peinture par E.J.H.Vernet.

Napoleon bids farewell to his Imperial Guard at Fontainebleau, April 20, 1814, shortly before abdicating. General Petit, Commandant, embraces him.

COURVOISIER

COGNAC

To great products and great men alike, history accords enduring fame. So with Courvoisier Cognac—The Brandy of Napoleon. For centuries, Courvoisier has been the choice of kings and statesmen and all who can command the finest. Enjoy it for its matchless flavour and bouquet—*pour la gloire* it perpetuates. ℣ *Imported by W. A. Taylor & Company, New York, N. Y., Sole Distributors for the U.S.A.*

*Courvoisier Cognac—and Courvoisier only—bears this registered phrase on every bottle. Reg. U. S. Pat. Off.

Is Europe really expensive? That depends.

On you.

For instance, you can have dinner in Paris for $25, or pay as little as $5—and order the same entrée.

You can buy a theatre ticket in London for $3.50, or pay as little as 35¢—and see the same show.

You can rent a room in Rome for $17 a day, or pay as little as $3.75—and enjoy the same view.

Jet fares to Europe have their highs and lows, too. Here again, the choice is yours, depending on what degree of comfort strikes your fancy and which price fits your budget. But you'll be glad to know *all* Pan Am fares are now lower than they've ever been.

First-class fares are down as much as 21 per cent. And Pan Am's low-cost 14 to 21 day ticket is now available practically year 'round.

With the exception of a few peak travel periods, you can plan a 14 to 21 day trip any time this summer. (See a Pan Am Travel Agent or call Pan Am for details.) Sample fare: New York to Paris, $342 round trip.

One thing no other airline can give you at *any* price: the sure feeling that comes from flying the World's Most Experienced Airline. It's worth all the money in the world.

First on the Atlantic
First on the Pacific
First in Latin America
First 'Round the World

PAN AM

YOU'RE BETTER OFF WITH PAN AM—
WORLD'S MOST EXPERIENCED AIRLINE