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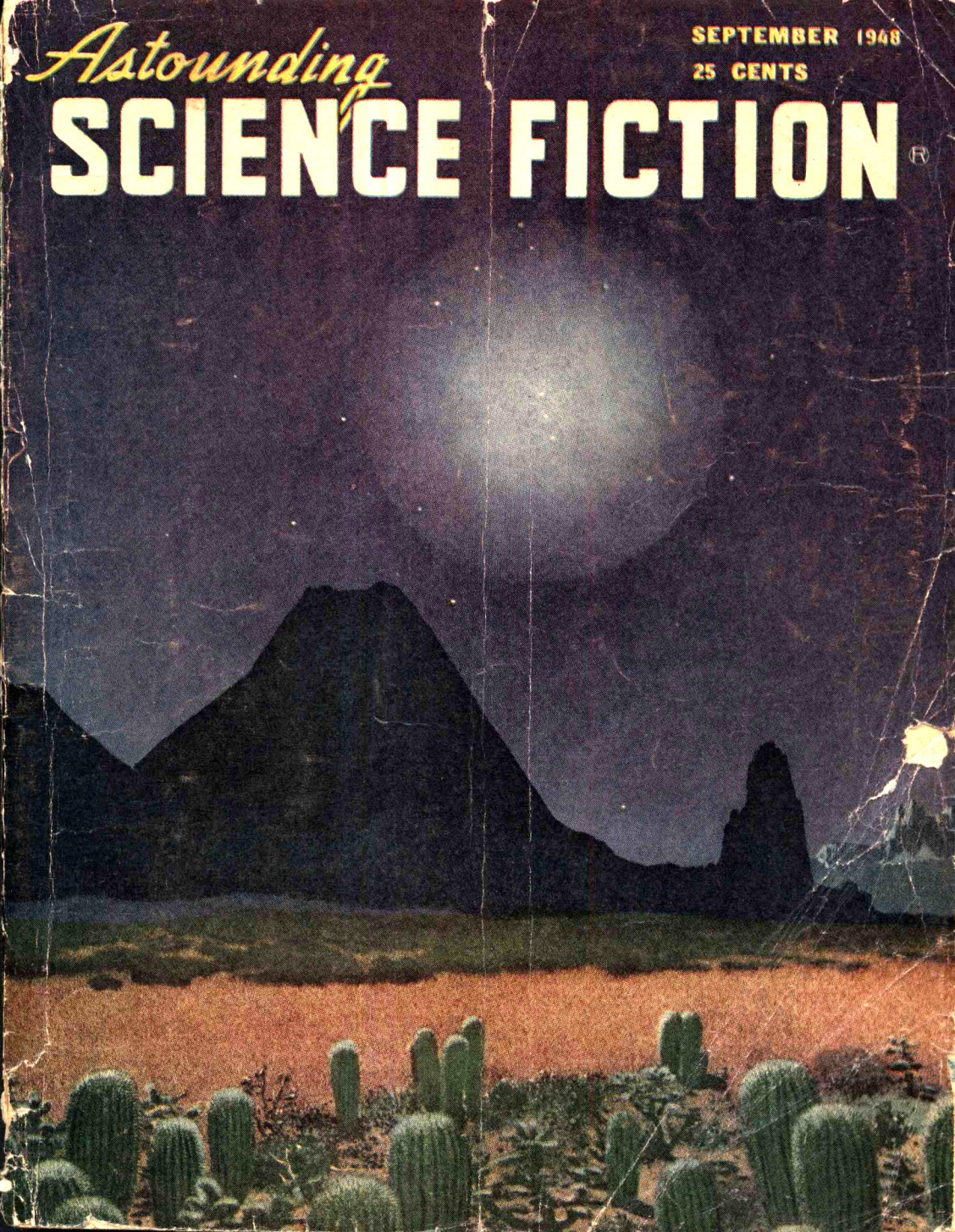

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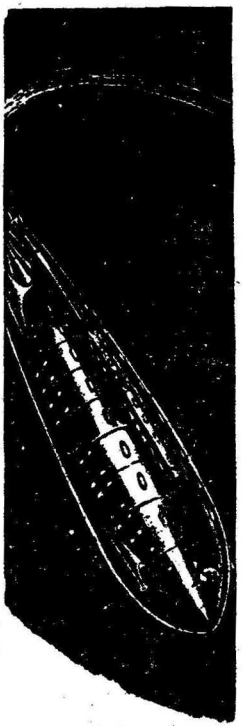

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JOHN W. CAMPBELL, JR.

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UNDESIRABLE INVENTION

Once upon a time, long ago, something crawled out of the sea—or got stranded on a beach—or somehow got itself into the terrible predicament of having to breathe air—and survived. The inventions of the land-livers were necessarily almost innumerable. The development of a bone-structure that could work without the support of buoying water—muscles so compact and powerful that they'd work as well with no water to float them. An oxygen-absorbing mechanism that would pick up oxygen from the atmosphere, without throwing off too much water vapor. A blood vessel system that could adjust to the varying hydrostatic pressures without the counteracting force of surrounding water. A very complex series of inventions was necessary.

In the process, the land-livers invented two other things which are of great importance—and one of which is extremely undesirable. They invented the proposition of limited-growth. And the land-livers invented something that the world had never known in the billion years or so of preceding animal life—old age and senility.

Old age and "natural" death are both unnatural concepts; neither exists for most living things. Only the relatively small number of land-living higher animals are subject to either biological aging, or senile decay, or so-called "natural" death. Immortality has long been a favorite theme of science-fiction; it's worth taking a good, solid look at it to see what it really means. So firmly is the idea that "old age and death are the natural consequences of life" ingrained in human beings that even in the fairly free-roaming minds of science-fiction they are automatically assumed to be problems of all races, of all planets, of whatever type. The evidence of terrestrial life forms is to the contrary. It appears, rather, as though land life forms have simply not yet succeeded in finishing the process of adapting to their more rigorous environment.

From the evolutionary standpoint, a race that breeds faster than it dies is more successful than a race that breeds extremely slowly, and is immortal. The rabbit is more successful than the elephant; there's no pressure on evolution to produce an immortal

rabbit. The blind forces of nature don't care whether an individual survives, and in a period of great change of body-type—as the period of adaptation from sea to land—the type that breeds fastest, has the most generations in the shortest time, will have the best chance to produce more successful mutations. There is, thus, a positive pressure on short-lived, fast-turnover species. The immense, and immensely stupid titanotheres, for instance, would be just as useless a model today as they were when they lived—who wants an immortal, immutable mountain of brainless flesh around?

There is only one way to maintain —as a stable situation—a breed that lives without ever becoming aged, or dying of senility and is also capable of rapid reproduction, and hence undergoing evolution. The situation in the sea is stable! a fish is practically immortal, except for such accidents as being caught and eaten by a larger or more powerful fish, or being attacked and eaten by a microorganism. Fish get big; they don't get senile.

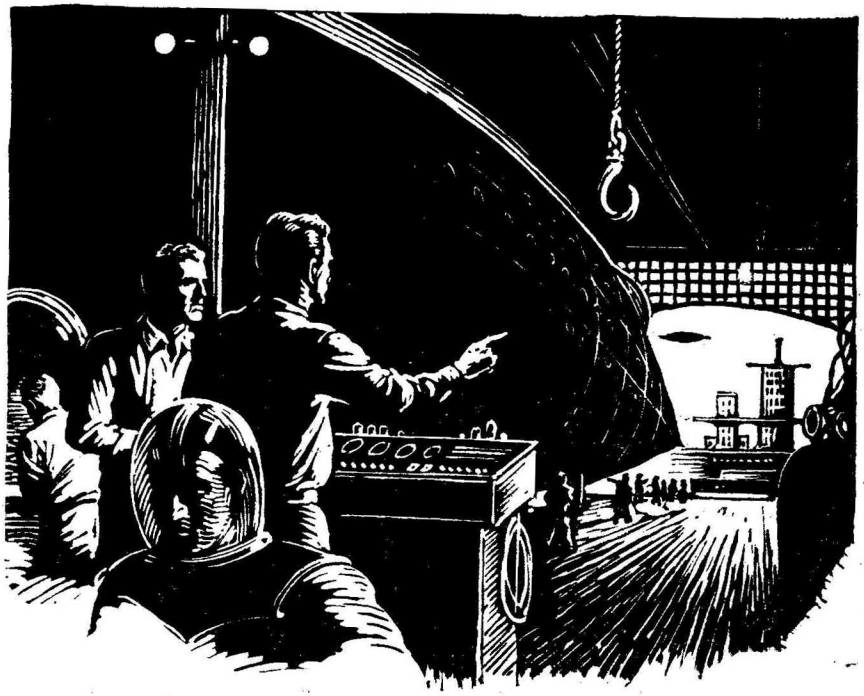
Fish, in fact, get much more out of life than we; they are practically immortal—or eaten—and the deep-sea fish don't waste a third of their lives sleeping, either. Neither death nor sleep is a necessary concomitant of life; only to modern terrestrial land-animals. And certainly in science-fiction we have no reason to assume that other races of other planets would be subject to old age or sleep.

It might not be all one hundred per cent benefit to an intelligent race, however. Remember the famous words of the Marine sergeant, urging his men into battle, "Cummon you birds! You wanta live forever?" We accept as axiomatic that "you've got to die sometime"; would a race that *knew* itself capable of five thousand or ten thousand years of life display the same attitude toward danger? A man thirty-five years old has half his life behind him; would an alien throw away his five thousand-year future on the gamble he could beat the train to the crossing, or dart across that street in time to escape the approaching car? Or engage in war because he didn't think he'd be killed?

The chance of immortality might make a people far more cautious; their approach to things might be very different. And certainly their philosophies would be a bit hard for human beings to fully appreciate. They might, on the one hand, have an immensely high regard for human life; on the other hand, because immortality and a fast reproductive rate are mutually incompatible in any limited ecology, the natural tendency of the savage level of culture is to exterminate the excess, if old age doesn't take care of that matter. That tendency might lead to a low regard for life, with duels and warfare common. If an individual has personal immortality, the urge to reproduce his kind might be considerably weaker. A human couple, on the average, have a little over two children in seventy years. The same couple reproducing at that rate, but living seven thousand instead of seventy years would produce quite a net increase in population!

But in general, several things appear fairly reasonable assumptions. We should be able to do for man what nature has done for fishes—let the natural tendency toward immortality of life have full sway. And we certainly have no reason to suppose that all air-breathing animals are mortal, just because we, here on Earth, happen to be!

THE EDITOR.



THE CATSPAW

BY GEORGE O. SMITH

***Somebody,** somewhere, had a fine idea, evidently, that was just a leetle too hot to try out at home. So they wanted someone else to try it—*

Illustrated by Orban

Thomas Barden slept fitfully. The dream was not nightmare, but it was annoying. It was like the important thought that does not quite struggle up through into consciousness but which remains unformed though the mind is aware of the hidden importance. It was like trying to read small print through a silk screen or to see fine detail through a sheet of florentine glass.

Furthermore it was recurring.

Strangely, Tom Barden seemed

to know that there was something strange about the dream, that it was more than just the ramblings of the subconscious mind. He knew that there was something to be gained by permitting the dream to run while he watched, so to speak. But the trouble was that the dream could not run so long as he remained cognizant enough in sleep to make mental notes. When he slept deep enough to permit the strange dream, he was deep enough to lose track of the delicate, and so very alien, train of thought.

The fitful sleep itself was a contributing factor to ultimate success. Since he slept not, he became drowsily tired and found himself lying wide awake time and again with strange semi-daydreams in which conscious thought and dream intermingled in a bizarre fantasy of fact and fiction.

He had been asleep or awake for hours. It was nearing four o'clock in the morning when Tom Barden slipped into a prolonged half-sleep and the dream, as it had before, came again.

He slipped into sleep and in dream, he saw himself luxuriously lounging on a broad couch. Above his head was a draped canopy of silk, its draped folds hanging low in a gorgeous pattern of silken folds. It was gently tinted in delicate colors that blended in a complete lack of regular pattern. It seemed more beautiful for lacking pattern than it could have been with any regularity.

It was none-ending, that canopy. From the draped dome above his couch the silken cyclorama fell in a colorful swirl to the floor where it folded over and over somewhere miles below the couch.

He—was isolated. He was protected. No intrusion could come even though Thomas Barden wanted the intrusion. Certainly if he denied entry, nothing could enter.

And yet he knew that beyond the many layers of flowing silk there was something demanding entry. He could not see nor hear the would-be intruder. He could not even see motion of the silk to show that there was such a being. Yet he seemed to sense it.

And when, finally, the intruder breached the outer layers of shrouding silk, Tom Barden knew it and was glad. Course after course of silken screen was opened by the intruder until finally the silk parted before his eyes and there entered—

Sentience!

It was without form and void.

But it was sentience and it was there for a definite purpose. It came and it hovered over Thomas Barden's broad couch and its thoughts were apparent. It was in communication with another sentience outside—

"I am in."

"Good," was the mental reply, also clear to Thomas Barden. It was not a direct communication from the other. It came relayed through the sentience above his bed, and since he was in direct mental communication with the other, thought and reply were clear also to Barden.

"Good," replied the other. "Be

quick and be thorough. We may never return!"

"You, sentience, listen for we have too little time. Those of your system are numbered in the billions, and of them all, you are the only one we have been able to contact though we have tried constantly for several years.

"As I communicate with you, your subconscious mind is being filled with a specialized knowledge of a science new to you. This science is not foreign to you, for it would normally follow the paths of discovery, yet you are not quite ready to discover it for yourselves. We give it to you, knowing that it will only speed up your advancement and it will not cause a passed-over space in the normal trend of advancing technology."

"Why are you giving this to us?" demanded Barden.

"A natural caution. You fear the complete altruist. I'll explain. This science will enable you to develop your spacecraft drive into a means of interstellar travel. This science is known to us. We are using it now. However, there is a political difficulty on our world. We have two factions. One faction wants conquest and subjugation of all systems that are less fortunate in their sociological and technological development. The other faction believes that any kind of subjugation of another people will lead to war upon war in pyramiding terror. I and my friends are members of this second belief. Since the first group has control, they are preparing to sweep out from our system with their ideal in force. The only way that subjugation of your race, complete with the attending strife, may be stopped is for you to have the same technological developments. Once you meet us as an equal, thoughts of enslaving you can not exist."

"Logical," admitted Barden.

"This science is entering your subconscious mind. It will not be clear to you for many days. I'd suggest rest and contemplation, but not heavy concentration. Learning is a matter of accepting facts and filing them logically in the subconscious mind. Unlike a course of study where fact follows fact, this knowledge is being poured in at high speed. Your subconscious mind is very much like a librarian who has just received a complete file of facts on a new world. Unfortunately these facts must be evaluated in terms of your own world and your own thought. After evaluation, they must be filed in the proper order. The subconscious never sleeps, but it will take time before the logical order is complete. At that time you will be able to speak with authority on the subject."

"I hope," replied Barden.

"You must! For we have had enough of war and talk of war. War is never fought between peoples who respect one another's ability. Take this knowledge and use it. And some day when you get the honest chance, pass it along to another race so that all men can be equal throughout the galaxy!"

The outsider made swift thought: "Quickly, for the veil thickens!"

"I must go. It would be dangerous for us both if I am trapped here when the veil closes. Just remember the billions of your men and the constant attempt to penetrate the mind of any one of them. Even this was sheer chance and it is failing—"

The sentience withdrew after a warning cry from the one on the outside. The silken screen closed, joined, and flowed to the floor without scar.

Barden was once more alone, protected, isolated.

Three weeks. It took Barden three long weeks. He awoke after the initial contact with the alien, and following the alien's advice, considered the matter coolly. It might be true and it might be a dream, but the fitfulness of his nature was gone. Barden then turned over and entered the sleep of the just for nine hours. After this awakening, he contemplated the dream and found it true.

Amazement at the accomplished fact was high, but the flood of knowledge occupied Barden's attention. Things kept coming up out of the dark in his mind that made little sense; other things were clear and sharp and Barden wondered whether these had ever been tried on Terra. They seemed so logical. Then as the days passed, these disconnected facts began to match together. The matrix of knowledge became less broken as the days went by, and—

At the end of three weeks, the sentience was proven correct. Thomas Barden knew, and he knew that he knew the last detail of a new science.

His only problem was getting this science into operation before the alien world could come—

He was all alone in this. No one on earth would believe his wild tale. They'd lay it to a nightmare and offer him medical advice. If he persisted, Thomas Barden would be writing his equations on the walls of a padded cell with a blunt crayon when the alien horde came.

And to walk into the Solar Space Laboratory and tell them he had a means of interstellar travel, complete with facts and figures would get him the same reception as the Brothers Wright, Fulton, and a horde of others. He would be politely shown the door and asked to go away and not bother them with wildness.

If he had time, he could declare the discovery of a phenomenon and offer it to the scientific world. Then step by step he could lead them all in the final disclosures, or even after a few discoveries had been turned over, he could act the part of a genius and force their hands by making great strides. He had too little time.

If he were wealthy, he could set up his own laboratory and gain recognition by proof. To go to work for another laboratory would mean that he would be forced to do work that he felt unimportant for sufficient a period to gain the confidence of his superiors. To be his own boss in his own laboratory would mean that he would not be

required to follow other lines of research; he could do things that would seem downright idiotic to those uninformed of the new science. That plus the fact that not one of the large laboratories would care to spend a small fortune on the cold predictions of a young unknown.

Thomas Barden wondered just how many men had found themselves hating the everlasting Time and Money factors before. A fine future!

Barden pondered the problem for almost a week. That made a total of four-weeks since the incident.

Then came a partial solution. He was an associate member of the Terran Physical Society. He could prepare a paper, purely theoretical in nature, and disclosing the basis for the new science. It would be treated with skepticism by most of the group, and such a wild-eyed idea might even get him scorn.

Yet this was no time to think of Thomas Barden and what happened to him. This was time to do something bold. For all the men of science who would hear of his theory, a few of them might try. If they tried one experiment, they would be convinced. Once convinced, he would be given credit.

The paper could not be very long. A long paper would be thrown out for divers reasons. A very short, terse paper might get by because it would show the logical development of thought. The reviewing members might think it sheer sophistry, but might allow it if for no other reason than to show how sophistic reasoning could build up a complete technology.

Barden began to make notes. A five-minute paper, packed with explosive details. He selected this fact and that experiment, chosen for their simplicity and their importance, and began to set them down.

His paper was ten pages long, filled with complex equations and terse statements of the results of suggested experiments. He sent it in to the reviewing board and then returned to his studies. For he would have to wait again.

Barden faced the reviewing board exactly eight weeks after the dream. By this time he was getting resigned to waiting. Also the hysteria that made him want immediate action was beginning to die in the face of logic. Obviously the alien culture was not on the verge of heading Solward or the alien mind would have told him that fact. He did mention that there was little time, but the alien would not have bothered if imminent disaster threatened.

Barden believed that the alien was cognizant of the difficulties of introducing a new science to a skeptical world—especially when done by an unknown. Perhaps if the famed Dr. Edith Ward had received the science, a word from her would have sent the men of all Terra, Venus and Mars scurrying to make their own experiments. Of course, Dr. Ward was head of the Solar Space Laboratory and could write high-priority orders for any-

thing short of complete utilization of Luna. She would not require disclosure to have her theories recognized.

Tom Barden wished that she were a member of the reviewing board, for then she might be directly interested. But he noted with some satisfaction that the Laboratory was represented. He faced the chairman confidently, though within him he was praying for a break.

"Mr. Barden," said the chairman, "you are not familiar with us. Introductions are in order. From left to right, are Doctors Murdoch, Harrison, and Jones. I am Edward Hansen, the chairman of this reviewing board. Gentlemen, this is Thomas Barden. You have read his brochure?"

There was a nod of assent.

"We have called you to ask a few questions," said the chairman.

"Gladly," said Barden. At least they were considering it. And so long as it was receiving consideration, it was far better than a complete rejection.

"This is, I take it, an experiment in sheer semantic reasoning?"

"It is more than that," said Barden slowly. "Not only is the reasoning logical when based upon the initial presumption, but I am firm in the belief that the initial presumption is correct."

Dr. Murdoch laughed. "I hope you'll pardon me, Mr. Barden. I'm rude, but it strikes me that you are somewhat similar to the prophet who sneers at the short-range predictions and prefers to tell of things that lie a hundred years in the future. By which I mean that testing out any one of your theories here would require the expenditure of a small fortune. The amount to be spent would be far in excess of any practical laboratory's budget unless some return is expected."

"If the premise proves true, though," said Barden, "the returns would be so great as to warrant any expenditure."

"Agreed," said Murdoch. "Agreed. Just show me proof."

"It is all there."

"Mathematical proof? The only proof of valid mathematics is in the experimental data that agrees. And may I add that when experiment and math do not agree, it is the math that gets changed. As witness Galileo's results with the freely falling bodies."

Barden nodded slowly. "You mean that mathematics alone is no proof."

"Precisely. Figures do not lie but liars can often figure. No offense, Barden. I wouldn't accuse any man of willful lying. But the math is a lie if it is based on a false premise."

"You have no experimental data at all?" asked Harrison.

Murdoch looked at Harrison and smiled tolerantly.

"Since Mr. Barden is not independently wealthy he could hardly have made any experiments," said Murdoch.

Dr. Hansen looked at Barden and said: "I believe that you have stumbled upon this line of reasoning by sheer accident and so firm is your

belief in it that you are making an attempt to have it tried?"

Barden smiled. "That is exactly right," he said earnestly.

"I do admire the semantic reasoning," said Hansen. "I am admittedly skeptical of the premise. Dr. Jones, you represent the Space Laboratory. This seems to be right in your department. What is your opinion?"

"If his theory is correct, great returns are obvious. However, I am inclined to view the idea as a matter of sophistic reasoning."

Barden hastened to get Dr. Jones' attention. "Look, sir. The same relegation of a theory to sophistic reasoning has happened before. Admittedly this is a new science. So have been several others. Someone must discover them in one way or another. The entire science of electronics was discovered in this way —Maxwell formulated the electromagnetic equations. Hertz made the initial experiments many years later. Marconi reduced them to practice, and then a horde of others came forth with their own contributions. Yet the vast technical holdings throughout the electronic field were initially based upon the mathematical predictions made by Maxwell."

"You seem well trained in logic and reasoning," smiled Hansen. "That was a rather sharp parallel. Yet you must understand our feelings in the matter. First, Maxwell was an accredited scientist before he formulated the famous Equations. Now if—and remember that big if —*if* this is a truly parallel case, we'd all like nothing better than to give you the acclaim you deserve. On the other hand, you expect us to foster you in your attempt to have millions spent on the experimentation you outline so logically. You must remember, Mr. Barden, that despite the fact that we, none of us, will have a prime function in the disbursement of any funds, we are none the less a primely responsible body. The fact that we permit you to speak will carry much weight. It will be a recommendation by us to the rest of the members. As such we must be cautious."

"Is there no way for an unknown man to make a contribution to science?" asked Barden.

"Of course. Produce one shred of evidence by experimentation."

"The cost!" exploded Barden. "You admit that every piece of equipment will require special construction. There is nothing in the solar system at the present time that will be useful."

"All of which makes us skeptical."

Murdoch spoke up: "We're not accusing you of trying to perpetrate a hoax. You must admit, however, that it is quite possible for any man to be completely carried away by his own theories. To believe in them thoroughly, even to the point of despising any man who does not subscribe to the same belief."

"That I do admit. However, gentlemen, I implore you to try. What can you lose?"

Hansen smiled wistfully. "About three million dollars."

"But think of the results."

Hansen's wistful expression increased. "We're all thinking of the result of dropping about three million dollars at the theory of a young, unknown man. It's a wild gamble, Mr. Barden. We're betting our reputations on ten pages of mathematics and very excellent logic. Can you think of what our reputations would be if your predictions were false?"

"But they are not."

Murdoch interrupted. "How do you know?" he said flatly.

"I have—"

"Wait," interrupted Murdoch again. "Please do not define X in terms of X. It isn't done except in very cheap dictionaries. You see, Mr. Barden, you are very earnest in your belief—for which we commend you. However self-determination is not enough to produce a science. Give us a shred of proof."

"Have you reviewed my mathematics?" demanded Barden.

"Naturally. And we find your mathematics unimpeachable. But an equation is not a flat statement of fact in spite of what they tell you. It is not even an instrument until you deduce from the equation certain postulates."

"But—"

"I'll give an example. The simplest form of electronic equation is Ohm's Law. Resistance equals Voltage divided by Current. Or, simpler: E equals IR. That has been proven time and again by experiment. Your equations are logical. Yet some of your terms are as though we were working with Ohm's Law without ever having heard of resistance as a physical fact in the conduction of electricity. Your whole network of equations is sensible, but unless you define the terms in the present-day terminology, we can only state that your manipulation of your mathematics is simple symbolic logic. You state that if P implies notQ, such is so—and then neglect to state what notQ is, and go on to state what you can do with P. Unless we know your terms, we can't even state whether you are dividing by real or unreal factors."

"I see that you are unimpressed."

"Not at all. We hoped that you might have had some experimental evidence. Lacking anything material to support your theory—" Hansen spread out his hands in a gesture of frustration.

"Then I've been wasting my time—and yours?"

"Not entirely. Will you speak on your paper as an experiment in sheer semantics?"

Barden considered. Perhaps if this could be presented as such it would be better than no presentation at all. Let them think him a crackpot. He'd win in the end. He would give his talk on the basis mentioned and then if there were any discussion afterwards he might be able to speak convincingly enough to start a train of thought.

"I'll do it," he said.

"Good," said Hansen. "The ability to think in semantic symbols is valuable, and every man could use a better grasp of abstract thought. Your paper will be presented next

week, here. We'll put you on the schedule for one o'clock."

Confidently, Tom Barden faced the sectional group of the Terran Physical Society and made his talk. He noted the interest present on every one of the eighty-nine faces. He prayed for a good reception, for he might be asked to present this paper at the international meeting, later. He felt that he was getting an excellent reception, for he had their interest.

He finished his speech and sat down. A buzz filled the room during the recess before discussion, and Barden saw with considerable interest that heads were nodding eagerly. Then the chairman rapped with his gavel.

"There will now be an open discussion," he said.

The buzz stopped.

"Any questions?" asked Chairman Hansen.

A hand went up near the back, and was recognized.

"I am Martin Worthington. I wish to state that the logic is excellent and the delivery was superb. May I ask if the pursuit of such impeccable logic is a matter of training, logical instinct, or by sheer imaginative power, did Mr. Barden momentarily convince himself of the truth of his premise and build up on that basis?"

Barden smiled. "The latter is true. Also, Mr. Worthington, I am still convinced of the truth of the basic premise."

The hall rang with laughter.

When it died, Barden continued. "Not only am I convinced of the validity of this theory, but I am willing to give all I have or ever hope to have for a chance to prove its worth."

"Then," said Worthington, "we are not so much to be impressed by the excellence of semantic reasoning as we have been. True sophistry is brilliant when the reasoner admits that his basic premise is false. Sophistry is just self-deception when the entire pattern is a firm conviction of the reasoner."

The crowd changed from amusement to a slight anger. The speaker, Barden, had not presented a bit of sheer reasoning. He had been talking on a theme which he firmly believed in!

Another hand went up and was recognized. "I am William Hendricks. May I ask if the speaker has any proof of the existence of such phenomena?"

"Only the mathematical proof presented here—and a more complete study at home. These were culled from the larger mass as being more to the point. It is my belief that the force-fields indicated in equation one may be set up, and that they will lead to the results shown in equation three."

"But you have no way of telling?"

"Only by mathematical prediction."

A third hand went up. A slender hand that was instantly recognized as that of Dr. Edith Ward.

"I wish to clarify a point," she said. "Mr. Barden's logic is impeccable, but it *is* based upon one false premise."

Barden looked at the woman carefully. No one could call her beautiful, but there was a womanly charm about her that was in sharp contrast to the cold facts she held in her brain. She looked about thirty years old, which included the mental adjustment necessary to compare her with a younger woman. That she was the head of the Solar Space Laboratory was in itself a statement of her ability as a physicist.

And the fact that she condemned his beliefs was as final as closing the lid and driving in the nails.

Period!

"I believe that my own belief is as firm as Miss Ward's," retorted Barden.

"You will find that your premise

may be valid, but the end-result is not profitable," she said flatly.

"You've experimented?" scoffed Barden.

"I don't have to," she said. "I know!"

"Perhaps by feminine intuition?" snapped Tom scathingly.

Edith Ward flushed and sat down abruptly, rebuffed and angry. Chairman Hansen arose and tried to speak, but the wellings and mutterings grew from a low murmur to a loud roar that changed slowly from random sounds of anger to a chant of "Throw him out! Throw him out! Throw him out!" as more and more voices took it up. Hansen banged sharply with his gavel and finally the angry cries died again into the dull muttering.

"We are not a rabble," said Hansen sharply. "I shall ask Mr. Barden to leave quietly. We will then continue with our regular business and forget this unhappy incident."

Barden left amid a sullen silence.

That was that. That door was closed to him, finally and completely. Barden went home in a blue funk and fretted for several hours. Then determination arose to show them all, and he consulted his notes again.

Time—and Money!

Doubtless it had been the same cry a thousand years ago, and there was no doubt that it would be the same stumbling block a million years from now. Perhaps on a different planet of a distant sun if Terra were no longer a running concern, but it would always be the cry.

Well, he thought, considering both, he did not know how much time he had. He knew he had little money. Also, he knew that no matter what he did he would never know about the time factor nor would he be able to change it much. Perhaps there might be some way to get money. If he was to be forced into the slow methods, and he failed, he would know that he had tried.

He took his mind from the ever-present problem of putting the science across, and started to inspect the new art from a dispassionate standpoint. It was his first try at looking at the technology from the standpoint of a scientific observer. Since the day of the dream, Tom Barden's one thought had been to initiate this development. Now, for the time being, Tom Barden went through his adequate storehouse of alien knowledge to see what other developments he might get out of it.

He grunted aloud: "If they won't let me build a better spacecraft, I'll build a better mousetrap!"

Then he laughed, for the new art was so complex and so well developed and so far beyond the present science that there were a horde of little items that could be put to work. The generation of spiral magnetic fluxes, for instance, would far outdo the machinist's magnetic chuck. No plain magnetic attraction this, but a twin-screw of magnetic flux lines throughout the chuck-plate and the metal work,

fastening them together. There were means of developing a type of superspeed radio communication along a tight beam that could not be tapped. A simple method of multi-circuit thyratron operation that had both an ionization and a deionization time of a fraction of microsecond or even less. A means of amplifying true square waves without distortion—permitting the paradox of the voltage assuming all values between zero and maximum instantaneously during the rise of the wave from zero to peak. A card-file sorting system capable of maintaining better than three million items and producing any given item with a distribution of near-items on either side—all contained in a desk-cabinet and operating silently within a three second interval. A magneto-physical means of exhausting vacuum tubes and removing occluded gases from the tube electrodes simultaneously. The latter could be kept in operation constantly during the life of the tube, if need arose.

He fastened on the latter. If it would generate the almost-perfect vacuum in a vacuum tube it would also de-air electron microscopes and all other kinds of equipment.

It was simple, too. It was not one of the direct results of the alien science, but it was an item used to develop the science from present technology. Doing it would not introduce anyone to Barden's technology any more than a thorough knowledge of small intricate mechanisms would introduce a mechanician to the field of electronics. But one cannot delve into basic electronic theory without hitting some of the principles of moving machinery.

Thomas Barden made his plans. When the plans were made, he bought tools and parts and went to work. Knowing every factor helped, and not many days passed before he had a working model of his magnetic vacuum pump.

He knew where to take it, luckily. He had worked for Terran Manufacturing, Incorporated and because of his connection there he was not unknown to the chief engineer of Solar Electric. Terran was a small outfit, and though Barden felt that he owed it some loyalty, he felt that the mighty Solar Electric could better afford the price he was prepared to ask. Terran would dig it up—but Solar was prepared at any time for that amount.

And the alien race might not wait—

He was ushered into the office of Hal Weston after an hour of painful waiting. The chief engineer of Solar Electric recognized him with a slight frown.

"You're the fellow who took off on Miss Ward, aren't you?"

"No," smiled Barden. "She happens to be the one that took off on me. I'm still right and I intend to prove it!"

"Not here, I hope. Your card stated differently."

"I'm entering nowhere on false pretenses, Mr. Weston. My card states my offer completely."

"You have a means of developing

an almost perfect vacuum and simultaneously removing adsorbed gas from any object in the inclosure?"

"Right!"

"Interesting if true. Let's see it."

"I have not the equipment with me. However, I have here a ten-inch glass sphere made from a laboratory flask. In it are several coins, bits of graphite, spongy palladium, and some anhydrous copper sulphate. This tube was evacuated by my equipment and there was no other treatment for removal of extraneous material."

"May we check that?"

"That is why I brought it along—for your own satisfaction."

Weston spoke into the communicator on his desk and in a minute, the door opened to admit an elderly man in a white coat. Weston gave him the flask and said: "Dr. Grosse, this flask is supposed to be totally evacuated and all absorbed gases removed as well as water vapor. I want a precision quantitative analysis of everything inside of this flask. And," he grinned, "get the results to me by day before yesterday."

"Now," said Weston to Barden, "granting that this is the real goods, how large can it be made?"

"It takes about four kilowatts per liter," said Barden. "Since the process takes only about ten seconds, the demand is quite high over a short period. But bearing in mind the four KW per liter, you may make the thing evacuate any volume up to the practical limit."

"Nothing for a home appliance," laughed Weston. "But if it will drive the spitting devil out of an electron microscope in ten seconds, it's worth it. What are you asking for rights and royalties if it performs as you state?"

"Mr. Weston, I'm interested in one thing only and that is to prove the value of my theory—the one that Edith Ward scorned."

"We're not interested in your theory save as a theory," said Weston.

"I don't want a position. I want enough immediate money to set up my own laboratory."

"You'll make a lot more if you take a small option now and accept a royalty, you know."

"I'll sell it outright for five million."

"I'm afraid that we can't settle that amount in one afternoon."

"That's all right," said Barden. "Get me twenty-five thousand as an option. Then take ten days to build one or to investigate all you want to. If it does not perform, I'll return your money. If it does perform, five million goes."

"Contingent upon Dr. Grosse's findings," said Weston. "And providing that you give me your original equipment in order to save some time in making the initial investigations. I'll have the option agreement and a certified check in this office tomorrow morning."

Barden smiled. "I *know* what the evacuator will do. I'll be back tomorrow with the original machine!"

Barden's original was an un-neat bit of coils and conducting rods and

it looked out of place in Weston's office. But the chief engineer did not mind. He was gloating over the analysis, and checking the report made by one of the mathematical physicists on the theory of the operation of the evacuator. Both were more than satisfactory.

"You're in, Barden," chuckled Weston as he countersigned the option agreement. "Now what do we do?"

"Me?" said Barden. "I'm going to rent me a large empty plant somewhere and start ordering equipment. I may even be back with a couple of other little gadgets later."

"If they're as good as this looks right now, they'll be welcome."

"I'll remember that," said Barden.

Barden's tracks were swift from there on. His first stop was to deposit the check in the bank to the amazement of his teller who felt forced to check the validity of the voucher despite the fact that it was certified. To have Thomas Barden, whose average salary had run about a hundred-fifty per week suddenly drop twenty-five thousand in the bank was—to the banker's point of view—slightly irregular.

Barden was not able to get out of the bank without having Mr. Coogan, the president of the bank, catch him and ply him with seventeen suggestions as to how the money could be invested. Tom almost had to get insulting before he could leave.

The next month was a harrowing, mad maze of events. He rented an unused factory, complete with machine tools. He hired seven men to help him, and then ran into difficulties because he had to make the equipment to make the machines. He found that starting from complete behind-scratch was a back-breaking job. Daily, the railroad spur dropped a freight car to be unloaded with stuff from one of the leading manufacturers of scientific equipment. The electric company took a sizable bite when they came along the poles with some wrist-thick cables and terminated it at his plant. He ended up by hiring three more men and putting them to making samples of some of the other by-products, knowing that his money would not last forever. The board of review had mentioned three million, but Barden was beginning to understand that despite all new types of equipment, they were still considering the basic physical laboratory as useful. They were right. It was a lot different starting from an empty factory and taking off from a well-maintained laboratory.

The days sped by and became weeks. The weeks passed and became months. And as the months worked themselves slowly past, chaos disappeared and order came from madness.

The by-products of the alien science came swiftly, and they sold well. Money flowed in fast enough to attract attention, and it was gratifying to Tom Barden to read an account of his "meteoric rise" that started from the day he "disagreed violently with the famed Dr. Ward."

If he had wanted money or fame, here it was. But Barden knew the story behind the story, and he also knew that whoever the alien might be, from whatever system, and adhering to whatever culture, the alien would find no fault in his operations. He had taken the long, hard road compared to the road taken by an accredited scientist producing such a theory. He cursed the delay and knew that it might have cut his time down to a dangerous minimum.

But Tom Barden had become the genius of the age. His factory had grown to a good staff, all but a few of whom worked on the basic science he needed to develop. It was developing slowly, but certainly, and each experiment showed him that the alien mind had been absolutely correct.

Daily he taught school for a hour. He knew every step, but he wanted his men to know the art when they were finished; the final experiment made. They would emerge from this trial-without-error period as technicians qualified to work on any phase of the new science. It gave him no small pleasure to know that his outfit would eventually be far ahead of the famous Solar Space Laboratory in techniques pertaining to the art of space travel. He hoped to make Dr. Edith Ward sit quietly down and eat her own words—backwards!

His plans were not published, and the outpourings of by-products seemed high enough to any observer to be the sensible output of the many men working there. None but those who worked there knew that Tom Barden knew every detail of every gadget that hit the various markets, and that the work of making the initial models was not the result of many man-hours of experiment, but a few man-hours of building to plans that had been proven and in use.

He was not bothered until the day it was anounced that Thomas Barden Laboratories were buying a spacecraft from the government.

The spacecraft was being delivered through the vast back doors of the factory at the same time that Dr. Edith Ward was entering the office doors in front.

Barden met her in his office. "How do you do, Miss Ward."

"How do you do," she returned with extreme politeness.

"May I ask your business?"

"I am here as a representative of the Solar Space Laboratory."

"Indeed?" And what has the government to say?"

Edith Ward slammed her purse down on his desk. "You fool!" she snapped. "Stop it!"

"Don't be upset," he said in an overly-soothing tone that was intended to infuriate. It succeeded.

"You blind fool. You're to stop experimenting in that superspeed drive!"

"Am I?"

"Yes," she blazed. "And I have official orders to stop it."

"Miss Ward, you tried to block me before. You did not succeed Why do you demand that I stop it?"

"Because it will not work!"

"You've experimented?"

"I have not because it is dangerous!"

"Then any knowledge you may have about this science is either guesswork or—feminine intuition?"

"You accused me of that before, remember?"

"I didn't get away with it then," said Barden. "But I can now. I was unknown then, remember? Well, remember again that I've advanced from unknown a year ago to my present stature now. And I might add that my present stature is not too far below your own, Miss Doctor Ward."

"I have authority to stop you."

Barden looked down at her with a cryptic smile. "Yeah?" he drawled. "Go ahead and try!"

"And do you think I can't?"

"Nope," he said.

"How are you going to stop me?" she blazed.

"I won't have to," he said. "Pub-

lic opinion will. Don't forget, Miss Ward, that people are still running this system. People are and always have been entirely in favor of the man who came up from nowhere and did things on a big plan. Horatio Alger died a long time ago, Miss Ward, but he's still a popular idea. When you stop me I shall appeal to the people."

"In what way?"

"You wouldn't be using your feminine jealousy to stall me while the Solar Lab develops the interstellar drive, would you?"

"You—!"

"Nah," he warned her blithely. "Mustn't swear!"

"Oh damn!"

"Now look, Miss Ward," said Barden quietly, "we've had our snarling-session twice. Once when you laughed me out of the Terran Physical Society's big meeting and now when I tell you that I am big enough so that you'll not stop me by merely expressing a personal opinion. Since I'm now big enough to command a little respect in my own right, supposing you give me some of yours and I'll see if I can find any in me to show you. Take the previous as a partial apology if you must. But I'm wanting to know by what basis you state that pursuing this job is dangerous—or say more dangerous than working on high-tension lines or space travel as it now exists."

"The theory you present has one danger factor. According to my own interpretation of your theory, the fields you require in your spacecraft to achieve superspeed are powerful enough to cause a magnetostriction in nonmagnetic materials. This magnetostriction is an atomic magnetostriction which causes the alignment of the planetary planes of the electron orbits. The result is a minor chain fission reaction that becomes major after the first nineteen microseconds."

"My theory is that nothing of that nature will take place," said Barden.

"Remember," she said, "despite your dislike of me personally, that I am trained in physics. Therefore my interpretation of physical phenomena and my predictions of such are more—"

"I agree," interrupted Barden. "But again do not forget that this is a field that is new to all scientists."

"Agreed again," she said with a slight smile. "But I've had several trained men working on your theory. They agree with me."

"Don't believe that anyone can formulate an opinion on the material that you have available."

"Oh, but we can."

"Then you have experimented—"

"No, we have not."

"Then exactly where did you get this extra information?" demanded Barden.

Dr. Edith Ward looked at Tom Barden carefully. "From the same place where you got yours!" she said slowly and deliberately.

Barden wondered, *did she know?*

He grinned. "I dreamed mine," he said. "Everything that I've produced emanated from a dream."

Then Barden embellished it thoroughly, knowing that the flagrance of his embroidery would sound like a lie to anyone who was really unaware of the truth. "I was invaded in a dream by a gentleman who used a mechanical educator on me and taught me everything that I've produced, everything that I've invented, and every advanced theory that I've had. I have become a scientist of an alien culture that I have full intention of making into a solar science."

"Then it is true," she breathed.

"What is true?" he demanded.

"Tom Barden, listen. Not only do I accept your apology of a few moments ago, but I offer mine. I —was afraid. Just as you were afraid to let the truth be known. I blustered and took my attitude because I could not let it be known that I, head of the Solar Labs, could be influenced by what the learned men would term either dream or hallucination."

"You've had one too?" he asked quietly.

She nodded.

Tom grunted. "Let's compare notes," he said. "Seems as how we got different stories out of our friends."

Edith nodded again and said: "It was a strange dream that came to me one night about a year and a half ago. I was the soul and master of a mighty castle, an impregnable fortress with but five roadways entering. Interpretation of that is simple, of course the five roadways were the five senses. A . . . messenger came, but instead of using any of the roadways, he came through the very walls, and warned me."

"Just what was his story?" asked Barden.

"That Sol was a menace to a certain race. This race—never defined nor located save that it was a stellar race—was incapable of conquering Sol excepting by stealth. However it could be done by giving one smart man a partial truth, and that it was more than probable that this would be done. The partial truth was the technique of a new science that would if not used properly, cause complete destruction of the system. In the final usage, there would be a fission-reaction of whatever planet it was used near. The reaction would create a planetary nova and the almost-instantaneous explosion of the planet would wipe out all life in the system and the counter bombardment of the sun by the exploding planet would cause the sun itself to go nova, thus completing the process."

"I presume your informant was quite concerned over the possible destruction of a friendly race?"

"Certainly," she said. "That is why he contacted me."

"If I were a member of the conquer-all faction of my story, Miss Ward, I would be trying to contact someone here to warn them of a terrible danger if the science were exploited. That would delay our work long enough for them to arrive, wouldn't it?"

"There is nothing so dangerous as a half-truth," said Edith Ward flatly.

"Nor as dangerous as a little knowledge," agreed Barden. "However, Miss Ward, my story is just as valid as yours. And since neither story may be checked for veracity, how do you propose to proceed?"

"I think you'd better stop!"

Barden sat down on the edge of the desk and looked down at her. She was sitting relaxed in the chair alongside, though it was only her body that was relaxed. Her face was tense and her eyes were half-narrowed as in deep concentration. Barden looked at her for a moment and then smacked a fist into the palm of his hand.

"Look," he said, "that's apparently what your informant wants. Now as to veracity, for every statement you make about the impossibility of interpreting theoretical logic into a complete prediction of physical phenomena without experimental evidence, I can state in your own words that you can't tell anybody what the outcome will be. You want me to stop. If my story is true, then Terra will have interstellar travel and will meet this incoming race on its own terms. Either proposition is O.K."

Edith Ward muttered something and Barden asked what she said.

"I said that I wondered how many men were too successful in mixing nitroglycerine before they had one smart enough to mail the formula to a friend—before he went up. I also wonder how many men tried Ben Franklin's experiment with the kite and—really got electricity out of the clouds and right through his body and was found slightly electrocuted after the storm had blown over. Number three—novas often occur in places where there seems to be no reason. Could they be caused by races who have just discovered some new source of power? And double-novas? A second race analyzing the burst and trying their own idea out a few years later?"

"My dear young woman," said Barden, "your attitude belies your position. You seem to be telling me not to advance in science. Yet you yourself are head of the Solar Space Laboratory, an institution of considerable reknown that is dedicated to the idea of advancement in science. Do you think that your outfit has a corner on brains—that no one should experiment in any line that you do not approve?"

"You are accusing me of egomania," she retorted.

"That's what it sounds like."

"All right," she snapped. "You've given your views. I'll give mine. You've shown reasons why both your informant and mine would tell their stories in support of your own view. Now admit that I can do the same thing!"

"O.K.," laughed Barden uproariously. "I admit it. So what?"

"So what!" she cried furiously. "You'll play with the future of an entire stellar race by rushing in where angels fear to tread!"

"Careful, Miss Ward. Metaphorically, you've just termed me a fool and yourself an angel."

"You are a fool!"

"O.K., lady, but you're no angel!"

"Mr. Barden," she said icily, "tossing insults will get us nowhere. I've tried to give you my viewpoint. You've given me yours. Now—"

"We're at the same impasse we were a half hour ago. My viewpoint is as valid as yours because there's nobody within a number of light-years that can tell the truth of the matter. You are asking me to suppress a new science. Leonardo Da Vinci was asked to suppress the submarine for the good of the race. He did it so well that we know about the whole affair."

"Meaning?"

"That true suppression would have covered the incident, too. But the submarine was suppressed only until men developed techniques and sciences that made undersea travel practical. If I suppress this science, how long do you think it will be before it is started again by someone else? How did either of our informants get the information?"

"Why . . . ah—"

"By trying it themselves!" said Barden, banging a fist on the desk for emphasis. Suppression is strictly ostrich tactics, Miss Ward. You can't avoid anything by hoping that if you don't admit it's there it may go away. It never does. The way to live honorably and safely is to meet every obstacle and every danger as it comes and by facing them, learn how to control them. Shakespeare said that—'The slings and arrows of outrageous fortune . . . or nobler in the heart to take arms against a sea of troubles . . . and by facing them, to conquer them!'" That may be bum misquote, Miss Ward but it is true."

"Then you intend to try it out?"

"I most certainly do!"

Edith Ward stood up. "I've nothing more to say. You force me to take action."

"I'm sorry, Miss Ward. If it is battle you want, you'll get it. You'll find it harder to quell Tom Barden The Successful than you found it a year ago when you shut off Tom Barden The Theorist with a word of scorn. I'm sorry—I really am."

"Sorry?" she repeated with disbelief.

"Sure," he said. "Barden Laboratories and Solar Labs could really go places if we weren't fighting. Only one more thing, Miss Ward."

"What?" she replied impatiently.

"Divide and conquer is not uniquely Terran!"

After she left, Barden wondered whether his final shot had hit anything. He returned to work and forgot about it, sensibly admitting that if it did he would not be bothered and if it did not he wouldn't stop anyway, and so he might as well get to work. He rather hoped to avoid the possible delay that would follow official action.

Dr. Edith Ward answered him within twenty-four hours. Her word was accepted as valid in many places; had been the final authority on such matters for some time. Up to now there had never been any defense. Plus the fact that his side

of the argument had never been voiced.

Barden didn't scourge the court for their decision. With only one accredited side of the evidence in, they could but take action. So Barden shrugged, grinned to himself, and spent several days in intense study, laying out the program that was to continue in his absence. Then he took the flier for the Terran Capital.

It was not a court hearing. It was more of a high-powered debate before a group of qualified judges and investigators. Barden looked into the background of his judges and was glad that the old system of appointment to investigating committees had been stopped. Though these men were not qualified physicists, they were not the old-line politician, who took an arbitrary stand because he thought that waving a banner with a certain device would sound good to his constituents. There would be little personal opinion or personal ambition in this hearing, and not one of the judges would sacrifice either contestant on the altar of publicity.

By unspoken agreement, neither he nor Edith Ward mentioned the source of their information. This Barden admitted was hard on the female physicist's argument for she could claim only mathematical analysis and he could claim experimental evidence.

They heard her side and then asked for his. He gave his arguments simply and answered every point she brought up. There was rebuttal and rejoinder and finally open discussion.

"I claim that this man is not a qualified physicist," she stated firmly. "As such he has not the experience necessary to judge the validity of my argument."

"I admit that I hold no degrees," said Barden. "Neither did Thomas Edison. Is Miss Ward convinced that no man without a string of college degrees is qualified to do anything but dig ditches?"

That hurt, for the investigators were not blessed with doctor's degrees in philosophy; the scattering of LLDs were about half honorary degrees and their owners though gratified for the honor knew how it was earned.

"Of course not," snapped Miss Ward. "I merely state—"

"If Miss Ward is so firm in her belief, why doesn't she bring forth some experimental evidence. She has the entire holdings of the Solar Space Laboratory at her disposal. If this is as important as she claims, then the financial argument may be dispensed with. For no amount of money is capable of paying for total destruction of the solar system."

"I need no experiments," she snapped.

"Or is Miss Ward trying to tell us that any line of research that she does not sponsor is not worth bothering with? Or is she trying to stop me so that she can take up? Or has she started—late—and wants me stopped before I get to the answer. That would make the famous Solar Space Laboratory

look slightly second-rate, wouldn't it."

"Gentlemen," cried Miss Ward facing the committee and ignoring Barden, "his statements are invidious. He is accusing me of jealousy, personal ambition, and egomania. This is not fair!"

"Miss Ward, I regret that you are not a man—or that I am not a woman. Then we would have an even chance before a committee of our contemporaries."

"Mr. Barden," she said in an icy voice, "I've been accused of flaunting my sex every time a question is raised. I've also been told by many that my position was gained in the same way. Just because I prefer to be a physicist instead of some man's housekeeper, I am viewed with suspicion, hatred, jealousy, and dislike. Well, Mr. Barden, you accuse me of using my sex. It is as much a hindrance as an aid, because I find that a woman has to be three times as good as the man in the same job in order to get the same recognition. If she isn't, nobody trusts her at all! Now," she said facing the committee, "I'll make my final plea. I've had mathematical physicists at work for almost a year. They agree with me. Thomas Barden has earned his position, I admit. But I still claim that he is moving forward along an unknown road because he is unable to make the necessary predictions. I've explained where this road leads to, and the consequences of following it blindly. He must be stopped!"

"Mathematics," said Barden, "and I quote Dr. Murdoch of the Board of Review of the Terran Physical Society: 'And may I add that when mathematics and experiment do not agree, it is the math that is changed. As witness Galileo's experiments with the falling bodies.' No one can make a certain prediction postulated on mathematics unless he has cognizance of every term. Miss Ward, are you aware of every factor?"

"No but—"

"Then your mathematics is faulty. And your opinion is, therefore, reduced to a personal opinion and not a scientific statement of fact. I've heard that a physicist is a learned one who leaps from an unfounded opinion to a foregone conclusion."

"You sound like an orator," snapped Edith Ward, "and orators seldom follow full fact unless it enhances their point."

"I'm sorry that you have that opinion," said Barden. "However, Miss Ward and gentlemen, regardless of what you do, of how you attempt to restrain me, I shall pursue this matter to the bitter end. If you deny me the right to work on Terra or any other solid body of the system, I shall take my laboratory into space and then we shall have two space laboratories—one of which will function in the medium for which it was named!"

Barden nodded affably, turned, and left the room.

One of the committeemen smiled sardonically and said: "I think he has just said, 'To Hell with us'!"

Another one nodded glumly and said: "Me, I think he's right. No

one can stand in the way of progress."

Edith Ward blazed. "Progress! Progress! Is destruction progress? Well, if the ultimate goal of mankind is to go out in a blazing holocaust of his own making, then this is true progress. One proper step toward the final Gotterdammerung!"

The committeeman smiled at her tolerantly. "Twilight of the Gods, Miss Ward? Oh come now, we aren't gods and I daresay that the universe will continue to function without man's aid and abetment."

Edith Ward snorted through her patrician nose. "Correct," she snapped. "But after we leave, who's here to care?"

Dr. Edith Ward was surprised by his arrival at the Solar Space Laboratory. She didn't expect him. He had won his battle, and she knew he was not the kind of man to gloat over a defeated enemy. Therefore she reasoned that she might never see him again for certainly she would not go to his place to see him —and eventually the whole system would go up, triggered by the untrained hand of Thomas Barden.

Then to have him call—it bothered her. Why—?

He entered, carrying a small olive branch, and he smiled boyishly as he handed it to her with a small bow.

"A truce," he suggested.

"There can be no truce," she said stonily. "It will either be you or me that is shown right."

"Oh, I wouldn't say that," he said with a smile. "Look, Miss Ward, I've never disregarded the possibility that you might be correct. All I've wanted was a chance to prove it instead of merely writing it off on the grounds of possible danger. One never knows what will happen until one tries. Therefore I wanted to continue. I've completed the ship and it is awaiting a trial. Any time we're ready."

"Is this a last attempt at mollification—a salving of your somewhat rusty conscience?"

"Not at all," he said. I want you to go along with me as a qualified observer."

"To observe what? Terra going up in flames?"

"Nope. Not necessary. The ship still retains its normal drive. We'll take it out beyond the orbit of Pluto by a couple of billion miles and let it go out there. I daresay that if you are correct, the fury of a few hundred tons of spacecraft going up in sheer energy will not damage the solar system much. Especially from that distance. Then if it does run, we're also on our way to one of the nearby stars. Like?"

"Sounds reasonable."

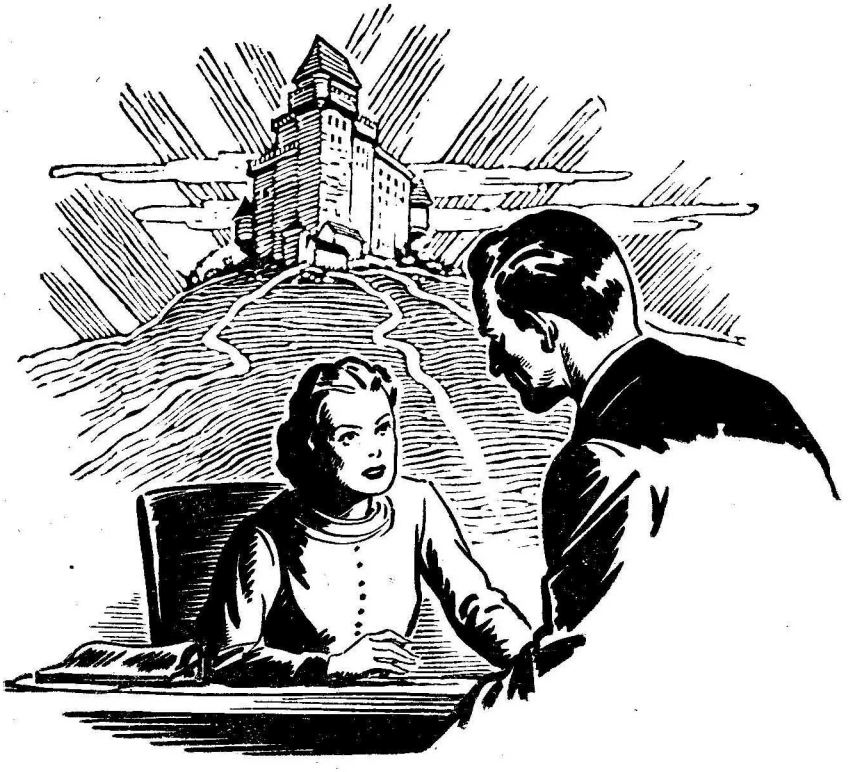
"Certainly," he said. "Frankly I've considered that ever since you mentioned the problem."

"I wonder if my informant considered it, too?" she said slowly.

"Probably."

"Then his warning was truly helpful."

"Iffen and providen again," he grinned. "But if he is so nicely altruistic, why didn't he tell us how to get a real superspeed drive?"



"Maybe there is none."

"Then," said Barden, "why knock out a solar system that is so far away that nothing it does can have any effect upon you?"

"A very valid point," said Edith Ward. Her eyes opened wide and her jaw fell slack. "Goodness," she breathed.

"Are we?" he asked hollowly. His expression was one of wonder and amazement.

"Well, if we win and it works, they've hazarded nothing and still have their science. If we lose, they will not miss us in the first place and also they'll quickly abandon that point."

"Guinea pigs," snorted Edith. She stood up and put one slim hand in his. She gave it a hearty shake and a firm grasp. "I'm in—from right now to the point where the whole cosmos goes up in a cloud of nuclear particles! I'll be at your place in the morning with my case packed for a six months' trip. Now I'm getting a whole case of feminine curiosity!"

"Yes?" he said cheerfully. "What, this time?"

"Well, if your informant was tossing us an experiment, hoping to

get an answer, then why did mine warn me? They'll never see a spaceship burst at a distance of a half dozen light-years. They might never really know."

"We'll find out," he said firmly. "There is something about both sides that I do not like!"

True to her word, Edith Ward turned up at the first glimmer of daylight with her case of personal belongings. "Where'll I have it put?" she asked.

"Ship Two, Stateroom Three," he said. "I have two crates fixed up so that if you're right, we can still get home without taking to the life-craft."

One hour later, the two ships lifted on their ordinary space drive and sped with constant acceleration directly away from the sun. At three times gravity they went, and as the seconds and the minutes and the hours passed, their velocity mounted upward. In both ships, the men worked quietly on their instruments, loafed noisily, and generally killed time. Everything had been triply checked by the time that turnover came, six days after the start. Then for six more days the ships decelerated at three gravities while the sun dwindled in size. Between Tom Barden and Edith Ward there was much talk, but no solution to the problem. They covered nearly all aspects of the possibilities and came up with the same result: Insufficient evidence to support any postulate.

About the only thing that came to complete agreement was the statement that there was more to this than was clear, and it was suspicious.

The feud that had existed faded away. It may have been the common interest, or if you will, the common menace. For though no true menace had shown, it was a common bond between Barden and Ward against a question that annoyed them simultaneously. It may have been simply the fact that man and woman find it hard to continue a dislike when they have something in common. Nature seems to have made it so. It may have been the thrill of adventure, prosaic as it was to be racing through unchangeable space for hour upon hour and day upon day with nothing but the sheerest of boredom outside of the ship. Perhaps it might have been that the sight out of any window was exactly the same today as it was yesterday and would be tomorrow or a hundred years from now—or even a thousand, for though the stars do move in their separate paths, the constellations are not materially different. The utter constancy of the sky without may have turned them inward to seek the changing play of personality.

Regardless of the reason, by the time they reached that unmarked spot outside of the orbit of Pluto where the ships became close to motionless with respect to Sol—there was no way of telling true zero-relative motion and true zero was not important anyway—they were friends.

The ships were rather closer together than they'd anticipated, and

it took only a couple of hours of juggling to bring them together. Then the skeleton crew of the one was transferred to the other ship. It drew away—and away and away.

"We've got more radio equipment aboard these crates than the Interplanetary Network owns," grinned Barden. "Everything on the darned crate is controlled and every meter, instrument, and dingbat aboard her will ship the answer back here. There must be a million radio-controlled synchros aboard these ships, and cameras on both to read every factor."

"That's fine," answered Edith with a smile. "What happens if it works like a charm and takes off at superspeed? How do your radio-controlled gadgets work then?"

"We'd lose the ship, of course, if we didn't have a time clock on the drive. If all goes well, the first drive will run for exactly ten seconds. Then we'll have about a ten-day flight to find it again because it will be a long way from here—straight out!" He smiled. "Of course, if we want to take a small chance, we could turn it on its own primary drive and superspeed it back if all goes well. But the radio controls will be as sluggish as the devil because there should be about a three or four hour transmission delay."

The other ship was a minute speck in the distance. Then a ship-alarm rang and the entire crew came to the alert. Barden said: "This is it!" in a strained voice and he pulled the big switch.

Along the wall was the bank upon bank of synchrometers, reading every possible factor in the controlled ship. Before the panel were trained technicians, each with a desk full of controls. Behind them were the directors with the master controls, and behind them stood Barden and Edith Ward. From holes above peeked the lenses of cameras recording the motions of every technician, and behind the entire group, more cameras pointed at the vast master panel. The recorders took down every sound, and the entire proceeding was synchronized by crystal-controlled clocks running from a primary standard of frequency.

At the starting impulse, the warm-up time pilot lit and the relays clicked as one, like a single, sharp chord of music. When the warm-up period ended the pilot changed from red to green and another bank of relays crashed home with a flowing roar, each tiny click adding to the thunder of thousands of others like it.

"That's the end of the rattle," observed Barden. "From here on in we're running on multicircuit thyratrons."

The meter panel flashed along its entire length as the myriad of Ready lights went on. The automatic starter began its cycle, and the synchrometers on the vast panel began to indicate. Up climbed the power, storing itself in the vast reservoir bit by bit like the slow, inexorable winding of a mighty clock spring. Up it went, and the meters moved just above the limit of perception,

mounting and passing toward the red mark that indicated the critical point.

As slow as their climb was, each meter hit the red mark at the same instant.

There was a murmur of low voices as each technician gave his notes to the recorders. No scribbling here, the voice itself with its inflection, its ejaculation, and its personal opinion under stress would be set down.

Then the master switch went home with a tiny flare of ionized gases—

And silently every panel went dead.

"Oh!" said Edith Ward in a solemn tone.

"Not yet," Barden objected. "This may be success."

"But—?"

"How do you hope to control a radio-controlled drone that is traveling higher than the velocity of propagation?"

"But how will you ever know?"

"When we—"

He was interrupted by the chatter of the radiation counter. Light splashed in through the tiny ports in a brilliant flare.

"Well, we won't," said Barden helplessly.

"Won't what?"

"Ever catch up with it! Not where it's gone!"

"So—?"

"So we've solved that problem," he said bitterly. "Your informant was right. From what the counter says, that was a vicious number. Well, I guess I am licked, finally. I admit it."

"Somehow," said Edith solemnly, "I know I should feel elated. But I am not. Fact of the matter is, I am ashamed that there is a portion of my brain that tells me that I am proven correct. I . . . fervently wish it were not so."

"Thanks," he said. "I wish but one thing."

"What?"

"I'd have preferred to have been aboard that crate!"

"Tom!" she said plaintively. "Not—oblivion."

"No," he said with a wistful smile. "At superspeed, my recording instruments could record nothing. Perhaps if I'd been aboard I could have found out what really happened. There is no way."

"But what can we do?"

"Build another one and spend my time trying to find out how to get a recording from a body that isn't really existent in this space at all."

"That sounds impossible."

"Then there is but one answer," he said, "and that is to go out with it and hope that by some machination I can control the reaction before it gets beyond stopping."

"Tom," she said quietly, "you are still convinced that such a thing is possible?"

"I am," he said. And then he stopped as his face filled with wonder.

"What?" she asked, seeing the change.

"Look," he said, his voice rising in excitement. "We caught radiation. Right?"

"Right."

"That means that the ship was not exceeding the velocity of light when it went up!"

"Yes, but—?"

"Then on the instantaneous recorders there must be a complete record of what every instrument *should have been reading* but did not due to the mechanical inertia of these meters! Right?"

"But suppose—"

"Look, Edith. The theory of the drive is based upon the development of a monopolar magnetic field that incloses space in upon itself like a blister, twisted off from the skin of a toy balloon. Now that field would collapse if the fission started, because the fission is initiated as you claim by magnetostrictive alignment of the planetary orbits of the field-electrons in the atoms. Obviously the magnetostrictive effect is more pronounced near to the center of the monopolar generator. Ergo that would go first, dropping the speed of the ship to below the velocity of light by considerable an amount. Then as the fission continued, spreading outward, the various instruments would go blooey—but not until they'd had . . . did you say thirteen microseconds after initiation the major fission took place?"

"Yes."

"Give it twelve microseconds to drop the ship below the speed of light and I have still one full microsecond for recordings!"

Edith Ward looked up in admiration. "And you'll bet your life on what your instruments can see in one millionth of a second?"

"Shucks," he grinned. "Way way back they used microsecond pulses to range aircraft, and they got to the point where a microsecond of time could be accurately split into several million parts of its own. Besides, I made those instruments!"

"Q.E.D." said Edith Ward quietly. "But how are you going to develop a monopolar magnetic field without the magnetostrictive effect? The prime consideration is not the field, but the fact that aligning the planetary orbits means that two things tend to occupy the same place at the same time. That isn't—they tell me—possible."

"Too bad the reverse isn't true," he said.

"You mean the chance of something occupying two places at the same time?"

"Uh-huh."

"What then?"

"Then we could develop two monopolar fields of opposing polarity to inclose the twin-ship proposition. Then the atomic orbits would not be affected since they would receive the bipolar urge."

"Couldn't you change from one to the other very swiftly?"

"Not without passing through zero on the way. Every time we passed through zero we'd end up at sub-speed. The ship would really jack rabbit."

"Oh."

"But," he said thoughtfully, "what happens if the monopolar

field is generated upon a true square wave?"

"A true square wave is impractical."

"You mean because at the moment of transition, the wave front must assume, simultaneously, all values between zero and maximum?"

"Yes," she said, "and it is impossible to have any item operating under two values."

"That is an existent item," said Barden with a smile. "Bringing back H. G. Wells' famous point of whether an instantaneous cube could exist."

"This I do not follow."

"Look, Edith," said Tom patiently. "Any true square wave must have a wave front in which the rise is instantaneous, and assuming all values between zero and maximum for the duration of an instant. An instant is the true zero-time, with a time-quantum of nothing—the indivisible line that divides two adjoining events. Just as a true line has no thickness.

"Now," he went on, "generating the monopolar field on a true square wave would flop us from one field to the other in true no-time. At that instant, we would be existing in all values from maximum negative to maximum positive, at the same time at zero—*but not truly assigned a real value.* Therefore we should not stop.

"However," he went on, "that is an impossibility because the true instant of no duration is impossible to achieve with any mechanism, electrical or otherwise. However, the fields set up to make possible this square wave do permit the full realization of the problem. For a practical duration, however small, the value of the wave does actually assume all values from maximum negative to maximum positive!"

She looked at him with puzzlement. "I thought they taught you only this one science," she said.

"That would have been useless," he grinned. "As useless as trying to teach a Hottentot the full science of electronics without giving him the rest of physics as a basis. No, little lady, I got the full curriculum, including a full training in how to think logically! How else?"

"You win," she said solemnly. "Fudge up your true square wave, and I'll buy a ticket back home in your crate!"

"Thanks, Edith," he said. "That's a high compliment. But there's more of us than we-all. I'll have to take a vote."

There was a roar at Barden's explanation. And his head technician stood up, waving for silence. "There's enough lifecraft aboard," he shouted over the noise. "Anybody who wants to get out can take 'em. They can make Terra from here in a couple of months in a lifecraft if they want to."

That got a roar of approval.

"Lucky I had two ships all fitted out," said Tom. "Also, with all this spare junk for radio-controlling the other crate we've got a shipload of spare parts. Probably take about a week flat to tinker it together, but it is far better to do it

out here than to go all the way home to Terra—that'd take about four weeks."

"I wonder why they didn't think of that square-wave idea," said Edith.

"Lord only knows."

"That's what bothers me," she said.

"Why?"

"Because we are playing with the other man's cards, remember. We're not leading authorities in this art. You got both the square-wave generator and the monopolar field out of them. Now why hadn't they tried it before?"

"On the theory that no beginner ever has a valid idea? No soap. Maybe they've been too close to the woods to see anything but them trees. Of course, there's another little angle we've not considered."

"Go on. First it was a political difference between factions for and against subjugation. Then I came in and threw in my two cents which sort of hardened the argument a bit. We didn't know whether my stuff was shoved in to stop production or to save Sol. We know now that your informant was telling the truth but not the whole truth. We know that mine was honest but not why he was. Then we came to the possibility that someone somewhere tossed us a fish because they were afraid to try it. Why the stopper on that?"

"Possibly they want us to really try it out and not total destruction."

"But—?"

"Look, Edith. Supposing you wanted to have something developed for you by a consulting laboratory. You've done that yourself at Solar Labs. Wouldn't you give them whatever information you had available?"

She nodded. "Nice explanation," she said solemnly. "Excepting that if I were doing it, I'd not call one man and start him experimenting on one pretext and then call another member of the laboratory and tell him that the information would lead to disaster."

"In other words, the big problem is motive."

"Precisely. And that's what we're up against. Try to figure out the hidden motives of extra-solar cultures."

"You believe there are two?"

Tom Barden nodded. "Uh-huh," he said. "And all the talking we can do from now until we find out won't help because we cannot interpret the thoughts of an alien culture in our own terms and hope to come out right!"

And that, of course, was that. It was definitely true. Reviewing all the evidence during the next ten days, they came up with a startlingly minute amount of fact. Barden had been given a scientific field because of a political argument; Edith Ward had been warned that the information was incomplete and would lead to disaster.

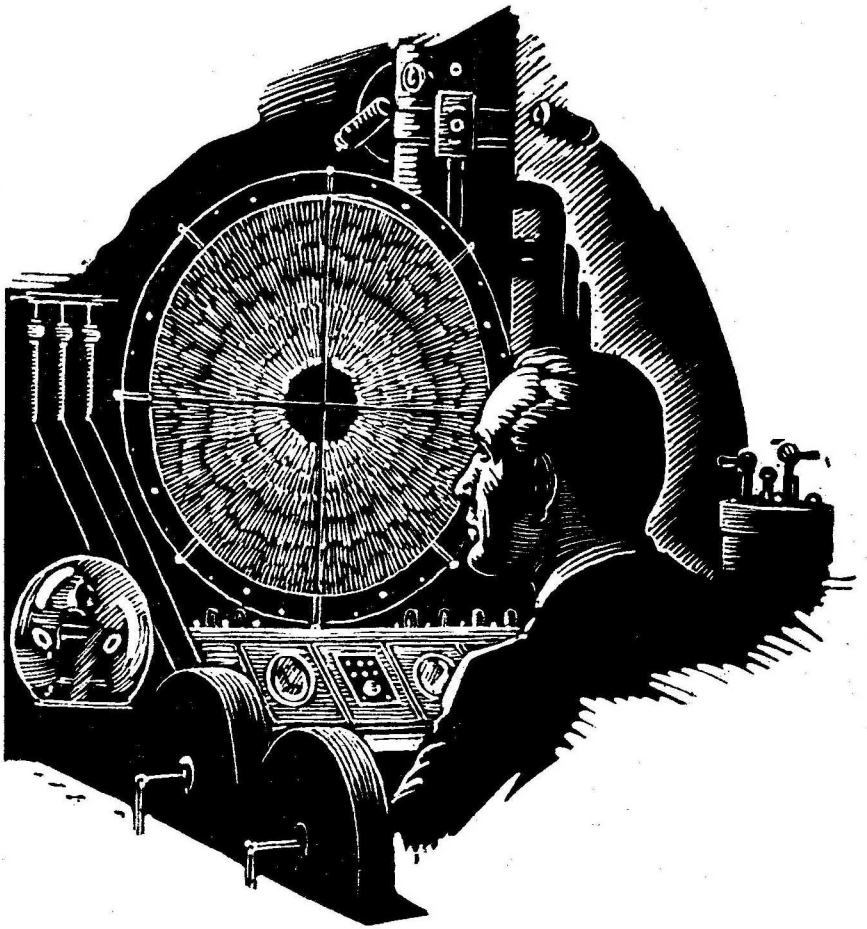
Build upon those slender bricks and they tumble all too quickly. Barden's story could be construed as an attempt to get consulting service on a dangerous project without

danger to the alien race. Ward's informant might have been an attempt to give Sol a good chance to solve it in safety, but in solution there would be no proof—or even in failure. For there was no way of telling proof from failure at many light-years of distance unless the failure bloomed the entire system into a nova.

And regardless of any theoretical argument, it was still a technical impossibility to construct any spaceship capable of traversing light-years without some means of super speed. Not without a suitable crew to do a job when it arrived.

Then, to reverse the argument, supposing that Barden's tale was correct. The opposing faction might hope to forestall any work by issuing the warning.

But if Barden's tale were correct, why did the so-called altruists offer



him a science that was dangerous to pursue?

Unless, perhaps, the political argument was conquest versus dominance. Both factions wanted conquest and dominance. One demanded the elimination of all races that might offer trouble. The other faction might argue that a completely dead enemy offers no real reward for conquest—for of what use is it to become king when the throne is safe only when all subjects are dead?

Yes, there's Paranoia. The paranoid will either become king of all or king of none—or none will remain to be king including himself. That theory is quite hard on rational people.

So went the arguments, and when the ten days were completed, they were no closer to the truth than they had been before.

Not entirely true, that. For they hoped to drive—somewhere—at a velocity higher than the speed of light.

With a firm hand, Tom Barden pressed the Start button. The relays clicked and the pilot lights flared red, and then after the warm-up period they turned green.

"This is it," he said, grasping the small lever that would start the automatic sequence.

Silence—almost silence came. From one corner came a small muttering and the click of beads. A throat was cleared unnecessarily, for it, like all others, was both dry and clear. A foot shuffled nervously—

"No!" shouted a voice.

Barden looked at Edith Ward. "Still—?" he said.

She nodded and put her hand over his on the lever. "Want me to prove it?" she said, pushing it home.

There was a tinnily musical note that crept up the scale from somewhere in the sub-audible, up through the audible scale and into the shrilling tones that hurt the ear. It was hard to really tell when it passed above the audible, for the imagination followed it for seconds after the ear ceased to function.

There was a creak that rang throughout the ship. A tiny cricket-voice that came once and changed nothing but to increase the feel of tenseness.

Then—nothing pertinent.

Except—

"Great Scott! Look at Sol!"

The already-tiny sun was dwindling visibly; it took less than three or four seconds for Sol's disk to diminish from visible to complete ambiguity against the curtain of the stars.

"We're in!" exploded Barden.

"Hey!" screamed a watcher at the side port. A flare whisked by, illuminating the scene like a photoflash bulb. A second sun, passed at planetary distance. It joined the starry background behind.

Barden shut off the drive and the tense feeling stopped.

"Well, we're in!" he said in elation. "We're in!"

The scanning room went wild. They gave voice to their feelings in a yell of sheer exuberance and

then started pounding one another on the back. Barden chinned himself on a cross-brace and then grabbed Edith Ward about the waist and danced her in a whirling step across the floor. The crew caught up with them; separating them. They piled into Barden, ruffling his hair and rough-housing him until he went off his feet, after which someone produced a blanket and tossed him until the blanket ripped across. Then they carried him to the desk and set him unceremoniously across it, face down, and left him there to catch his breath.

"Like New Year's Eve," he grunted.

The crowd opened to let Edith through. She came toward the desk as Tom unraveled himself and sat on the top. "A fine bunch of wolves," she chuckled gleefully. "Tom, have you ever been kissed by twenty-two men?"

"Wouldn't care for it," he said. "They're not my type. And besides, it's twenty-three." He made the correction himself.

Then things calmed down. They were—as one man put it—"a long way from home!"

"But what I want to know is why we can see the sun when we're going away from it at several times the velocity of light?" demanded Tom.

"Well, your own problem answers your own question," said Edith, patting her hair back into place. "Remember the square-wave problem? Well, in the transition-period, you are simultaneously obtaining all degrees from maximum negative to maximum positive including zero. Zero is where the ship, being out of space-warp, must drop below the speed of light. The sun receding is due to the persistence of vision that lasts between transition periods. Lord only knows how far we travel between each transition."

"We can find out," said Tom. "I'd hoped to develop a velocimeter by using the doppler effect, but that's not possible, I guess. I'd suggest that we find out where we are and then head back for Sol. Might as well get for home and start the real thing cooking."

"What was that sun we passed?"

"I'll not tell you now," said Tom. "One of the nearby stars but I don't know which. We might stop, though, and take a closer look at an alien star from close up."

The ship was turned and the drive was applied until the star expanded into a true sun. At about a billion miles, they stopped to inspect it sketchily. They were not equipped to make any careful observations of stellar data.

They watched it like sightseers viewing Niagara Falls for an hour. There was really nothing to see that could not be taken in at a glance, but the idea of being near to one of the extrasolar systems was gratifying in itself.

Then, as the realization that they could watch that silently blazing star for years without producing anything of interest or value, Barden called a halt to the self-hypnosis and they resumed their

stations. The drive was applied again, and they passed the star, picking up speed as they went.

Somewhere ahead was Sol, lost in the starry curtain of the sky. But they were not lost, for they were headed in roughly the right direction and eventually Sol would emerge and stand out before them in plenty of time to correct their course.

The entire group, their period of strain over, stood idly looking out of the ports. There was nothing to see save that star, passing into the background. But their work was finished and they were loafing. It looked like an excellent time to just stand and do nothing. Barden was inspecting the superdrive unit with a paternal smile, noting with some gratification that it was even smaller than the normal driving gear of the ship. Dr. Edith Ward had gone to her room to repair the damage done during the celebration. Jerry Brandt, the manual pilot, was sitting idly, playing a senseless game with the myriad of switches on his disconnected board as the autopilot controlled the ship.

Two of the crew were matching pennies in front of the meter panel, and three more were watching a chess game between two of the others who were using various-shaped radio tubes as men. All was set for a quiet journey home.

Their first alien sun dwindled and was soon lost. Before them, the stars were immobile until one at near center swelled visibly. Jerry Brandt idly kicked his switches into neutral and switched over to manual drive long enough to correct the course; the swelling star and the rest of the sky swiveled about the ship until Sol was on the cross-hairs.

This time there were no days of flight from Terra to beyond-Pluto. Their ship plunged sunward at a dangerous pace, dropping below the speed of light at the tick of an instant at about the orbit of Jupiter. At under the speed of light but far above the normal speeds of spacecraft, the ship headed Terraward, and slowed as it went. The superdrive was turned off a few thousand miles above Terra and the rest of the voyage to the surface of the planet took actually longer than the quick run across interstellar space.

They landed in the huge construction yard at the Barden Laboratories.

A success—

"Yeah," said Tom Barden dryly. "A success. But who did what to whom and why?"

Edith Ward nodded in puzzlement. "You don't suppose it was just some nearby star wanting to observe a nova at close proximity?"

"Seems to me that wouldn't tell 'em anything," said Barden. "That would be a completely artificial nova and lacking of true data. Of course, I'm no astronomer and don't know beans about the subject at all. I admit it. I'd be lost trying to find my way home from out there if I couldn't retrace my steps. I wouldn't recognize Sol from Sirius if I were on Arcturus, and I'd not know how to go about it."

"Spectral lines, and stellar data—" said Edith.

"I have a hunch that whoever—in fact I'm certain—gave me this information was uncertain as to whether I was in the next stellar system or halfway across the universe."

"That would depend upon the range of whatever gadget they used to implant the information—and whether it were beamed. Also, Tom, there's another interesting item. You say there was a mental conversation in your case. That means that the velocity of propagation of that medium is instantaneous! Either that or he was right here on Terra."

"Got me. But if he were right here, why didn't he meet me in person, or make a future date?"

"I pass," said Edith. "I have a fair working knowledge of astrogation. I wonder if it is complete enough for my fellow to have positioned us. On the other hand, mine came strictly as information without chitchat. Like someone handing me a telegram full of data."

Barden considered the problem a moment as the girl went on

"But my knowledge of astrogation is merely the angular constants of the Marker-Stars and how to recognize them from their constellation-positions. He might be able to set up a model of this hunk of sky and reach the right answer—only if he sought the information, however. I did not give it, and he seemed uninterested—as I say, it was like getting a phonograph record or a radiogram."

They entered Barden's office and as they did, Tim Evans came running in. Barden nodded and said: "Miss Ward, this is Tim Evans, my head mathematical physicist. Tim, this is Dr. Ward."

They acknowledged the introduction, but Tim was excited. "Look, Tom, did it work?"

"We had trouble on Ship One but we fudged Two up and made it sing like an angel." Barden explained sketchily.

"Oh," said Evans, his face falling slightly.

"Why?"

"Because I've been thinking along another line and I've come up with another kind of superdrive. If yours didn't work, this one is certain."

"Yes? Go on."

"No need to," said Evans. "Yours is far more efficient and less bulky. Mine would get you there but it would take up a lot of extra space. Besides, it doesn't offer the chance to see where you're going directly, but only through a new type of celestial globe. Furthermore, it wouldn't move as fast. So, forget it."

"New type of celestial globe?" asked Barden. "We could use it, maybe. We can see out all right, but that's due to the intermittence. The present celestial globe system is an adaptation of the pulse-ranging transmission-time presentation, you know. When you're running above light the globe is useless."

"But look, Tom," objected Edith. "You won't need one at superspeed. You'll not be maneu-

vering, and if you hit something a few million miles ahead in the globe, you're past it before anything could work anyway."

"Admitted," he said. "But I'd like to have one, anyway. Look, Evans, how does this thing work?"

"On a magneto-gravitic principle. Gravity, I am beginning to understand, is not a matter of wave propagation at all. It is a factor of matter—and it is either there or it isn't."

"I wouldn't know."

"Well, that's the theory. So we utilize an artificial manifestation of gravity, beamed. It also seems that gravitational effects are mutual. In other words, the attraction between Terra and Sol is the combination of mutual attractions. So our beam, increasing the attraction between the object and the beam also causes the increase of the attraction between the beam and the object. For beam read transmitter; I always think of the radiating element as being the beam instead of what I should. Anyway, when the attraction is increased, it affects a detector in the radiating elements. That gives you your indication."

"How about ranging."

"Still a matter of the inverse-square of the distance. We know accurately the attraction-factor of our beam. Whatever reflects will have distance-diminishment which we can measure and use."

"But it is also proportional to the mass, isn't it?" asked Barden.

"It'll take a nice bunch of circuits," grinned Evans, "but we can check the mass with another beam's attraction to it and differentiate. An integrating system will solve for range on the basis of mass and distance. The celestial search and presentation systems will be the same."

"O.K.—how about communications?"

"Sure," said Evans.

"You rig 'em up," said Barden. "And Tim, tell Eddie to refurbish the ship. We're going out again. And I want three or four of the original space drives put aboard as working spares."

"Working spares?" asked Evans.

"Yeah, mount 'em on girder-frameworks complete with atomic units. I'm going to prove the next point."

"What next point?" asked Dr. Edith Ward.

"I want to find out if your informant was telling the truth," said Tom Barden. "Interested?"

Edith shuddered a little. "That's a big responsibility," she said. "You intend to destroy a whole stellar system?"

"I don't know. I'm going to see whether that stuff would actually start an overall sustaining fission reaction in a planet after the minor fission got under way. If it does, then it is no worse for me to blow up a dead system than it would be for my little informant getting us to blow up ours."

"You sound rather positive about it."

"One or the other," said Barden. "I'm bothered. No matter how you look at it, we . . . or I, was like a

small child given matches to play with in a nitrocellulose storehouse. Unless you'd come up with yours, I'd have most certainly blown us sky high."

"Right. I think we owe my friends a debt of gratitude."

"I'll agree to that. But for this test, we'll ramble until we find a relatively unimportant star with only one or two planets, devoid of life. Then we'll try it."

"But even with dead system, you're taking a lot upon yourself."

"How?"

"There will, from that time on, be a monument to the memory of Thomas Barden. You'll be the object of argument and of both admiration and hatred. Flag-wavers will either point with pride or view with alarm, depending upon their politics. Why not wait until the thing is discussed?"

"Forever? No, Edith. None of us can afford it. We must know. If this works, Sol has a rather dangerous weapon against any possible conquesting races in the galaxy. Regardless of what has gone before, Sol is in a position to go out and make her mark upon the galaxy. It is best to go prepared, and if we fear nothing, we neither need fear subjugation."

"But destroying a stellar system—"

"Who'll miss it?" he asked.

She looked blank. "I don't know," she said. "It just seems so big. It doesn't seem right that one man should be able to go out and destroy a stellar system. One that has been stable for million upon million of years. Superstition, perhaps," she said thoughtfully. "I'm not a religious woman, Tom. I am not sacrilegious, either. Somehow, somewhere, there must be a God—"

"Who made the universe. With a density of ten to the minus twenty-eighth power and an average temperature of matter about twenty million degrees? For the benefit of Terrans. Well if so, Edith, He is willing to see one of His experiments used to further mankind in his struggle. *Ad astra per aspera,* my dear!"

Edith agreed solemnly but was obviously unconvinced.

"Look," he hastened to add, "if all this was put here for the benefit of Terrans, we're expected to use it. If we are incidental in some grand plan encompassing a billion suns in a thousand galaxies, loss of one sun won't matter."

"I suppose that's logic," she said. "I'd prefer not to talk about it too much. I know it should be done, but it still seems all wrong somehow."

"We've got to know. Remember there's a lot of truth in the whole thing," he said thoughtfully. "And also a lot of untruth. They did tell me the way to interstellar travel —in a slightly slaunchwise fashion. They told you about the disintegration-process. Now, darn it, Edith, did they scare us away from planetary tries because they knew it would damage the system or for another reason? How do we know the thing would ruin a planet and

ultimately the system? Answer, we do not."

She nodded glumly. "I suppose that it is a step toward the final solution."

"Right, and as soon as we can get a nice system, we'll try it!"

"This is Procyon," said Tom Barden. "Or so they tell me. I wouldn't know."

The star was a small disk almost dead ahead; its light shone down through the fore dome of the ship augmenting the lights in the observation room.

"Sentiment again," she said. "I'd prefer a system more distant."

"If this has the right kind of planets, Procyon it is," said Barden flatly. "If it has planets unsuited for life, what possible good can it do Terra? Plus the fact that the instability that follows the nova for a few years will act as a nice signpost toward Terra from all parts of the galaxy. Remember, men will really be spreading out with the new drive."

"Again you're right. But have you no sentiment?"

He looked at her. "Not when it interferes with practicality—"

They were coasting along at half the speed of light, under the superdrive. On all sides were running cameras. One coast across the system with the moving picture cameras covering the sky would bring any planets into ken; the parallax of planetary bodies would show against the fairly constant sky. There was also visual observation for interest's sake.

At the far side, the ship came to a stop with respect to Procyon, and while the films were developing, Jerry Brandt swapped ends and ran the ship nearer the center of the system. Procyon, from one side port, looked about as large as Sol from Terra and it seemed about as bright and warm.

It was here that they met the alien ship. It came from nowhere and passed them slantwise at a terrific velocity. As it passed, a stabbing beam darted once, and the beam-end burst into a coruscation of sheer energy.

"That," blubbered Barden, "was close!"

Jerry Brandt swore thoroughly, and whipped the ship around slightly, cramming on the superdrive but keeping the drivers below the speed of light. He set his switches carefully, and seconds later the alien ship appeared for one brief instant and then was gone. While it was there, eye-visible in the sky, one of the ship's own cutting planes sheared out and sliced the driving tubes from the bottom of the ship.

Then it was gone and Brandt fought the switches, stopping the ship.

"What—was that?"

"We've got a nice way of retaliating," said Barden harshly. "We use the intermittent generator of the superdrive but we stay below the velocity of light. Jerry has calibrated the intermittence and the rep-rate to a nice precision. We appear in true space, slash out, and disappear again to reappear God

knows how many miles farther on. Now we'll go back and see whether that bird wants more." He spoke to Jerry: "Take care!"

"Easy she goes," replied Brandt. "Did you see that joker? He tried to ruin us!"

They came up as the inert alien came into view. It stabbed again with that beam but missed. Jerry Brandt swore again and cut the ship from end to end with his cutting plane. This time there was no response save a swirl of smoke from the cleft sides of the ship.

"We've used these to cut asteroids into stove lengths," he told Barden sharply. "I wonder how many of them have been used likewise on some hapless enemy."

"I don't have any way of knowing," said Barden. "And I don't care whether it is a proper weapon to use or not. It worked."

"What are you going to do?" asked Dr. Ward.

He smiled at her. "He didn't like us—apparently for no reason than we were alien. If he'd come in peaceable, we'd have made talky-talk. As it is, he fired first but not too well. Now we'll just grab his ship and see what he's got, who he is, where he's from—and possibly why."

It was a small ship outside, in space. But getting it into the vast cargo-hold of Barden's ship required some more trimming. The alien ship finally lay in eight sections, stacked. The cargo hold was now jammed with alien ship and much of the spare equipment and supplies were jettisoned.

Then they went in warily to examine the alien. They found the alien crew—four of them. They were spacesuited but unconscious.

"Hope they breathe air at twenty-per cent oxygen," growled Barden. They opened the suits and laid the unconscious aliens on tables in one of the operations rooms.

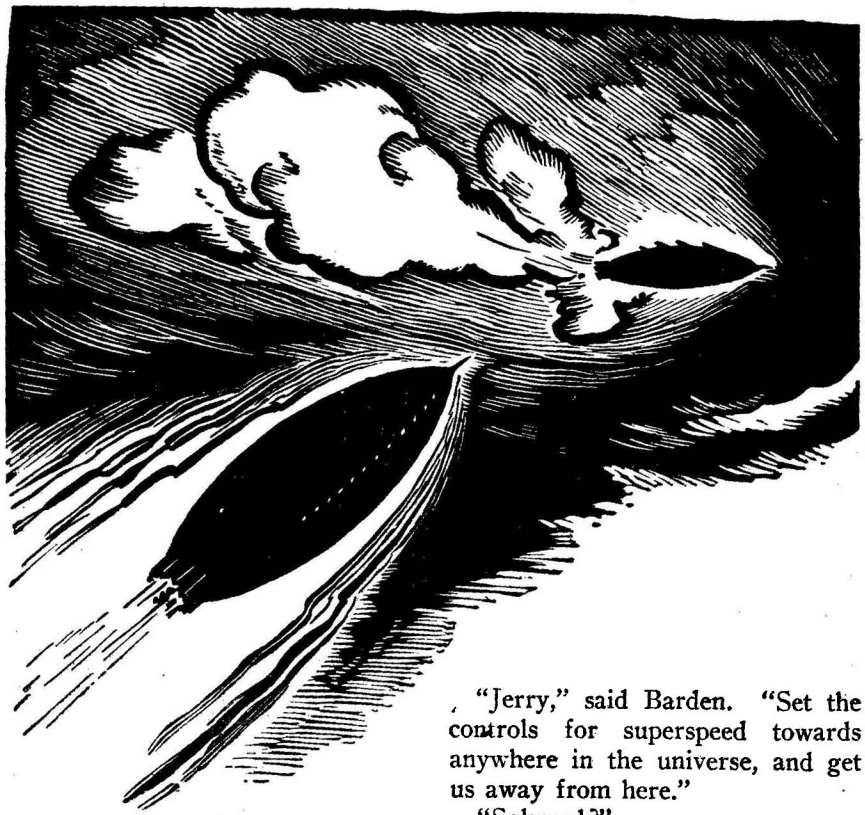
They were squat and wide, almost humanoid save for large eyeballs under the closed double lids. Their noses were almost nonexistent, and each hand splayed wide with seven stubby fingers. These hands were symmetrical, but despite a thumb on either side, the Terrans doubted that they were more dextrous than Terrans because of their shorter fingers.

Their shoulders were very wide, but also quite thin, indicating a long, unfavorable leverage with less muscle.

"Ugly looking—" started Jerry Brandt, who shut himself off as he remembered Edith Ward.

She looked up at him and flushed. "They are," she said with a slight smile. Brandt blushed with embarrassment and spluttered incoherently for a moment. The pilot might have spluttered for some time had not the foremost alien stirred, causing a diversion.

They crowded him as he awoke and looked about him. His expression was undecipherable, though there was quite a change in facial composure as he saw the kind of white-faced animals that surrounded him. He looked, and then he



clutched rapidly at a device on his belt. Barden swung a fist and caught the creature on the forearm, causing him to drop the half-drawn weapon. Brandt stooped over and picked it up, and the rest of the crew proceeded to disarm the other three.

Edith found a length of wire and made a loop of it. She held it in front of the alien.

He relaxed, splaying his hands and holding them wide from his body. Her action had been understood and the creature did not want his hands tied.

"Jerry," said Barden. "Set the controls for superspeed towards anywhere in the universe, and get us away from here."

"Solward?"

"No. He should get as little information as possible.

Jerry left, and the ship soon turned slightly and started off. Barden waved the creature to the port and pointed out Procyon, which was diminishing swiftly. The alien grew excited, and made wondering motions.

"That . . . thing . . . knows what the score is, partly," observed Edith.

"That . . . thing . . . had better behave," said Barden flatly. "And while we're wondering about him, I hate to think of him being called a Procyonian."

"Call 'em *Pokeys,*" said Tim Evans.

"O.K. Now let's show him his ship."

The alien's excitement changed to dismay as he viewed the wreckage. He looked at it, and then as if wiping it off as finished, he turned away.

There was but one cargo lock in Barden's ship. And though the alien craft had been trimmed, and considerable of it trimmed away and left, it was still packed in with most of the remaining spares. These included the four superdrive motors, mounted on their griders with the atomic units. The alien saw these and went over to inspect them, and Barden let him go.

What possibly could have been familiar they did not know. The chances of an alien gasoline engine being instantly recognizable as such by a Terran is problematical. A simple electric motor might be—especially if connected to a storage battery, or even by a wire cable to a wall outlet. Doubtless, the electron tube would be recognized by a spider-man from the other end of the galaxy, for the handling of electrons must be similar no matter where they are used. There will be cathodes and grids and anodes and connecting prongs, wires, or terminals.

The unprotected superdrive motor was not incased. It had been a job intended for test-stand operation and, therefore, it could be inspected fairly well. Something about it was familiar, and one spot of familiarity was sufficient for the alien to reconstruct the rest.

He nearly exploded with frantic gestures. He ran to Barden—his run was a swift waddle due to the wide leg-base—and clutched Tom's arm. He pointed to the cut-apart spaceship and indicated that he wanted to go up into that pile to find something. Barden shrugged and nodded, and then followed the alien.

It was difficult for Barden, for the alien was sure-footed in his climb up the jagged edges to one section near the middle of the pile. He disappeared inside and found a piece of equipment, which he brought out. He set this upon the floor and returned with other equipment which he added to the original piece. Then taking the whole bunch in his arms, he led them up to the operations room.

Here he put it on a table. Then he opened the main piece and drew out a two-pronged plug which he waved in Barden's face, made plugging gestures into the blank wall, and then made searching motions.

Barden pointed to the nearest convenience outlet, and the creature waddled to it with the rest of his equipment.

He probed into the openings with test-leads and read the results on meters of his own. He showed Barden exactly what the meters should read.

Barden nodded and they set to work matching their line-current to the alien's specifications. It turned out to be one hundred ninety-three

volts at seventy cycles. Meanwhile, one of Barden's men replaced the alien's plug with a Terran-type and they inserted it gingerly. The alien put a temple-set over his head and handed one to Barden.

"This," came the thought, "is an instrument used to extract information from enemies. It will serve as a means of communication."

"Why did you fire on us?" thought Barden.

"You are alien. We are at war; in fact have been at war with the devils from that star—" and here came a mixed-impression of a distorted constellation that was not familiar to Barden, who was not too familiar with astronomy anyway, and so he passed it over. He stopped the alien momentarily, to send one of the men to tell Jerry Brandt to return to within a light-year or so of Procyon.

"But," continued the alien, "you are not using—that?"

"Not exactly," said Barden.

"No, for that means death."

"We were going to try it out," was Barden's calm thought.

"On— NO!" came the terrified reply.

"Well," returned Barden, "we're never pleased with red-hots who shoot at us!"

"But an entire system?" came the pleading exclamation.

"Filled with people of the same ilk," returned Barden, unimpressed.

"But even warfare must not be annihilation," objected the alien. "For of what value is a dead enemy?"

"They are no longer any bother." Barden grunted. "We dislike being bothered, and our will happens to be that we want to go wherever we choose at any time we please. A favorable attitude upon the part of any other culture is one that permits us our will. A dead culture will never obstruct us, for one thing. It will never revert to its original attitude of belligerency, for the second thing. And for the third thing, alien, with the interstellar drive we have, we can find those cultures in the galaxy which see exactly as we do, therefore it is to our advantage to eliminate any malcontents right now."

"But what do you intend to do?" demanded the creature.

"My system has been the tool of some other culture. The purpose is not clear, though the outcome might have been quite disastrous. I intend to find both that culture and their reasons and extract full payment!"

"But how—?"

Barden smiled in a hard manner. "I intend to plant one of these unprotected space motors on one of your planets," he said. "That is for my own protection. Then we'll collect one of the enemy, and do likewise with his system. Then you and he will have your little talk—and you'll first call off this war or you'll both be enjoying novas in your own backyards. It's about time that people learned how to get along with one another!"

"But I have little authority."

"*I* have," smiled Barden in a completely self-satisfied manner. "I have all the authority necessary to

demand that your superiors and your scientists meet their contemporaries of your enemy—and peacefully."

"What are you going to do with me?"

"Do you know both languages?"

"No," answered the alien. "That's why we use the mentaphone."

"What do you know of the space motor?"

"Very little. It is, as you know, dangerous. We are forbidden to experiment on it."

"You know it is dangerous?" asked Barden.

"We have excellent reason to believe so. Our studies have been purely theoretical. But tell me, how do you hope to accomplish this mission of yours?"

"One of you four will be permitted to land and carry our message. One of the enemy race will do likewise."

The alien disagreed. "You can never land," he said. "You can not even approach."

"No?" said Barden harshly. "Well, we'll plant our motors first. And you'll use whatever you have to communicate with them and you'll tell 'em all. Then, my squat friend, there had better be a ten-thousand piece brass brand playing the Solar Anthem as we land! *Or else!*"

Tom Barden sat in an easy-chair, relaxing. He was watching the others, who were glaring at one another and trying to conceal their thoughts. Lanthar—he of Procyon—and Grenis of Sirius both knew that the Terran who sat there so easily was not fooling.

"Now," said Barden, "what's the story. I've told you what happened and why I'm angry. This warfare must stop, and Sol, too, must be protected. Only by complete agreement can all three of us occupy the sky in safety. Otherwise, there may be but two of us—and perhaps only one. You—Lanthar—what do you know of the space motor?"

"I'll tell," said the one from Procyon. "I've been in disagreement with the plan but outvoted. We discovered it and its danger. We'd have worked upon it, but we could not permit it to be used in space because of attack. We could not try it on a planet because of the danger. Remember, we were at war and could afford to take no chances. There was a large faction who outvoted me—and then they permitted its theft from a false laboratory. It is amusing, Terran, to go into the full details of how this laboratory was set up, run, and finally thefted. We actually treated it as though it held one of our high secrets, but we were lax only in the total number of guards we used. They—succeeded.

"The purpose of this was to permit them to try it out. That would mean their destruction. I've insisted that a dead enemy is of no value—"

"We follow your reasoning, all of us," said Barden. "And go further. We state that an enemy is a total loss *per se* and we avoid the expense. Now, Grenis, you stole

the plans?"

"We did," said the Sirian. "But there was something wrong. Not only did we steal the plans, but we inspected their plant. While they were setting up their laboratory they forgot to include some means of accepting and dissipating enough transmitted power to make the work look real. There was a quite large discrepancy between the power used and the power we calculated would be needed to carry on such a program. So we became suspicious—which started when we were able to penetrate the place in the first place.

"What we found was interesting," said the Sirian. "But we were suspicious. We studied it carefully, and it seemed perfect. But, Terran, came again the suspicion. For if this were so perfect, why weren't they using it?

"Because it might be a trap," he went on. "And like he and his, we dared not establish a space-laboratory because of the fear of attack. So we were completely stopped."

Lanthar grunted. "So he and his bunch went to work on a method of contacting other people at a great distance," he said. "It took them a long time and they were without success at all until they succeeded in contacting you."

"That is correct," said Grenis, making an apology. "We have detectors capable of working on the gravitic effects. A nova would disrupt both the magnetic and the gravitic levels sufficiently to warn us immediately. And we knew that any race who was not suspicious of an enemy would try it—"

"I see," said Barden angrily. "Then we have you to thank? And you," he said to Lanthar, "knowing that this was done, tried to protect us?"

"Not basically," apologized the man from Procyon. "You see, we did not know you—nor even where you were in the galaxy. You meant nothing to us at all then, except as a consulting service for our enemy—completely hidden and quite safe. We did not want you to go into nova because that would have warned them. We knew that after a period of time, with no sign of failure, they'd try it!"

"A fine pair of stinkers," sneered Barden. "Well," he said with a laugh, "Now you'll co-opetate with us all, or else! But Lanthar, how can you be certain that nova will occur?"

Lanthar of Procyon stood up and smiled tolerantly. "Me—?" he said. "I know only what I've been told about it. Strangely enough, it came to me in a dream, too!"

Somewhere in the galaxy, two scientists consulted their time-predictions. They agreed silently that sufficient time had been permitted, and that their detectors had shown no warping of the magneto-gravitic continuum. Despite the questionable value of negative evidence, they felt safe.

"I doubt all new arts," said one of them, thrusting the switch home, "especially when I know not the source."

THE END

DREAMS ARE SACRED

BY PETER PHILLIPS

A new English author presents a suggestion for curing the schizo who retires from reality into his own world of dreams. Louse up his dreams!

Illustrated by Cartier

When I was seven, I read a ghost story and babbled of the consequent nightmare to my father.

"They were coming for me, Pop," I sobbed. "I couldn't run, and I couldn't stop 'em, great big things with teeth and claws like the pictures in the book, and I couldn't wake myself up, Pop, I couldn't come awake."

Pop had a few quiet cuss words for folks who left such things around for a kid to pick up and read; then he took my hand gently in his own great paw and led me into the six-acre pasture.

He was wise, with the canny insight into human motives that the soil gives to a man. He was close to nature and the hearts and minds of men, for all men ultimately depend on the good earth for sustenance and life.

He sat down on a stump and showed me a big gun. I know now it was a heavy Service Colt .45. To

my child eyes, it was enormous. I had seen shotguns and sporting rifles before, but this was to be held in one hand and fired. Gosh, it was heavy. It dragged my thin arm down with its sheer, grim weight when Pop showed me how to hold it.

Pop said: "It's a killer, Pete. There's nothing in the whole wide world or out of it that a slug from Billy here won't stop. It's killed lions and tigers and men. Why, if you aim right, it'll stop a charging elephant. Believe me, son, there's nothing you can meet in dreams that Billy here won't stop. And he'll come into your dreams with you from now on, so there's no call to be scared of anything."

He drove that deep into my receptive subconscious. At the end of half an hour, my wrist ached abominably from the kick of that Colt. But I'd seen heavy slugs tear through two-inch teakwood and mild steel plating. I'd looked along that barrel, pulled the trigger, felt the recoil rip up my arm and seen the fist-size hole blasted through a sack of wheat.

And that night, I slept with Billy under my pillow. Before I slipped into dreamland, I'd felt again the cool, reassuring butt.

When the Dark Things came again, I was almost glad. I was ready for them. Billy was there, lighter than in my waking hours—or maybe my dream-hand was bigger—but just as powerful. Two of the Dark Things crumpled and fell as Billy roared and kicked, then the others turned and fled.

Then I was chasing them, laughing, and firing from the hip.

Pop was no psychiatrist, but he'd found the perfect antidote to fear—the projection into the subconscious mind of a common-sense concept based on experience.

Twenty years later, the same principle was put into operation scientifically to save the sanity—and perhaps the life—of Marsham Craswell.

"Surely you've heard of him?" said Stephen Blakiston, a college friend of mine who'd majored in psychiatry.

"Vaguely," I said. "Science-fiction, fantasy . . . I've read a little. Screwy."

"Not so. Some good stuff." Steve waved a hand round the bookshelves of his private office in the new Pentagon Mental Therapy Hospital, New York State. I saw multi-colored magazine backs, row on row of them. "I'm a fan," he said simply. "Would you call me screwy?"

I backed out of that one. I'm just a sports columnist, but I knew Blakiston was tops in two fields—the psycho stuff and electronic therapy.

Steve said: "Some of it's the old 'peroo, of course, but the level of writing is generally high and the ideas thought-provoking. For ten years, Marsham has been one of the most prolific and best-loved writers in the game.

"Two years ago, he had a serious illness, didn't give himself time to convalesce properly before he waded into writing again. He tried

to reach his previous output, tending more and more towards pure fantasy. Beautiful in parts, sheer rubbish sometimes.

"He forced his imagination to work, set himself a wordage routine. The tension became too great. Something snapped. Now he's here."

Steve got up, ushered me out of his office. "I'll take you to see him. He won't see you. Because the thing that snapped was his conscious control over his imagination. It went into high gear, and now instead of writing his stories, he's living them —quite literally, for him.

"Far-off worlds, strange creatures, weird adventures — the detailed phantasmagoria of a brilliant mind driving itself into insanity through the sheer complexity of its own invention. He's escaped from the harsh reality of his strained existence into a dream world. But he may make it real enough to kill himself.

"He's the hero of course," Steve continued, opening the door into a private ward. "But even heroes sometimes die. My fear is that his morbidly overactive imagination working through his subconscious mind will evoke in this dream world in which he is living a situation wherein the hero must die.

"You probably know that the sympathetic magic of witchcraft acts largely through the imagination. A person imagines he is being hexed to death—and dies. If Marsham Craswell imagines that one of his fantastic creations kills the hero — himself — then he just won't wake up again.

"Drugs won't touch him. Listen."

Steve looked at me across Marsham's bed. I leaned down to hear the mutterings from the writer's bloodless lips.

". . . We must search the Plains of Istak for the Diamond. I, Multan, who now have the Sword, will lead thee; for the Snake must die and only in virtue of the Diamond can his death be encompassed. Come."

Craswell's right hand, lying limp on the coverlet, twitched. He was beckoning his followers.

"Still the Snake and the Diamond?" asked Steve. "He's been living that dream for two days. We only know what's happening when he speaks in his role of hero. Often it's quite unintelligible. Sometimes a spark of consciousness filters through, and he fights to wake up. It's pretty horrible to watch him squirming and trying to pull himself back into reality. Have you ever tried to pull yourself out of a nightmare and failed?"

It was then that I remembered Billy, the Colt .45. I told Steve about it, back in his office.

He said: "Sure. Your Pop had the right idea. In fact, I'm hoping to save Marsham by an application of the same principle. To do it, I need the co-operation of someone who combines a lively imagination with a severely practical streak, hoss-sense—and a sense of humor. Yes—you."

"Uh? How can I help? I don't even know the guy."

"You will," said Steve, and the significant way he said it sent a trickle of ice water down my back. "You're going to get closer to Marsham Craswell than one man has ever been to another.

"I'm going to project you—the essential you, that is, your mind and personality — into Craswell's tortured brain."

I made pop-eyes, then thumbed at the magazine-lined wall. "Too much of yonder, brother Steve," I said. "What you need is a drink."

Steve lit his pipe, draped his long legs over the arm of his chair. "Miracles and witchcraft are out. What I propose to do is basically no more miraculous than the way your Pop put that gun into your dreams so you weren't afraid any more. It's merely more complex scientifically.

"You've heard of the encephalograph? You know it picks up the surface neural currents of the brain, amplifies and records them, showing the degree—or absence—of mental activity. It can't indicate the kind or quality of such activity save in very general terms. By using comparison-graphs and other statistical methods to analyze its data, we can sometimes diagnose incipient insanity, for instance. But that's all —until we started work on it, here at Pentagon.

"We improved the penetration and induction pickup and needled the selectivity until we could probe any known portion of the brain. What we were looking for was a recognizable pattern among the millions of tiny electric currents that go to make up the imagery of thought, so that if the subject thought of something—a number, maybe—the instruments would react accordingly, give a pattern for it that would be repeated every time he thought of that number.

"We failed, of course. The major part of the brain acts as a unity, no one part being responsible for either simple or complex imagery, but the activity of one portion inducing activity in other portions—with the exception of those parts dealing with automatic impulses. So if we were to get a pattern we should need thousands of pickups—a practical impossibility. It was as if we were trying to divine the pattern of a colored sweater by putting one tiny stitch of it under a microscope.

"Paradoxically, our machine was too selective. We needed, not a probe, but an all-encompassing field, receptive simultaneously to the multitudinous currents that make up a thought-pattern.

"We found such a field. But we were no further forward. In a sense, we were back where we started from — because to analyze what the field picked up would have entailed the use of thousands of complex instruments. We had amplified thought, but we could not analyze it.

"There was only one single instrument sufficiently sensitive and complex to do that—another human brain."

I waved for a pause. "I'm home," I said. "You'd got a thought-reading machine."

"Much more than that. When we tested it the other day, one of my assistants stepped up the polarity-reversal of the field—that is, the frequency—by accident. I was acting as analyst and the subject was under narcosis.

"Instead of 'hearing' the dull incoherencies of his thoughts, I became part of them. I was inside that man's brain. It was a nightmare world. He wasn't a clear thinker. I was aware of my own individuality. . . . When he came round, he went for me bald-headed. Said I'd been trespassing inside his head.

"With Marsham, it'll be a different matter. The dream world of his coma is detailed, as real as he used to make dream worlds to his readers."

"Hold it," I said. "Why don't you take a peek?"

Steve Blakiston smiled and gave me a high-voltage shot from his big gray eyes. "Three good reasons: I've soaked in the sort of stuff he dreams up, and there's a danger that I would become identified too closely with him. What he needs is a salutary dose of common sense. You're the man for that, you cynical old whiskey-hound.

"Secondly, if my mind gave way under the impress of his imagination, I wouldn't be around to treat myself; and thirdly, when—and if—he comes round, he'll want to kill the man who's been heterodyning his dreams. You can scram. But I want to stay and see the results."

"Sorting that out, I gather there's a possibility that I shall wake up as a candidate for a bed in the next ward?"

"Not unless you let your mind go under. And you won't. You've got a cast-iron non-gullibility complex. Just fool around in your usual iconoclastic manner. Your own imagination's pretty good, judging by some of your fight reports lately."

I got up, bowed politely, said: "Thank you, my friend. That reminds me—I'm covering the big fight at the Garden tomorrow night. And I need sleep. It's late. So long."

Steve unfolded and reached the door ahead of me.

"Please," he said, and argued. He can argue. And I couldn't duck those big eyes of his. And he is—or was—my pal. He said it wouldn't take long—(just like a dentist)—and he smacked down every "if" I thought up.

Ten minutes later, I was lying on a twin bed next to that occupied by a silent, white-faced Marsham Craswell. Steve was leaning over the writer adjusting a chrome-steel bowl like a hair-drier over the man's head. An assistant was fixing me up the same way.

Cables ran from the bowls to a movable arm overhead and thence to a wheeled machine that looked like something from the Whacky Science Section of the World's Fair, A.D. 2,000.

I was bursting with questions, but

the only ones that would come out seemed crazily irrelevant.

"What do I say to this guy? 'Good morning, and how are all your little complexes today?' Do I introduce myself?"

"Just say you're Pete Parnell, and play it off the cuff," said Steve. "You'll see what I mean when you get there."

Get there. That hit me—the idea of making a journey into some nut's nut. My stomach drew itself up to softball size.

"What's the proper dress for a visit like this? Formal?" I asked. At least, I think I said that. It didn't sound like my voice.

"Wear what you like."

"Uh-huh. And how do I know when to draw my visit to a close?"

Steve came round my side. "If you haven't snapped Craswell out of it within an hour, I'll turn off the current."

He stepped back to the machine. "Happy dreams."

I groaned.

It was hot. Two high summers rolled into one. No, two suns, blood-red, stark in a brazen sky. Should be cool underfoot—soft green turf, pool table smooth to the far horizon. But it wasn't grass. Dust. Burning green dust—

The gladiator stood ten feet away, eyes glaring in disbelief. All of six-four high, great bronzed arms and legs, knotted muscles, a long shining sword in his right hand.

But his face was unmistakable.

This was where I took a good hold of myself. I wanted to giggle.

"Boy!" I said. "Do you tan quickly! Couple of minutes ago, you were as white as the bed sheet."

The gladiator shaded his eyes from the twin suns. "Is this yet another guise of the magician Garor to drive me insane—an Earthman here, on the Plains of Istak? Or am I already—mad?" His voice was deep, smoothly-modulated.

My own was perfectly normal. Indeed, after the initial effort, I felt perfectly normal, except for the heat.

I said: "That's the growing idea where I've just come from—that you're going nuts."

You know those half-dreams, just on the verge of sleep, in which you can control your own imagery to some extent? That's how I felt. I knew intuitively what Steve was getting at when he said I could play it off the cuff. I looked down. Tweed suit, brogues—Naturally. That's what I was wearing when I last looked at myself. I had no reason to think I was wearing—and therefore to be wearing—anything else. But something cooler was indicated in this heat, generated by Marsham Craswell's imagination.

Something like his own gladiator costume, perhaps.

Sandals—Fine. There were my feet—in sandals.

Then I laughed. I had nearly fallen into the error of accepting his imagination.

"Do you mind if I switch off one of those suns?" I asked politely. "It's a little hot."

I gave one of the suns a very dirty look. It disappeared.

The gladiator raised his sword. "You are—Garor!" he cried. "But your witchery shall not avail you against the Sword!"

He rushed forward. The shining blade cleaved the air towards my skull.

I thought very, very fast.

The sword clanged, and streaked off at a sharp tangent from my G.I. brain-pan protector. I'd last worn that homely piece of hardware in the Argonne, and I knew it would stop a mere sword. I took it off.

"Now listen to me, Marsham Craswell," I said. "My name's Pete Parnell, of the Sunday *Star*, and—"

Craswell looked up from his sword, chest heaving, startled eyes bright as if with recognition: "Wait! I know now who you are—Nelpar Retrep, Man of the Seven Moons, come to fight with me against the Snake and his ungodly disciple, magician and sorceress, Garor. Welcome, my friend!"

He held out a huge bronzed hand. I shook it.

It was obvious that, unable to rationalize—or irrationalize—me, he was writing me into the plot of his dream! Right. It had been amusing so far. I'd string along for a while. My imagination hadn't taken a licking—yet.

Craswell said: "My followers, the great-hearted Dok-men of the Blue Hills, have just been slain in a gory battle. We were about to brave the many perils of the Plains of Istak in our quest for the Diamond—but all this, of course, you know."

"Sure," I said. "What now?"

Craswell turned suddenly, pointed. "There," he muttered. "A sight that strikes terror even into my heart—Garor returns to the battle, at the head of her dread Legion of Lakros, beasts of the Overworld, drawn into evil symbiosis with alien intelligences—invulnerable to men, but not to the Sword, or to the mighty weapons of Nelpar of the Seven Moons. We shall fight them alone!"

Racing across the vast plain of green dust towards us was a horde of . . . er . . . creatures. My vocabulary can't cope fully with Craswell's imagination. Gigantic, shimmering things, drooling thick ichor, half-flying, half-lolloping. Enough to say I looked around for a washbasin to spit in. I found one, with soap and towels complete, but I pushed it over, looked at a patch of green dust and thought hard.

The outline of the phone booth wavered a little before I could fix it. I dashed inside, dialed. "Police H.Q.? Riot squad here—and quick!"

I stepped outside the booth. Craswell was whirling the Sword round his head, yelling war cries as he faced the onrushing monsters.

From the other direction came the swelling scream of a police siren. Half a dozen good, solid patrol cars screeched to a dust-spurting stop outside the phone

booth. I don't have to think hard to get a New York cop car fixed in my mind. These were just right. And the first man out, running to my side and patting his cap on firmly, was just right, too.

Michael O'Faolin, the biggest, toughest, nicest cop I know.

"Mike," I said, pointing. "Fix 'em."

"Shure, an' its an aisy job f'the bhoys I've brought along." said Mike, hitching his belt.

He deployed his men.

Craswell looked at them fanning out to take the charge, then staggered back towards me, hand over his eyes. "Madness!" he shouted. "What madness is this? What are you doing?"

For a moment, the whole scene wavered. The lone red sun blinked out, the green desert became a murky transparency through which I caught a split-second glimpse of white beds with two figures lying on them. Then Craswell uncovered his eyes.

The monsters began to diminish some twenty yards from the riot squad. By the time they got to the cops, they were man-size, and very amenable to discipline—enforced by raps over their horny noggins with nightsticks. They were bundled into the squad cars, which set off again over the plains.

Michael O'Faolin remained. I said: "Thanks, Mike. I may have a couple of spare tickets for the big fight tomorrow night. See you later."

"Just what I was wantin' Pete. 'Tis me day off. Now, how do I get home?"

I opened the door of the phone booth. "Right inside." He stepped in. I turned to Craswell.

"Mighty magic, O Nelpar!" he exclaimed. "To creatures of Garor's mind you opposed creatures of your own!"

He'd weaved the whole incident into his plot already.

"We must go forward now, Nelpar of the Seven Moons—forward to the Citadel of the Snake, a thousand lokspans over the burning Plains of Istak."

"How about the Diamond?"

"The Diamond—?"

Evidently, he'd run so far ahead of himself getting me fixed into the landscape that he'd forgotten all about the Diamond that could kill the Snake. I didn't remind him.

However, a thousand lokspans over the burning plains sounded a little too far for walking, whatever a lokspan might be.

I said: "Why do you make things tough for yourself, Craswell?"

"The name," he said with tremendous dignity, "is Multan."

"Multan, Sultan, Shashlik, Dikkidam, Hammaneggs or whatever polysyllabic pooh-bah you wish to call yourself—I still ask, why make things tough for yourself when there's plenty of cabs around? Just whistle."

I whistled. The Purple Cab swung in, perfect to the last detail, including a hulking-backed, unshaven driver, dead ringer for the

impolite gorilla who'd brought me out to Pentagon that evening.

There is nothing on earth quite so unutterably prosaic as a New York Purple Cab with that sort of driver. The sight upset Craswell, and the green plains wavered again while he struggled to fit the cab into his dream.

"What new magic is this! You are indeed mighty, Nelpar!"

He got in. But he was trembling with the effort to maintain the structure of this world into which he had escaped, against my deliberate attempts to bring it crashing round his ears and restore him to colorless—but sane—normality.

At this stage, I felt curiously sorry for him; but I realized that it might only be by permitting him to reach the heights of creative imagery before dousing him with the sponge from the cold bucket that I could jerk his drifting ego back out of dreamland.

It was dangerous thinking. Dangerous—for me.

Craswell's thousand lokspans appeared to be the equivalent of ten blocks. Or perhaps he wanted to gloss over the mundane near-reality of a cab ride. He pointed forward, past the driver's shoulder: "The Citadel of the Snake!"

To me, it looked remarkably like a wedding cake designed by Dali in red plastic:—ten stories high, each story a platter half a mile thick, each platter diminishing in size and offset on the one beneath so that the edifice spiraled towards the brassy sky.

The cab rolled into its vast shadow, stopped beneath the sheer, blank precipice of the base platter, which might have been two miles in diameter. Or three. Or four. What's a mile or two among dreamers?

Craswell hopped out quickly. I got out on the driver's side.

The driver said: "Dollar-fifty."

Square, unshaven jaw, low forehead, dirty-red hair straggling under his cap. I said: "Comes high for a short trip."

"Lookit the clock," he growled, squirming his shoulders. "Do I come out and get it?"

I said sweetly: "Go to hell."

Cab and driver shot downwards through the green sand with the speed of an express elevator. The hole closed up. The times I've wanted to do just that—

Craswell was regarding me open-mouthed. I said: "Sorry. Now I'm being escapist, too. Get on with the plot."

He muttered something I didn't catch, strode across to the red wall in which a crack, meeting place of mighty gates, had appeared, and raised his sword.

"Open, Garor! Your doom is nigh. Multan and Nelpar are here to brave the terrors of this Citadel and free the world from the tyranny of the Snake!" He hammered at the crack with the sword-hilt.

"Not so loud," I murmured. "You'll wake the neighbors. Why not use the bell-push?" I put my thumb on the button and pressed. The towering gates swung slowly open.

"You . . . you have been here before—."

"Yes—after my last lobster supper." I bowed. "After you."

I followed him into a great, echoing tunnel with fluorescent walls. The gates closed behind us. He paused and looked at me with an odd gleam in his eyes. A gleam of—sanity. And there was anger in the set of his lips. Anger for me, not Garor or the Snake.

It's not nice to have someone trampling all over your ego. Pride is a tiger—even in dreams. The subconscious, as Steve had explained to me, is a function or state of the brain, not a small part of it. In thwarting Craswell, I was disparaging not merely his dream, but his very brain, sneering at his intellectual integrity, at his abilities as an imaginative writer.

In a brief moment of rationality, I believe he was strangely aware of this.

He said quietly: "You have limitations, Nelpar. Your outward-turning eyes are blind to the pain of creation; to you the crystal stars are spangles on the dress of a scarlet woman, and you mock the God-blessed unreason that would make life more than the crawling of an animal from womb to grave. In tearing the veil from mystery, you destroy not mystery—for there are many mysteries, a million veils, world within and beyond worlds—but beauty. And in destroying beauty, you destroy your soul."

These last words, quiet as they sounded, were caught up by the curving walls of the huge tunnel, amplified then diminished in pulsing repetition, loud then soft, a surging hypnotic echo: "Destroy your SOUL, DESTROY your soul. SOUL—"

Craswell pointed with his sword. His voice was exultant. "There is a Veil, Nelpar—and you must tear it lest it become your shroud! The Mist—the Sentient Mist of the Citadel!"

I'll admit that, for a few seconds, he'd had me a little groggy. I felt —subdued. And I understood for the first time his power as a word-spinner.

I knew that it was vital for me to reassert myself.

A thick, gray mist was rolling, wreathing slowly towards us, filling the tunnel to roof-height, puffing out thick, groping tentacles.

"It lives on Life itself," Craswell shouted. "It feeds, not on flesh, but on the vital principle that animates all flesh. I am safe, Nelpar, for I have the Sword. Can your magic save you?"

"Magic!" I said. "There's no gas invented yet that'll get through a Mark 8 mask."

Gas-drill—face-piece first, straps behind the ears. No, I hadn't forgotten the old routine.

I adjusted the mask comfortably. "And if it's not gas," I added, "this will fix it." I felt over my shoulder, unclipped a nozzle, brought it round into the "ready" position.

I had only used a one-man flame-thrower once—in training—but the experience was etched on my memory.

This was a de luxe model. At the first thirty-foot oily, searing blast, the Mist curled in on itself and rolled back the way it had come. Only quicker.

I shucked off the trappings. "You were in the Army for a while, Craswell. Remember?"

The shining translucency of the walls dimmed suddenly, and beyond them I glimpsed, as in a movie close-up through an unfocused projector, the square, intense face of Steve Blakiston.

Then the walls re-formed, and Craswell, still the bronzed, naked-limbed giant of his imagination, was looking at me again, frowning, worried. "Your words are strange, O Nelpar. It seems you are master of mysteries beyond even my knowing."

I put on the sort of face I use when the sports editor queries my expenses, aggrieved, pleading. "Your trouble, Craswell, is that you don't want to know. You just won't remember. That's why you're here. But life isn't bad if you oil it a little. Why not snap out of this and come with me for a drink?"

"I do not understand," he muttered. "But we have a mission to perform. Follow." And he strode off.

Mention of drink reminded me. There was nothing wrong with my memory. And that tunnel was as hot as the green desert. I remembered a very small pub just off the street-car depot end of Sauchiehall Street, Glasgow, Scotland. A ginger-whiskered ancient, an exile from the Highlands, who'd listened to me enthusing over a certain brand of scotch. "If ye think that's guid, mon, ye'll no' tasted the brew from ma own private deestillery. Smack ye're lips ower this, laddie—" And he'd produced an antique silver flask and poured a generous measure of golden whiskey into my glass. I had never tasted such mellow nectar before or since. Until I was walking down the tunnel behind Craswell.

I nearly envisaged the glass, but changed my mind in time to make it the antique flask. I raised it to my lips. Imagination's a wonderful thing.

Craswell was talking. I'd nearly forgotten him.

". . . near the Hall of Madness, where strange music assaults the brain, weird harmonies that enchant, then kill, rupturing the very cells by a mixture of subsonic and supersonic frequencies. Listen!"

We had reached the end of the tunnel and stood at the top of a slope which, broadening, ran gently downwards, veiled by a blue haze, like the smoke from fifty million cigarettes, filling a vast circular hall. The haze eddied, moved by vagrant, sluggish currents of air, and revealed on the farther side, dwarfed by distance but obviously enormous, a complex structure of pipes and consoles.

A dozen Mighty Wurtlitzers rolled into one would have appeared as a miniature piano at the foot of this towering music-machine.

At its many consoles which, even at that distance, I could see con-

sisted of at least half-a-dozen manuals each, were multi-limbed creatures—spiders or octopuses or Polilollipops—I didn't ask what Craswell called them—I was listening.

The opening bars were strange enough, but innocuous. Then the multiple tones and harmonies began to swell in volume. I picked out the curious, sweet harshness of oboes and bassoons, the eldritch, rising ululation of a thousand violins, the keen shrilling of a hundred demonic flutes, the sobbing of many 'cellos. That's enough. Music's my hobby, and I don't want to get carried away in describing how that crazy symphony nearly carried me away.

But if Craswell ever reads this, I'd like him to know that he missed his vocation. He should have been a musician. His dream-music showed an amazing intuitive grasp of orchestration and harmonic theory. If he could do anything like it consciously, he would be a great modern composer.

Yet not too much like it. Because it began to have the effects he had warned about. The insidious rhythm and wild melodies seemed to throb inside my head, setting up a vibration, a burning, in the brain tissue.

Imagine Puccini's "Recondita Armonia" re-orchestrated by Stravinsky then re-arranged by Honneger, played by fifty symphony orchestras in the Hollywood Bowl, and you might begin to get the idea.

I was getting too much of it. Did I say music was my hobby? Certainly—but the only instrument I play is the harmonica. Quite well, too. And with a microphone, I can make lots of nice noise.

A microphone—and plenty of amplifiers. I pulled the harmonica from my pocket, took a deep breath, and whooped into "Tiger Rag," my favorite party-piece.

A stunning blast-wave of jubilant jazz, riffs, tiger-growls and tremolo discords from the tiny mouth organ, crashed into the vast hall from the amplifiers, completely swamping Craswell's mad music.

I heard his agonized shout even above the din. His tastes in music were evidently not as catholic as mine. He didn't like jazz.

The music-machine quavered, the multi-limbed organists, ludicrous in their haste to escape from an unreal doom, shrank, withered to scuttling black beetles; the lighting effects that had sprayed a rich, unearthly effulgence over the consoles died away into pastel, blue gloom; then the great machine itself, caught in swirl upon wave of augmented chords complemented and reinforced by its own outpourings, shivered into fragments, poured in a chaotic stream over the floor of the hall.

I heard Craswell shout again, then the scene changed abruptly. I assumed that, in his desire to blot out the triumphant paean of jazz from his mind, and perhaps in an unconscious attempt to confuse me, he had skipped a part of his plot and, in the opposite of the flash-back beloved of screen writers, shot himself forward. We were—somewhere else.

Perhaps it was the inferiority complex I was inducing, or in the transition he had forgotten how tall he was supposed to be, but he was now a mere six feet, nearer my own height.

He was so hoarse, I nearly suggested a gargle. "I . . . I left you in the Hall of Madness. Your magic caused the roof to collapse. I thought you were—killed."

So the flash-forward wasn't just an attempt to confuse me. He'd tried to lose me, write me out of the script altogether.

I shook my head. "Wishful thinking, Craswell old man," I said reproachfully. "You can't kill me off between chapters. You see, I'm not one of your characters at all. Haven't you grasped that yet? The only way you can get rid of me is by waking up."

"Again you speak in riddles," he said, but there was little confidence in his voice.

The place in which we stood was a great, high-vaulted chamber. The lighting effects—as I was coming to expect—were unusual and admirable—many colored shafts or radiance from unseen sources, slowly moving, meeting and merging at the farther end of the chamber in a white, circular blaze which seemed to be suspended over a thronelike structure.

Craswell's size-concepts were stupendous. He'd either studied the biggest cathedrals in Europe, or he was reared inside Grand Central Station. The throne was apparently a good half-mile away, over a completely bare but softly-resilient floor. Yet it was coming nearer. We were not walking. I looked at the walls, realized that the floor itself, a gigantic endless belt, was carrying us along.

The slow, inexorable movement was impressive. I was aware that Craswell was covertly glancing at me. He was anxious that I should be impressed. I replied by speeding up the belt a trifle. He didn't appear to notice.

He said: "We approach the Throne of the Snake, before which, his protector and disciple, stands the female magician and sorceress, Garor. Against her, we shall need all your strange skills, Nelpar, for she stands invulnerable within an invisible shield of pure force.

"You must destroy that barrier, that I may slay her with the Sword. Without her, the Snake, though her master and self-proclaimed master

of this world, is powerless, and he will be at our mercy."

The belt came to a halt. We were at the foot of a broad stairway leading to the throne itself, a massive metal platform on which the Snake reposed beneath a brilliant ball of light.

The Snake was—a snake. Coil on coil of overgrown python, with an evil head the size of a football swaying slowly from side to side.

I spent little time looking at it. I've seen snakes before. And there was something worth much more prolonged study standing just below and slightly to one side of the throne..

Craswell's taste in feminine pulchritude was unimpeachable. I had half-expected an ancient, withered horror, but if Flo Ziegfeld had seen this baby, he'd have been scrambling up those steps waving a contract, force-shield, or no force-shield, before you could get out the first glissando of a wolf-whistle.

She was a tall, oval-faced, green-eyed brunette, with everything just so, and nothing much in the way of covering—a scanty metal chest-protector and a knee-length, filmy green skirt. She had a tiny, delightful mole on her left cheek.

There was a curious touch of pride in Craswell's voice as he said, rather unnecessarily: "We are here, Garor," and looked at me expectantly.

The girl said: "Insolent fools—you are here to die."

Mm-m-m—that voice, as smooth and rich as a Piatigorski cello-note. I was ready to give quite a lot of credit to Craswell's imagination, but I couldn't believe that he'd dreamed up this baby just like that. I guessed that she was modeled on life; someone he knew; someone I'd like to know—someone pulled out of the grab bag of memory in the same way as I had produced Mike O'Faolin and that grubby-chinned cab-driver.

"A luscious dish," I said "Remind me to ask you later for the phone number of the original, Craswell."

Then I said and did something that I have since regretted. It was not the behavior of a gentleman. I said: "But didn't you know they were wearing skirts longer, this season?"

I looked at the skirt. The hem line shot down to her ankles, evening-gown length.

Outraged, Craswell glared at his girl-friend. The skirt became knee-length. I made it fashionable again.

Then that skirt-hem was bobbing up and down between her ankles and her knees like a crazy window blind. It was a contest of wills and imaginations, with a very pretty pair of well-covered tibiae as battleground. A fascinating sight. Garor's beautiful eyes blazed with fury. She seemed to be strangely aware of the misbecoming nature of the conflict.

Craswell suddenly uttered a ringing, petulant howl of anger and frustration—a score of lusty-lunged infants whose rattles had been simultaneously snatched from them couldn't have made more noise—

and the intriguing scene was erased from view in an eruption of jet-black smoke.

When it cleared, Craswell was still in the same relative position but his sword was gone, his gladiator rig was torn and scorched, and thin trickles of blood streaked his muscular arms.

I didn't like the way he was looking at me. I'd booted his super-ego pretty hard that time.

I said: "So you couldn't take it. You've skipped a chapter again. Wise me up on what I've missed, will you?" Somehow it didn't sound as flippant as I intended.

He spoke incisively. "We have been captured and condemned to die, Nelpar. We are in the Pit of the Beast, and nothing can save us, for I have been deprived of the Sword, and you of your magic.

"The ravening jaws of the Beast cannot be stayed. It is the end, Nelpar. The End—"

His eyes, large, faintly luminous, looked into mine. I tried to glance away, failed.

Irritated beyond bearing by my importunate clowning, his affronted ego had assumed the whole power of his brain, to assert itself through his will—to dominate me.

The volition may have been unconscious—he could not know why he hated me—but the effect was damnable.

And for the first time since my brash intrusion into the most private recesses of his mind, I began to doubt whether the whole business was quite—decent.

Sure, I was trying to help the guy, but . . . but dreams are sacred.

Doubt negates confidence. With confidence gone, the gateway is open to fear.

Another voice, sibilant. Steve Blakiston saying ". . . unless you let your mind go under." My own voice ". . . wake up as a candidate for a bed in the next ward—" No, not—". . . not unless you let your mind go under—" And Steve had been scared to do it himself, hadn't he? I'd have something to say to that guy when I got out. If I got out . . . if—

The whole thing just wasn't amusing any more.

"Quit it, Craswell," I said harshly. "Quit making goo-goo eyes, or I'll bat you one—and you'll feel it, coma or no coma."

He said: "What foolish words are these, when we are both so near to death?"

Steve's voice: ". . . sympathetic magic . . . imagination. If he imagines that one of his fantastic creations kills the hero—himself—he just won't wake up again."

That was it. A situation in which the hero must die. And he wanted to envisage my death, too. But he couldn't kill me. Or could he? How could Blakiston know what powers might be unleased by the concept of death during this ultramundane communion of minds?

Didn't psychiatrists say that the death-urge, the will to die, was buried deep, but potent, in the subconscious minds of men? It was not buried deep here. It was glar-

ing, exultant, starkly displayed in the eyes of Marsham Craswell.

He had escaped from reality into a dream, but it was not far enough. Death was the only full escape—

Perhaps Craswell sensed the confusion of thought and speculation that laid my mind wide open to the suggestions of his rioting, perfervid, death-intent imagination. He waved an arm with the grandiloquent gesture of a Shakespearean Chorus introducing a last act, and brought on his monster.

In detail and vividness it excelled everything that he had dreamed up previously. It was his swan-song as a creator of fantastic forms, and he had wrought well.

I saw, briefly, that we were in the center of an enormous, steep-banked amphitheater. There were no spectators. No crowd scenes for Craswell. He preferred that strange, timeless emptiness which comes from using a minimum number of characters.

Just the two of us, under the blazing rays of great, red suns swinging in a molten sky. I couldn't count them.

I became visually aware only of the Beast.

An ant in the bottom of a wash-bowl with a dog snuffling at it might feel the same way. If the Beast had been anything like a dog. If it had been anything like *anything.*

It was a mass the size of several elephants. An obscene hulking gob of animated, semi-transparent purple flesh, with a gaping, circular mouth or vent, ringed inside with pointed beslimed tusks, and outside with—eyes.

As a static thing, it would have been a filthy envenomed horror, a thing of surpassing dread in its mere aspect; but the most fearsome thing was its nightmarish mode of progression.

Limbless, it jerked its prodigious bulk forward in a series of heaves—and lubricated its path with a glaucous, viscid fluid which slopped from its mouth with every jerk.

It was heading for us at an incredible pace. Thirty yards—Twenty—

The rigidity of utter fear gripped my limbs. This was true nightmare. I tried desperately to think . . . flame-thrower . . . how . . . I couldn't remember . . . my mind was slipping away from me in face of the onward surging of that protoplasmic juggernaut . . . the slime first, then the mouth, closing . . . my thoughts were a screaming turmoil—

Another voice, a deep, drawling, kindly voice, from an unforgettable hour in childhood—"There's nothing in the whole wide world or out of it that a slug from Billy here won't stop. There's nothing you can meet in dreams that Billy here won't stop. He'll come into your dreams with you from now on. There's no call to be scared of anything." Then the cool, hard butt in my hand, the recoil, the whining irresistible chunk of hot, heavy metal—deep in my subconscious.

"Pop!" I gasped. "Thanks, Pop."

The Beast was looming over me.

But Billy was in my hand, pointing into the mouth. I fired.

The Beast jerked back on its slimy trail, began to dwindle, fold in on itself. I fired again and again.

I became aware once more of Craswell beside me. He looked at the dying Beast, still huge, but rapidly diminishing, then at the dull metal of the old Colt in my hand, the whisp of blue smoke from its uptilted barrel.

And then he began to laugh.

Great, gusty laughter, but with a touch of hysteria.

And as he laughed, he began to fade from view. The red suns sped away into the sky, became pin points; and the sky was white and clean and blank—like a ceiling.

In fact—what beautiful words are "in fact"—in fact, in sweet reality, it *was* a ceiling.

Then Steve Blakiston was peering down, easing the chromium bowl off the rubber pads round my head.

"Thanks, Pete," he said. "Half-an-hour to the minute. You worked on him quicker than an insulin shock."

I sat up, adjusting myself mentally. He pinched my arm. "Sure—you're awake. I'd like you to tell me just what you did—but not now. I'll ring you at your office."

I saw an assistant taking the bowl off Craswell's head.

Craswell blinked, turned his head, saw me. Half-a-dozen expressions, none of them pleasant, chased over his face.

He heaved upright, pushed aside the assistant.

"You lousy bum," he shouted, "I'll murder you!"

I just got clear before Steve and one of the others grabbed his arms.

"Let me get at him—I'll tear him open!"

"I warned you," Steve panted. "Get out, quick."

I was on my way. Marsham Craswell in a nightshirt may not have been quite so impressive physically as the bronzed gladiator of his dreams, but he was still passably muscular.

That was last night. Steve rang this morning.

"Cured," he said triumphantly. "Sane as you are. Said he realized he'd been overworking, and he's going to take things easier—give himself a rest from fantasy and write something else. He doesn't remember a thing about his dream-coma—but he had a curious feeling that he'd still like to do something unpleasant to a certain guy who was in the next bed to him when he woke up. He doesn't know why, and I haven't told him. But better keep clear."

"The feeling is mutual," I said. "I don't like his line in monsters. What's he going to write now—love stories?"

Steve laughed. "No. He's got a sudden craze for Westerns. Started talking this morning about the sociological and historical significance of the Colt revolver. He

jotted down the title of his first yarn—'Six-Gun Rule'. Hey—is that based on something you pulled on him in his dream?"

I told him.

So Marsham Craswell's as sane as me, huh? I wouldn't take bets.

Three hours ago, I was on my way to the latest heavyweight match at Madison Square when I was buttonholed by an off-duty policeman.

Michael O'Faolin, the biggest, toughest, nicest cop I know.

"Pete, m'boy," he said. "I had the strangest dream last night. I was helpin' yez out of a bit of a hole, and when it was all over, you said, in gratitude it may have been, that yez might have a couple of spare tickets f'the fight this very night, and I was wondering whether it could have been a sort of telly-pathy like, and—"

I grabbed the corner of the bar doorway to steady myself. Mike was still jabbering on when I fumbled for my own tickets and said: "I'm not feeling too well, Mike. You go. I'll pick my stuff up from the other sheets. Don't think about it, Mike. Just put it down to the luck of the Irish."

I went back to the bar and thought hard into a large whiskey, which is the next best thing to a crystal ball for providing a focus of concentration.

"Telly-pathy" huh?

No, said the whiskey. Coincidence. Forget it.

Yet there's something in telepathy. Subconscious telepathy—two dreaming minds in rapport. But I wasn't dreaming. I was just tagging along in someone else's dream. Minds are particularly receptive in sleep. Premonitions and what-have-you. But I wasn't sleeping either. Six and four makes minus ten, strike three—you're out. You're nuts, said the whiskey.

I decided to find myself a better-quality crystal ball. A scotch in a crystal glass at Cevali's club.

So I hailed a Purple Cab. There was something reminiscent about the back of the driver's head. I refused to think about it. Until the pay-off.

"Dollar-fifty," he growled, then leaned out. "Say—ain't I seen you some place?"

"I'm around," I said, in a voice that squeezed with reluctance past by larynx. "Didn't you drive me out to Pentagon yesterday?"

"Yeah, that's it," he said. Square unshaven jaw, low forehead, dirty red hair straggling under his cap. "Yeah—but there's something else about your pan. I took a sleep between cruises last night and had a daffy dream. You seemed to come into it. And I got the screwiest idea you already owe me a dollar-fifty."

For a moment, I toyed with the idea of telling him to go to hell. But the roadway wasn't green sand. It looked too solid to open up. So I said "Here's five," and staggered into Cevali's.

I looked into a whiskey glass until my brain began to clear, then I phoned Steve Blakiston and talked. "It's the implications," I said

finally. "I'm driving myself bats trying to figure out what would have happened if I'd conjured up a few score of my acquaintances. Would they all have dreamed the same dream if they'd been asleep?"

"Too diffuse," said Steve, apparently through a mouthful of sandwich. "That would be like trying to broadcast on dozens of wavelengths simultaneously with the same transmitter. Your brain was an integral part of that machine, occupying the same position in the circuit as a complexus of recording instruments, keyed in phase with Craswell's brain—until the pick-up frequency was raised. What happened then I imagined purely as an induction process. It was—as far as the Craswell hook-up was concerned, but—"

I couldn't stand the juicy champing noises any longer, and said: "Swallow it before you choke." The guy lives on sandwiches.

His voice cleared. "Don't you see what we've got? During the amplification of the cerebral currents, there was a backsurge through the tubes and the machine became a transmitter. These two guys were sleeping, their unconscious minds wide open and acting as receivers; you'd seen them during the day, envisaged them vividly—and got tuned in, disturbing their minds and giving them dreams. Ever heard of sympathetic dreams? Ever dreamed of someone you haven't seen for years, and the next day he looks you up? Now we can do it deliberately—mechanically-assisted dream telepathy, the waves reinforced and transmitted electronically! Come on over. We've got to experiment some more."

"Sometimes," I said, "I sleep. That's what I intend to do now—without mechanical assistance. So long."

A nightcap was indicated. I wandered back to the club bar. I should have gone home.

She hipped her way to the microphone in front of the band, five-foot ten of dream wrapped up in a white, glove-tight gown. An oval-faced, green-eyed brunette with a tiny, delightful mole on her left cheek. The gown was a little exiguous about the upper regions, perhaps, but not as whistle-worthy as the outfit Craswell had dreamed on her.

Backstage, I got a double shot of ice from those green eyes. Yes, she knew Mr. Craswell slightly. No, she wasn't asleep around midnight last night. And would I be so good as to inform her what business it was of mine? College type, ultra. How they do drift into the entertainment business. Not that I mind.

When I asked about the refrigeration, she said: "It's merely that I have no particular desire to know you, Mr. Parnell."

"Why?"

"I'm hardly accountable to you for my preferences." She frowned as if trying to recall something, added: "In any case—I don't know. I just don't like you. Now if you'll pardon me, I have another number to sing—"

"But, please . . . let me explain—"

"Explain what?"

She had me there. I stumble-tongued, and got a back view of the gown.

How can you apologize to a girl when she doesn't even know that you owe her an apology? She hadn't been asleep, so she couldn't have dreamed about the skirt incident. And if she had—she was Craswell's dream, not mine. But through some aberration a trickle of thought-waves from Blakiston's machine had planted an unreasoning antipathy to me in her subconscious mind. And it would need a psychiatrist to dig it out. Or—

I phoned Steve from the club office. He was still chewing. I said: "I've got some intensive thinking to do—into that machine of yours. I'll be right over."

She was leaving the microphone as I passed the band on my way out. I looked at her hard as she came up, getting every detail fixed.

"What time do you go to bed?" I asked.

I saw the slap coming and ducked.

I said: "I can wait. I'll be seeing you. Happy dreams."

THE END

IN TIMES TO COME

Starting next month is, as has been somewhat more than hinted at, the first part of A. E. van Vogt's sequel to "World Of Ā"—"The Players of Ā". The story of Ā as told in the first yarn was an incomplete fragment; during the course of that story, it became clear that the forces moving behind the scenes of the conflict on Venus and Earth were far greater than mere planetary politics—actually, interstellar politics had focused on the unwary, unknowing Solar System.

But two great questions remained unanswered—unclarified—at the end of the story. The Galactic civilization had found many intelligent peoples on many planets in the galaxy—and they were *all* human! Some factor unknown even to the galaxy-wide culture must have been at work—but what?

And Gosseyn, more than any other, found that some still unknown force was manipulating him—and, apparently, manipulating even the forces of the Galactic politics! The Chess Player remained unknown—

"The Players of Ā" deals with that—with the forces that were making the whole immense powers of the Galactic culture dance to their tune. And with Gosseyn, who was the instrument on which that tune was played!

It is, incidentally, van Vogt at his best—which is very, very good reading!

THE EDITOR.

THE GREAT AIR MONOPOLY

BY RENÉ LAFAYETTE

A neat racket the boys had—you had to buy the privilege of breathing the air of the planet! And enforcing that tax law was quite a trick. Effective, too—

Illustrated by Cartier

Ole Doc sat in the cool sunlight of Arphon and pulled at a fragrant pipe. The *Morgue,* his ship-laboratory, sat in lush grass up to its belly beside the sparkling lake and from its side came out an awning to make a stately pavilion for the master.

Sun [12] was thirty degrees high and Arphon's autumn sucked hungrily at the warmth, even as Ole Doc sucked at the pipe. He was getting away with something with that pipe. His little super-gravitic slave Hippocrates was bustling around, all four hands busy, now and then coming to a full stop to lower his antennae at Ole Doc in disapproval. It was not of his

master that he disapproved, it was the pipe.

"What if it is his birthday?" growled Hippocrates. "He shouldn't. He said he wouldn't. He promised me. Nicotine, *ugh!* and three whole days until he takes his treatment. Nicotine on his fingers, poisoning him; nicotine in his lungs. Poison, that's what it is. In the pharmacopoeia . . . !!" And he rattled off a long, gruesome list of poisons for, once going, his phonograph-recordwise mind went on into Nilophine, Novocaine and Nymphodryl. Suddenly he realized where all this was heading and in anger at himself now as well as Ole Doc, got back to work with his birthday party preparations. They were very intricate preparations. After all, there had to be nine hundred and five candles on that cake.

Ole Doc paid his little slave no heed. He sat in the sunlight and puffed his pipe and occasionally made intricate calculations on his gold cuff—his filing case was full of torn cuffs containing solutions which would have rocked even his brothers of the Universal Medical Society,* much less the thousand and five humanoid systems in this one galaxy.

He didn't hear the clanking chains or the bark of the guards on the march, even though they came closer with every second and would pass hard by the ship. It was nothing to Ole Doc that Arphon was a boiling turmoil of revolt and murder. In the eight hundred and eighty years since he had graduated from Johns-Hopkins Medical school in Baltimore, Maryland, First Continental District, Earth, Orbit Three, Sun [1], Rim Zone, Galaxy[1], Universe—or 1, 316°, 1 m. ly hub[1], 264-89, sub-3[28] which will find it for you on the space charts if you are going there—he had seen everything, done everything, felt everything, tasted everything, been everything including a Messiah, a Dictator, a humanoid animal in a glass dome and a god, and there were few things left to amaze or interest him.

He supposed some day he would crack up or get shot or forget his regular youth treatments for a month and wind up in the quiet crypt where sat the nine hundred

* U.M.S.—Universal Medical Society—the supreme council of physicians organized in the late Twenty-third Century after the famous Revolt Caduceus which claimed the lives of two billion humanoids of the Earth-Arcton Empire through the villainous use of new medical discoveries to wage war and dominate entire countries. George Moulton, M.D., Dr. Hubert Sands the physiochemist, James J. Lufberry, M.D., and Stephen Thomas Metridge, M.D., who was later to become as well known as Ole Doc Methuselah, had for nearly a hundred years kept to a laboratory studying far beyond contemporary skills and incidentally extending their work by extending their own lives, came out of retirement, issued a pronunciamento—backed with atomic and du-ray hand weapons and a thousand counter-toxins—which denied to the casual practitioner all specialized medical secrets. Thus peace came to the Empire. Other systems anxiously clamored for similar aid and other great names of medicine quietly joined them. For centuries, as the Universal Medical Society, these men, hiding great names under nicknames, who eventually became a fixed seven hundred in number, maintained a Center and by casual patrol of the Systems kept medicine as well as disease within rational bounds. Saluting no government, collecting no fees, permitting no infringement, the U.M.S. became dreaded and revered as The Soldiers of Light and under the symbol of the crossed ray rods impinged their will upon the governments of space under a code of their own more rigorous than any code of laws. For the detailed records and history of the U.M.S., for conditions governing the hundred-year apprenticeship all future members must serve and for the special codes of call and appeal to the U.M.S. in case of plague or disaster, consult L. Ron Hubbard's "Conquest of Space," 29th Volume, Chapter XCLII. René LaFayette.

coffins of black ebony and gold containing all the mortal remains of Soldiers of Light who had departed the service in the only way possible and whose brothers had carefully brought them home.

He calculated from time to time and filled his pipe. After a while, when dinner was over, he'd go to the lake, make an artificial dusk and try out his battery of flies on the trout. Just now he was calculating.

It had come to him that morning that negative could be weighed and if this were so, then it could be canned and if that were true, he could undoubtedly surprise his colleagues at the Center some two hundred million light-years away by making painless amputations so that new limbs could be grown.

He had just come up to his ninety-sixth variable when Hippocrates heard the chain gang. The little slave was ashamed of himself for being too busy or too provoked to heed sounds audible to him these past sixteen and two-tenths minutes.

Hippocrates jumped to the panel, making the *Morgue* rock with his great weight and four-handedly threw on a combination of switches which utterly camouflaged the *Morgue,* screened Ole Doc without making him invisible, trained outward a brace of 600 mm. blasters rated at a thousand rounds a second and turned down the oven so that his cake wouldn't burn. These four importances attended to, Hippocrates hung invisible in the door and eyed the column with disfavor as it came in sight.

Ole Doc saw it at last. It would have been very difficult to have avoided it, seeing that the vanguard —a huge Persephon renegade— would momentarily stumble against the screen, the limit of which he was paralleling.

It was a weird sight, that column. The lush grass bent under white human feet and became stained with red. Clothing ripped to nothing, eyes sunken and haunted, bent with iron fetters and despair, the hundred and sixteen people captive there appeared like shades just issued forth from hell for a bout with Judgment Day.

The guards were brutish humanoids, eugenicized for slave tending. And this was odd because Ole Doc himself a hundred or was it fifty years before had thought the practice stopped by his own policing. These ape-armed, jaguar-toothed devils were like humans mad with a poisonous stimulant or like Persephons dragged from their pits and injected with satanic human intelligence. Their pointed heads were as thick as helmets, their necks were collared with an owner's mark, their shoulders and shaggy loins girded about with blasters and brass cases and their elephant-pad feet were shoed in something resembling spittoons. Whoever owned and controlled that crew who in turn controlled these human slaves must be a very rough lad himself.

Doc raised a microglass to his eye and read the collar brand. It wasn't a man's name, it was a commercial company stamp. "Air, Limited."

Maybe they would have gone on

by and nothing whatever would have been written in the *Morgue's* log. But then Ole Doc saw her.

She was slight, but strong enough to bear this iron. She was curved just so and thus. And her eyes and nose and mouth made a triangle, just . . . well, and her hair flowed back and down her back.

Ole Doc sat up and the pipe dropped unheeded to the ground. He looked harder. The lines before and behind her vanished. The guards vanished. The grass, the sunlight, all Arphon vanished. And there was this girl. Ole Doc stood up and his knees wobbled a little which was odd because Ole Doc was in a physical recondition far superior to most men of twenty-five.

She saw him and for an instant, as she looked and he looked broke her stride. The slave behind her was old and stumbled. The slave ahead was jerked back by his collar. The Persephon humanoid whirled off the screen he had just bumped and came around to see the tangle. And down came his brass rod.

It never touched the young lady. Ole Doc had not practised drawing and hip shooting for about four hundred years but his hand had not forgotten. That Persephon humanoid sort of exploded into a mist. His arm flew up sixty yards, turned at the top and came down with a thump on the *Morgue's* screen where it lay, dripping, suspended in air. The guard's blaster belt went off after an instant like a chain of small cannons and blew tufts of grass in the air. The hole smoked and the other guards came up sharply, gaped and as one faced about with guns drawn looking for their quarry.

It was not quite fair. Ole Doc was out of the screen where he could shoot without deflection and he was shooting. And even if he was a fine target it was still not sporting. He had five Persephons only to shoot at him and then there were four, three, two, none. And patches of grass smoked and there was silence. A final belt cartridge exploded in a hole and there was silence again.

The Persephons never knew that they had had the honor of being shot by a Galactic Medalist in short arms.

The slaves stood still and shivered. A wild one had pinked an old woman at the end of the column and she was sitting down staring at her own blood. The rest were gazing miserably at this new menace who had risen up from the tall grass. Ole Doc found he was shaking with the excitement and he disliked finding it so for he had often told himself that one should never get a thrill out of killing, that being a barbarous sort of joy and besides at the end there it had been but five to one. He picked up his fallen pipe, jammed it into his mouth and took a drag. The slaves screamed and fell back from this smoking monster, the tobacco habit having been extinct most everywhere for hundreds of years.

Hippocrates grunted with disgust. He had not been able to

more than slew the 600 mm. into position and had not had the satisfaction of shooting even one round.

He came out. Shrilly shrewish he said: "You ought to know better. I have told you and told you and told you and you ought to know better. You'll get hurt. I've said you'll get hurt and you will. You leave that to the bravos and buckos. It says right in your code that 'Whosoever shall kill large numbers of people solely for satisfaction shall be given a hearing and shall be fined a week's pay, it being the mission of this Society to preserve mankind in the galaxy—'" He brought up short. His terror for Ole Doc had brought him into an error of quoting the Parody Code. It actually said ". . . . kill large numbers for experimentation shall . . ." This fussed him so that he shut off the force screens and came down and would have carried Ole Doc straight back into the ship for a take-off had not his revered master been staring so hard, pipe again forgotten.

Hippocrates took the pipe. He looked for the objection. He knocked out the bowl. He looked again, more wonder in his antennae waves, and slyly broke the pipe to bits. Still no objection. Hippocrates poured out the contents of the pouch and heaved bits and leather as far as his very powerful arms could throw. Still no objection. Hippocrates walked all the way around Ole Doc and stared at him. His master was staring at the line of slaves.

No, at the center of the line. And someone there was staring as though hypnotized.

"Oh," moaned Hippocrates, seeing plenty of trouble. "A girl!"

Now it was no plan of Ole Doc's to inspect Arphon of Sun[12]. He was on his leisurely way to hand a deposition warrant to a System Chief over in Sub-Rim 18, 526°, that worthy having failed to respect Section 8, Paragraph 918 of Code 94 of the Universal Medical Society. And if Arphon has slaves like this, it was theoretically none of his medical business.

But she was staring at him.

He flushed a little and looked down. But he was caped in gold and belted in scarlet with metal wings on his yellow boots and was decent.

Hippocrates sighed with the depth of resignation. He went over and chopped the girl out of the line with a simple twist of the iron links, bare-handed. Then he set her bodily to one side and to the rest made pushing motions with his hands.

"Shoo! Shoo!" said Hippocrates. "You are free. Go!"

"Nonsense," said the girl in a voice which made tingles go up and down Ole Doc's spine. "How can they go anywhere? They have no money to pay the air tax."

"The air—" Hippocrates gaped at her. She was just a human being to him. Personally he liked machines. "Nonsense yourself. The air's here and the air's free. Shoo! SHOO! You stay," he added over one of his shoulders to the girl. "Shoo!"

And the slaves sank down and began to inch forward on their knees to the little slave. "No, no," they cried. "We cannot pay the tax. We have sickened already in our homes when the air was shut off. We cannot pay. We are repossessed and on our way to remarketing. Don't send us away! Help us! Money, money! You pay our tax and we will work—!"

"Master!" cried Hippocrates, scuttling back. For there were definite limits on his skills and when these were reached he had but one god. "Master!"

But the slaves just came on, inching forward on their knees, hands pitifully upraised, begging and whining and Hippocrates fell hastily back again.

"Air, air. Buy us air! You pay our tax. Don't send us away!"

"MASTER!"

Ole Doc paid no heed to his slave now behind him, to the pathetic cries, to the creeping throng or to anything else on Arphon for that matter. He was still staring at the girl and now she blushed and pulled the rags of a robe around her.

That did it. "Put her in the ship!" said Ole Doc. "The rest of you get out of here. Go back to your homes! Beat it!" But this relapse into the vernacular of his youth had no effect on the crowd. They had crept forward, leaving flattened grass behind them.

Suddenly an old man with a ragged gray stubble and thin chest caught at his throat, rose up and with a wild scream cried, "Air! Air! Oh—" And down he went, full length into the grass. Two others shortly did the same thing.

Ole Doc sniffed alertly. He looked at his third cloak button but it was still gold and so the atmosphere was all right. He sniffed again. "Test for air," he said to Hippocrates.

The little fellow leaped gladly into the *Morgue* and in his testing brought visibility back to the ship. He saw, through the port, that this startled half a dozen of the slaves out there into fits and the fact made him feel very superior. He, master of machinery, tested for the air. And it was good.

Ole Doc pulled down his helmet to cover his face and walked forward. He rolled over the senseless antique of sixty-five winters and examined him for anything discoverable.

He examined several more and from the eighth, who just that instant was half blind with airlessness and the flash of Ole Doc's U.M.S. gorget, flicked out a specimen of spittle and passed it to Hippocrates.

"Culture it," said Ole Doc.

"Negative," said Hippocrates six minutes later, still carrying 'scope and speed culture flask. "Bacteriologically negative."

"Air!" screamed the old man, reviving. And an instant later She went down on her face and didn't move.

Ole Doc had her in the ship in about ten seconds. Hippocrates threw a force cordon around the

rest and f o u r - h a n d e d l y went through them spraying a sterilizer all over them with two hands and breaking their chains apart with the remaining sets of fingers.

"Air!" they whined and gasped. "Air, air, air!"

Ole Doc looked sadly down at the girl on the table. She was fragile and lovely, stretched there on the whiteness of the *Morgue's* operating room. She was in odd contrast to all these brilliant tubes and trays, these glittering rods and merciless meters. Ole Doc sighed and then shook off the trance and became a professional.

"There's such a thing as malnutrition," he said to Hippocrates. "But I never heard of mal-oxygenation. Her chest— Here, what's this?"

The tag had been clipped solidly through her ear and it read, "Property of Air, Limited. Repossessed Juduary 43rd, '53. By order of Lem Tolliver, President, Air Limited."

That offended Ole Doc for some reason. He tore it off and put a heal compress on the small, handsome ear. When he removed it five seconds later there were no scars.

Ole Doc read the tag again and then angrily stamped it under foot. He turned to his job and shortly had a mask on the girl which fed her oxygen in proper pulsations and gave her a little ammonia and psionized air in the bargain.

He was just beginning to take satisfaction in the way her lovely eyes were flickering as she came around when Hippocrates leaped in, excited.

"Ship landing!" blurted the little fellow. "Guns ready. Tell me when to shoot."

"Whoa," said Ole Doc. "Force screen them off until you see what they are at least. Now, there you are, my dear."

She struggled up and pulled off the mask. She looked mystified at her surroundings until she heard others calling for air outside. Then she flicked her eyes at Ole Doc and it was his turn to sigh.

"Ugh!" said Hippocrates. "Nicotine, women! You never live to be ten thousand, *I* bet. Next, rum!"

"Fine idea," said Ole Doc. "My dear, if you'd like to step this way—"

Hippocrates watched him open doors for her. He knew Ole Doc would take her to a stateroom where she could shower and shift into Ole Doc's robe. And then in the salon that Michalo had newly designed, they'd sit in soft lights and talk above the whine of violins. *Ugh!* It had been exactly nineteen years and six days since Ole Doc had shown any interest in a woman— The little slave paused. He grinned. After all, this was Ole Doc's birthday. It was hard enough to live hundreds of years with nothing ever exciting any more. Hippocrates knew for his people, gypsum metabolism though they were, normally went utterly stale at twelve thousand and faded into complete boredom. Humans lived faster in the head—

He grinned and swung up into

a gun turret. Let him have his birthday and three cheers for it.

But the ship called Hippocrates back sharply. And he was again intensely annoyed with Ole Doc. Women. Now look at the trouble that was coming. The ship was a Scoutcraft Raider for atmosphere travel and it had enough armament to slaughter a city and it was manned with humans who, even at this distance, looked extremely unreliable.

It landed on the edge of the screen and five guards leaped down, blasters ready to cover the debark of a huge-shouldered, black-garbed man. Hippocrates was reminded of a vulture and almost whiffed the odor that always clings to those birds. He turned on the near screen and disregarded the fact that its force kicked about twenty slaves a dozen feet or more outward from the *Morgue*.

The five scouted the grass, found the holes where the guards had been and fished up bits of melted brass. They stood and glared at the slaves who, seeing the ship had begun to howl and plead and creep toward that as they had toward Hippocrates.

The big human stopped and looked at the *Morgue*. Its stern was toward him and he didn't see the crossed ray rods on the nose or the meaningful letters *U. M. S. S. Morgue, Ole Doc Methuselah.*

"You better stop," said Hippocrates in the high turret.

The men stopped.

The big human looked up at the turret. He signaled his men to fan out and for his ship to depress its

heaviest cannon. Hippocrates shivered a little for he was not sure his screen would hold against the size of those muzzles.

"I'm Big Lem Tolliver!" shouted the human. "This is Air, Limited talking and if you got a good reason why my Persephons ain't alive, spill it, for I ain't withholding my fire long."

"You better go away!" yelled Hippocrates in derision. "If my master sees you, he'll cut you open to see the size of your liver or drill holes in your skull to equalize the vacuum. You better go!"

"Only a hundred and fifteen in this gang," said a shrunken human being who reached only to Tolliver's elbow but who served him as a lieutenant of sorts. "According to the radio report, that's one missing."

"Search the ship!" said Big Lem Tolliver.

Hippocrates swooped down with his 600 mm. "Stop and go away. This is the *U.M.S.S. Morgue* and we specialize in dead men named Lem Tolliver."

He thought this was pretty apt. After all, he'd never imagined being able to convert lines from "Tales of the Early Space Pioneers." He was a success. It stopped them.

"Spacecrap!" said Lem Tolliver in a moment. "That's no U.M.S. ship! You'd never steal a slave if you were."

"Slaves are U.M.S. business, pardner," said Hippocrates. "And even if they weren't, we'd make it our business, son. You going to go along and tell your mama to wipe your nose or am I going to have to wipe it myself—with 'sploders. Now git!" He was certainly converting well today.

"Up there, Tinoi. Search it and if they've got the missing one, haul her out. And then we'll see about the murder that's been done here amongst our people."

Tinoi, the shrunken one, hung back. He'd never had a taste for 600 mm. stuff himself. Let them as would be heroes, he valued his daily issue of *doi*.

Hippocrates saw the hesitation and grew very brave. He spanged a dozen sploders into the earth before the group and would have shot a thousand more as warning if the Scoutcraft Raider, ordered so, had not replied with a resounding vomit of fire.

The *Morgue* reeled as the screen folded. The top turret caved into tangled smoke. The side port fused and dripped alloy gone molten. And Big Lem Tolliver looked on in some annoyance for there went his chance of recovering the missing repossessed slave.

The men went about collecting the hundred and fifteen and forming them into lines. They were bitter because they could not imagine what had burst these perfectly good chains and they had to tie lines through the broken links.

"Air!" moaned the prisoners.

"Stow it," said Big Lem. "We'll teach you to breathe air you didn't pay for. Form 'em up boys and get them on their way. That spaceship, or what's left of it, is a shade too hot for me."

"You ain't goin' to make me escort them," said Tinoi. "It's a heck of a walk to Minga. I bought them Persephon-castes to do the walking."

"If I say walk, you'll walk," said Big Lem. "And if I say walk straight out into space, you'll walk. And if I say hoof it from here to Galactropolis, you'll walk every condemned light-year of it barefoot. If I can't have my orders obeyed, who can? And if you can't obey Big Lem Tolliver, you can't obey nobody. Who thought up this company? Who makes it work? Who handles all the paper work and hires politicians and abdicates kings when he chooses? Who keeps the whole confounded planet running and your belly full. Lem Tolliver, that's who. And what's Air, Limited but Lem Tolliver? And what's Arphon but Lem Tolliver? And that makes me a planet."

This syllogism caused a return of good humor. He expanded, rocked on his heels and looked down at Tinoi. "Yessir. That makes me Arphon, or mighty doggone near. Well, Tinoi, do you walk?"

"Guess so, Arphon," grumped Tinoi and appeared very beaten about it. He knew better than to appear elated. Somebody else would have got the detail if he hadn't objected and it would be fine to breathe something else besides the ozone stink of the Scoutcraft Raider. Too, he could always sell a slave or two to some farm and turn in a death report. "Guess I'll have to," mumbled Tinoi, "but I'll need two gunners and a marine off the ship, and don't go making me take Connoly along."

"That's Connoly and two marines you'll get," said Tolliver. "Now line 'em up and get—"

"Wait," said Tinoi, forgetting his elation about Connoly who could surely build them litters for the slaves to pack. He stared at the smoking side of the spaceship. "There's somebody alive."

And indeed it appeared to be the truth. Crawling backwards out of the smoke came a seared being, tugging at the boot of a second. Tinoi was all action. He swooped in, holding his breath against the fumes and snatched up the obviously live one.

Coughing and beating out a burning spot on his coat, he let her slide into the grass. "There's the missing one," he said. "Now we can get on our way."

Big Lem looked down at her and made a disdaining face. She was very badly singed property, an enormous burn blotting out almost all of her face and destroying one eye. Wounded and bedraggled, it was plain that she would no longer gladden the eyes of man.

Tinoi looked at her tag, the one around her ankle, and then stared at the ear where the repossession tag should have been and was not. He looked at his boss. "This is Dotty Grennan, the one they picked up 'specially for you. She sure is spoiled for looks."

"Throw her into the line. Some men will buy anything," said Big Lem.

"Don't guess she'll be able to walk much," said Tinoi.

"What's that to me? Throw her in. Captain! Captain! Here, you Foster. Get up there and tell my captain to send Connoly and two marines out here and stand by to take off."

The man named Foster leaped up into the Scoutcraft Raider with the message and came back shortly eating a chocolate bar to walk the line up.

"Air," moaned the slaves. "Air!"

"Shut up, you repossessed mothers' sons," said Tinoi, beating them into line with the butt of his blastick. "Form up, form up or I'll give you a lot more air than you'll ever be able to use." He tried four times to make an old man stand on his feet and then left off profanity, and held an open hand toward Tolliver.

"I'll have to have a few charges," said Tinoi. "After all, it's bad enough to walk to Minga without having to drag a hundred and sixteen passed out repossessions."

"It's a waste of company money," said Big Lem. But he signaled Connoly as the big gunner came out of the Raider and Connoly went back for charges.

These were small cylinders with "A.L." painted in red on them, and when they were exploded around the slaves, sent off a greenish spray which hung foggily about them. Tinoi stepped clear and waited for the murk to dissipate and then, when the slaves had revived, turned to and lined them up without further delay.

Big Lem watched the crowd move off. He knew Tinoi would probably be carried most of the way in litters made by Connoly and he understood what would happen to a couple of those younger girls. And he knew a dozen would be sold and reported dead. But Lem Tolliver could appreciate that kind of loyalty and wouldn't ever have understood another kind of man. He grinned as the last of them disappeared in the trees and without another look at the smoking spaceship, boarded the Scoutcraft Raider and took off.

An hour later Ole Doc came to himself lying in the grass where the girl had pulled him. For a little while he lay there and enjoyed the cool fragrance of the soft blades around him. It was quite novel to be alive and to be so glad to be alive.

After a little he rose up on his elbows and looked at the *Morgue*. The alloy had stopped dripping and the smoke had cleared away but the poor old ship looked ready for a spare parts house. The upper turret had been straight-armed back, a ten-foot hole lay under her keel and the keel was bent, and the near port had been melted entirely out of line. And then he took heart. For she wasn't hulled that he could see and her tubes at one end and her Texas on the other were untouched. He started to spring up but the second he put weight on his right hand it collapsed and he felt sick.

He looked down and saw that his palm was seared away and his

wrist sprained or broken. He felt rapidly of his shoulders and chest but his cloak had protected him there. One boot was almost seared off but his ankle and foot were uninjured. Aside from singes, his wrist and hand, he had survived what must have been a considerable conflagration. He came up swiftly then and went through the hot door. Small spirals of smoke were rising from the salon upholstery. One huge gold panel had curled off its mountings from heat and a silver decanter was lying in a puddle on the charred rug, struck squarely by a ray translating itself through the hull.

But the young woman was gone and Ole Doc, looking back at the trampled meadow through the misshapen door understood suddenly how he must have got out there. No calloused space ranger would have tried to rescue him. Either the girl had tried or Hippocrates—

"Hippocrates!" "Hippocrates," "Hippocrates," echoed the empty cabins.

Ole Doc raced into the Texas and looked around. He went aft to the tube rooms and found them empty. And he had nearly concluded that they must have taken his little slave when he thought of the jammed turret.

The ladder was curled into glowing wreckage and the trap at the top had fused solidly shut from the impact of a direct hit. Ole Doc stood looking upward, a lump rising in his throat. He was afraid of what he would find behind that door.

He went casting about him for a burning torch and was startled by a whir and clang in the galley as he passed it. In a surge of hope he thrust open the door. But little Hippocrates was not there. Pans, spoons and spits were just as he had left them. A bowl of gooey gypsum and mustard, the slave's favorite concoction for himself, stood half eaten on the sink, spoon drifting minutely from an upright position to the edge of the bowl as the neglected mixture hardened. A small, pink-bellied god grinned forlornly in a niche, gazing at the half-finished page of a letter to some outlandish world. The whir and clang had come from the opening oven door on the lip of which now stood the ejected cake, patiently waiting for icing, decorations and nine hundred and five candles.

Ole Doc closed the galley softly as though he had been intruding on a private life and stood outside, hand still on the latch. For a long, long time he had never thought about it. But life without Hippocrates would be a desperate hard thing to bear.

He swore a futile, ordinary oath and went to his operating room. His hand was burning but he did not heed it. There was an amputator in here some place which would saw through diamonds with cold fire. He spilled three drawers on the floor and in the blinding glitter of instruments finally located the tool.

It wasn't possible to reach the trap without taking away the twisted ladder and for some minutes

he scorched himself on the heated metal until he could cut it all away. Then it occurred to him that he would have no chance of getting Hippocrates down if there was anything left of him for that little fellow weighed five hundred kilos even if he was less than a meter tall.

Ole Doc found rope and mattresses and then, standing on a chair, turned the cold fire on a corner of the trap. He stopped abruptly for fear the excess jet would touch Hippocrates' body on the other side and for a while stood frowning upward. Then he seized a thermometer from his pocket and began to apply it all over the steel above him. In a minute or two he had found a slightly higher temperature over an area which should compare with the little slave's body and he chalked it off. Then, disregarding the former lines of the trap, jetted out five square feet of resistant metal as though it had been butter. The torch was entirely spent when he had but an inch to go but the lip had sagged from weight enough for him to pry down. A moment later he was crawling into the turret.

Hippocrates lay curled into himself as though asleep. He was seared and blackened by the heat of the melting girder which had buckled and pinned him down.

Ole Doc hurriedly put a heart counter against the slave's side and then sagged with relief when he saw the needle beat-beat-beat in faint but regularly spaced rhythm. He stood up, feeling his own life surging back through him, and wrenched away the confining girder.

Carefully, because he had never made any study of the slave's anatomy—which anatomy had been the reason Ole Doc had bought him at that auction God knew how many, many scores of years ago, two centuries? three?— Ole Doc trussed the little fellow in a rope cradle and by steadying the standing part over a split jet barrel, began the weary task of lowering the enormous weight down to the mattresses below.

It took a full twenty minutes to get Hippocrates on an operating table, but when that was done, Ole Doc could examine him in perplexity. Other than diet, which was gypsum, Ole Doc knew nothing about the slave.

The antennae were not injured. The arms were bruised but whole. The legs appeared sound. But there was a chipped look about the chest which argued grave injury. Hippocrates was physician to himself and knowing this Ole Doc went back to the tiny cabin off the galley.

He found some amulets which looked like witchcraft and a bottle which his keen nose identified as diluted ink with a medical dosage on the label. He found some chalky looking compresses and some white paint.

Completely beaten he went back and sat down beside the table. Hippocrates' heart was beating more faintly.

His anxiety becoming real now,

like a hand around his throat, Ole Doc hurried to the galley. He had seen Hippocrates tipsy a few times and that meant a stimulant. But it wasn't a stimulant which Ole Doc found.

The letter was addressed in plain lingua spacia.

Bestin Karjoy,
Malbright, Diggs Import Co.
Minga, Arphon.
By Transcript Corporation of the Universe charge U.M.S. O.D.M.

Dear Human Beings:

Forty-six years ago you had one Bestin Karjoy of my people doing your accounts. Please to give same Bestin this message. Hello Bestin. How are you? I am fine. I have not been feeling too good lately because of the old complaint and if your father still employ with you you tell him Hippocrates needs to come see him and get some advice. My master got birthday today so I give him happy birthday with nine hundred and five candles which surprise you for human but you know how big and famous he is and anyway I can come in gig tonight and see you about dawn-dark halfway on park front because I don't know where you really live and your father. . . .

The cake must have demanded something there for it stopped in a blot.

"At five dollars a word outer space rates!" exclaimed Ole Doc. But when he had read it through he was willing to have it at five hundred a word.

He hastened back to the operating table and put the gypsum and mustard close to hand, stacking with it water, the diluted ink and a call phone turned on to the band of his own, propping up a note:

"Hold on, old fellow. I'm returning with your friend Bestin or his father. I'll stay tuned on this phone."

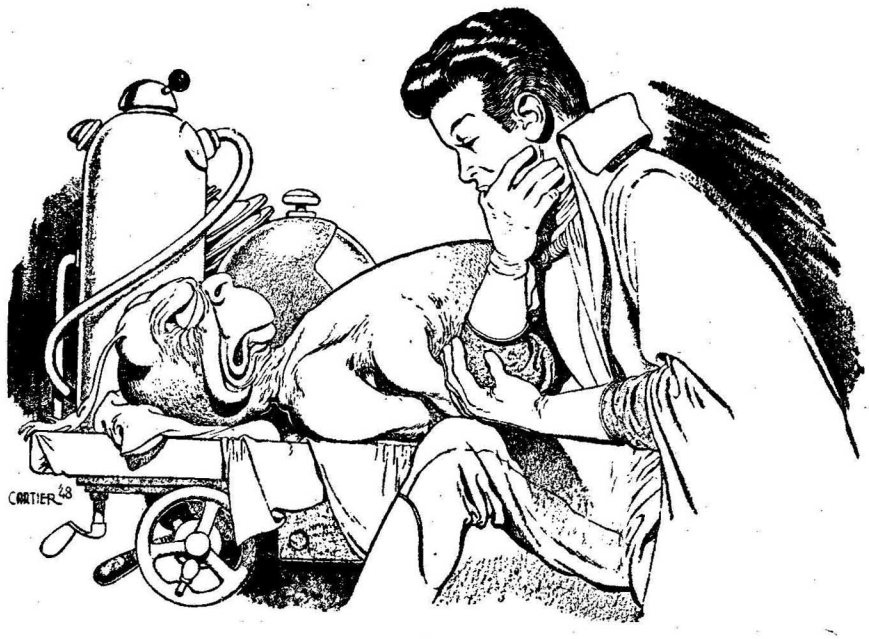
His hand annoyed him as he tried to write with it and when the note had been placed he plunged his arm to the elbow into a catalyst vat and felt the painful prickling which meant a too fast heal. It would scar at this speed but what was a scar?

He saw that the gig, which had been on the side away from the blast, was uninjured, and he had almost launched it when he saw it would never do to go demanding things in his present charred state.

Impatiently he threw on a new shirt, boots and cloak and thrusting a kit and a blaster into his belt, lost no further time.

The gig was a small vacuum-atmosphere boat, jet powered and armed. It was capable of several light-years speed and was naturally very difficult to handle at finites like ten thousand miles an hour. Ole Doc went straight past Minga twice before he properly found it, glimpsed it just long enough to see the landing strip in the middle of town and put the gig down to paving at three hundred and eighty.

Ordinarily Ole Doc disliked middle-sized towns. They didn't have the chummy, "hello-stranger" attitude of the pioneer villages of space and yet lacked any of the true comforts of the city. Built by money-hungry citizenry around a space repair yard such towns were intent upon draining off the profit of the mines and farms incoming and out-



going. They were, in short, provincial. . A rover port had some color and danger, a metropolis had comfort and art. Such as Minga had law and order and a Rotarian club and were usually most confoundedly proud of being dull.

And so Ole Doc didn't give Minga much of a glance, either passing over or walking in. Brick fronts and badly painted signs—houses all alike—people all— But even Ole Doc in his rush had to slow and stare.

Minga was a city, according to the Space Pilot, of ninety thousand people where "a limited number of fuel piles, ice, fresh water, provisions and some ship chandlery can be obtained" and "repairs can be made to small craft in cradles with capacity under one hundred tons" and "the space hospital is government staffed by the Sun[12] System Navy with limited medical stores available" and "two small hotels and three restaurants provide indifferent accommodations due to the infrequency of stopovers." Not exactly the sort of town where you would expect to see a well-dressed man of fifty carefully but unmistakably stalking a cat.

It was not even a fat cat, but a gaunt-ribbed, matt-furred, rheumy-eyed sort of feline which wouldn't go a pound of stringy meat. But from the look on the well-dressed gentleman's face, there was no other reason than that.

Had he seen a riot, a golden palace, a ten-tailed dog or a parade of seals singing "Hallelujah," Ole Doc would not have been much

amazed, for one sees many things strange and disorders unreasonable in a lifetime of rolling through the systems great and small. Ole Doc had been everywhere and seen everything, had long ago come to the conclusion that it wasn't even curious, but a well-dressed obviously influential old man engaging in the stalk of a mangy cat—well!

The gentleman had crept around the corner to pursue his game and now he had a fence for cover and with it was using up the twenty-yard lead the cat had had originally. In his hand the gentleman held a butterfly net and in his eye there was hunger.

The cat was unable to locate its pursuer now and stopped a bit to pant. It looked beleagured as though it had been hunted before and the old gentleman had it worried. It crouched warily behind a post and condensed itself anew when it saw Ole Doc some thirty feet away. This new distraction was its undoing.

Soft-footed and alert, the old gentleman left the fence and crossed the walk out of the cat's range of vision. Too late the animal caught the shadow beside it and sprang to escape. There was a swish of net and a blur of fur, a yowl of dismay and a crow of triumph and the old gentleman, by twisting the net into a bag below the hoop, struck an attitude of victory.

Ole Doc started breathing again and walked forward. The old gentleman, seeing him, held up the prize.

"A fine morsel now, isn't it, sir?" said the old gentleman. "Been three solid weeks since we've dined on good, tasty cat. Don't yowl, my good rabbit avec croutons to be, for it won't do you a bit of good. My, my, my that was a long chase. Ten solid blocks and tortuous, too, what with thinking every instant some gutersnipe would leap out and snatch my prize from me. For I'm not as young as once I was. Dear me."

Ole Doc could see no insanity in the fellow's eyes nor find any fault other than this enthusiasm for dining on mangy cats. But, he decided suddenly, this was no time to follow the quirks of the human mind. Serious business—very serious business—was waiting for him in the wrecked hull of the *Morgue*. He glanced anxiously at his radio pack. The *tic-tic-tic* of the heart counter was very slow.

"Sir," said Ole Doc, "while I can't share your enthusiasm for cat on toast, I could use some of your knowledge of this town. Could you tell me where I might find a company known as Malbright, Diggs? They import, I think and have their main office here in Minga."

At this the old gentleman stopped admiring his capture which was now entirely subdued. "Malbright, Diggs. Bless me!" And he removed a pocket handkerchief and blew his nose heavily. "You won't be from any town on Arphon, then."

"Be quick, man. Where can I find any member of that firm?"

The old gentleman blew again. "Well," he said, "if you've a mind

for fantasy, you might try looking in heaven and then again, as their creditors would have had it, in hell. One place or the other I dare say you'll find my poor old billiard companion Malbright and his sad little partner Diggs. But Arphon isn't hell, sir. Indeed it's two stops beyond."

"The firm has failed, then. Where was it located?"

"Oh, the original Malbright, Diggs has failed, sir. But it's Air Limited you'd have to approach to get any trace of their affairs. Malbright was the cause of it you see, poor chap. Got to needing more and more air and couldn't pay the bill out of his share. And he took to . . . well," and here be blew his nose again, "from the till you might say and one day the firm failed. Poor Malbright. Had to have the air, you see. Couldn't pay the bill. And as it was a partnership, Diggs stood ready but unable to settle the accounts. And that was the end of it. A fine, thriving business it was, too, until Malbright took to needing air. But it's all gone, all gone." And he looked around him at the autumn day as though the dismal winter snows lay heavily over the streets.

Ole Doc frowned. "Air? What nonsense is this about air. Short time ago I heard something of it. But I haven't any time. You'll remember a small extraracial clerk that Malbright had, then. Probably four-handed. Name of Bestin Karjoy—"

"Oh, dear me, no. Malbright and Diggs must have had a thousand clerks. Business ran into the billions of tons per annum, you know. Customers all over the system. Fine, rich company. Poor Malbright." And he honked again on the handkerchief.

Ole Doc was impatient. "How could a firm like that fail just because one partner needed a little air. Why, man, the whole sky around here is full of it. Air!"

"I beg your pardon, sir," said the old gentleman, shocked. "I *beg* your pardon." And before Ole Doc could think of further questions, the old gentleman hurried away, clutching his precious rabbit soup in the form of a very mangy cat, and was gone.

Ole Doc's boots were angry on the pavement. He was struck now, as he looked for signs, with an air of decay and unhappiness about the town. There were people here and there but they were listless and incurious like beings who have been hungry too long or who despair of any hope. Store windows were clutters of dusty junk. The theater marquee was advertising the personal appearance of a singer ten years dead. Shutters groaned in the faint wind and stairs staggered in crazy disrepair. The town looked like it had been sacked and repeopled with ghosts.

There was a city park ahead, a pitiful little thing of broken fountains and root-cracked walks and Ole Doc saw two dogs slinking through it, wary like hunted beasts, sniffing hungrily at refuse.

The town, he realized with a start, was starving. The children

he saw in a doorway were bloat-bellied and unpleasant. Ole Doc turned toward them and they made a sorry effort to run away. He peered into the interior of the rickety dwelling and saw that they were now clustered around the bed of a woman who might, in other stages of economics, have been comely.

She saw his shadow and turned. Wearily she tried to motion him away. "No. No more . . . I can't . . . I can't pay."

This was definitely his business but he thrust it aside. "Madam, I am not trying to collect money. Here is a gold coin," and he dug one from his money pouch and placed it courteously on the table. "I want to find a man, an extra racial being of four hands, named Bestin Karjoy. Direct me to some one who will know and you shall have my deepest thanks."

She managed to understand this and then made a motion at her eldest boy. "Go, Jimmy. Go show him what he wants." But she looked suspiciously at the coin as she picked it up.

Ole Doc winced when he saw how close to the skin her bones were. He pulled a small hypo gun from his pocket, fumbled in his kit and loaded it with slugs. The jet it shot penetrated without pain and he triggered it six times before he left the room. They didn't know they had been force fed and only stared in awe at the small gun, afraid it might be a blaster.

Ole Doc motioned to the eldest and went back into the street. But he might have found the place himself.

It was a great, gold-fronted building before which lounged Persephon guards. And over the top of the door was the mighty legend, "Air, Limited" and on the panel, "Big Lem Tolliver, Savior of Arphon."

Ole Doc gave the boy another gold coin and then breasted the guards. They stopped him with guttural grunts and were about to argue in earnest at his pressure when they both came up rigid, staring straight ahead. Ole Doc put the hypo gun back into his pocket, looked hard at the guards to make sure the rigor had set good and hard and would stay for a while and walked on in.

A clerk came up. "This is a private office, sir. The general entrance for the payment of taxes, rentals and bail are next door. Besides—"

"I want to see your records," said Ole Doc. "I am looking for an extraracial man named Bestin Karjoy and no second-rate town like this is going to stop me. Where are your records?"

Fatally, the clerk had new objections. There was a small snick and Ole Doc put the gun back into his pocket. "You are a trained clerk and obedient to one Lem Tolliver. It is the will of Tolliver that you find the name Bestin Karjoy in your files and give me the address."

The narco slug had bitten straight through the modish waistcoat and pink silk undershirt. "Yes sir.

Coming right up, sir. Won't keep you waiting a minute, sir. What Big Lem wants—"

"Who says Big Lem wants anything?" came hugely from the door. "I," he said waddling closer, chin outthrust, "do not like gents who go around spieling off orders I ain't issued. Now, whoever you are, let's hear just why you impersonate a messenger for me."

Ole Doc looked at him rather wearily. He gripped the hypo gun in his pocket, but he never got a chance to use it. Some sixth sense told one of Tolliver's bodyguard that an attack was imminent and Ole Doc was seized from behind and held hard while the contents of his pockets were turned out by Tolliver.

The small meters and instruments, the minute boxes of pellets, the hypo gun itself, these meant nothing to Tolliver or anyone around him. But the gorget meant something— The solid gold ray rods of the U.M.S. which were chained to Ole Doc's throat in such a position as to protect the most vulnerable point of the jugular. Tolliver tried to yank it off, failed to break the chain and so had to stare at it.

"U.M.S.," said Tolliver. "Huh."

A clerk had come in to aid his fallen brother of the files and inkpots for the first one, under the stimulus of the narco slug and crossed orders had quietly fainted away. "Universal Medical Society," said the new clerk. And then he realized what he had said and jumped back, letting his brother clerk fall. He stared, mouth agape, at Ole Doc.

"Univ—" began Tolliver. And then his face went a little white. He bent as he stared at Ole Doc. Then, dismissing it. "He'd imitate a messenger. He'd pretend anything. He ain't no Soldier of Light. Where's the crowd with him?"

"They . . . they operate alone," said the second clerk. "I . . . I read in the *Universal Weekly* that they—"

"Bosh! What would they care about Arphon? U.M.S.," blustered Tolliver, "is strictly big time. He'd never land here. Listen, you whatever-you-call-it, don't give me no stuff about U.M.S. You're here for graft and I'm on to your game. Now, let's see how good you are at crawling out of your lie. Go on, crawl!"

Ole Doc sighed. He had seen such men before. "I suppose I am addressing Lem Tollander."

"Tolliver!"

"Lem Tolliver, then. President or some such thing of Air, Limited."

"Correct. And you come here for a shakedown. Listen—" And then he stopped and looked at a new thing in the contents of the pockets. It was a slave ear tag. "Ah," he said, snatching it up from the desk, "you've been tampering with company property already. Oh, yes. That girl—so you were in that ship we blasted a few miles east of Minga, huh? Say, buddy, don't you know where to stop? A guy'd think you were kind of confused. You've already lost an old tub of a space tramp, and lucky you got out

with yourself in one chunk. What kind of nerve is this—"

"Oh, do be quiet," sighed Ole Doc.

The flood of speech was suddenly dammed. It had been years and years since anyone had said such a thing to Big Lem Tolliver. Judging from the attitudes struck by the men in the office at this blasphemy, it was going to be years and years before anyone tried to say it again, too.

But Big Lem was a man of many convictions and foremost amongst them was a decided prejudice in favor of his own vast greatness. He had been honeyed and buttered and siruped so long by fawning menials that he had forgotten there were other ways to talk.

Big Lem looked more closely at Ole Doc. "Who are you anyway?"

"You seemed convinced of something else a moment ago. I'm a doctor."

"Ah," said Big Lem. He brightened and rubbed his huge paws together. "A doctor. A crooked doctor impersonating a U.M.S. soldier. Ah."

The whole thing was opened to a page he could read. He scooped up the print. This fellow had come here for a shakedown, impersonating a Soldier of Light. And because men are likely to best understand what they themselves actually are, Big Lem Tolliver was utterly satisfied.

Grinning, the president of Air, Limited, had his men search the visitor for other weapons and equipment and then with every cordiality, ushered Ole Doc into an office big enough for a ballroom and ten times as fancy.

"Sit down, sit down," said Big Lem, sprawling into the oversize chair behind his king-size desk. "Know very much about doctoring?"

Ole Doc played it patient, stilling the urgency he felt now that his small pack radio had been taken from him. He sat down in a high-backed leather chair. "Others no doubt are much better informed," he sighed.

"Where and when did you pick it up?"

"Well . . . a very long time ago. I may not know as much about modern medicine as I might."

"Went to school maybe?"

"Yes. But it was a long time ago."

"Sure, sure. And probably got kicked out of the profession for some . . . well, we all make mistakes and recovery isn't possible unless one uses his wits." He winked ponderously and laughed much beyond the need of it. "I tell you, doc, you wouldn't think to look at me that I was just a typical trans-system tramp once. Look around. Them hangings cost a fortune and them pictures is worth a cold five million. They're originals and if they ain't and I ever find out about it, God help my agents." He laughed again. "Well, doc, I guess you're wondering why I'm being so great about this thing, huh?"

"Somewhat."

"You're a cool one. I like that.

I like it very much. Well, I tell you. I could use a doctor. I don't need a good one, see. You'll do just fine if you know anything at all."

"I thought there were doctors here."

"Them that was here up and went away." He enjoyed a brief chuckle and then sobered. "I had a doc as partner. He'd been a good one in his day but drink and women had got too much for him. He died about five years back and we been kind of isolated for some time, like. So, I can use a doctor. A doctor that ain't all knocked around by professional ethics."

"And what's in it for him?"

"Thousands and thousands and thousands. Oh, I can pay all right. And pay very well indeed. Taxes, fees, sales . . . I can pay. Air, Limited is just about as sound a concern as you'll ever find, my friend." He beamed jovially. "You give me quite a turn with that thingum-a-jig on your throat. The U.M.S.— Well, you knew how to back up a play. If I thought you was on the level, you wouldn't be sitting there, but I know you ain't. Not an honest pill in your pockets. No stethoscope. A blaster. Oh, I can tell a thing or two."

"Where'd I slip up?" said Ole Doc innocently.

"Why, the blaster of course. The U.M.S. is death on violence. Oh, I've studied up, I have. And I figure the chances of one of their big patrols coming this way is about ten million to one at least in this century. We ain't nothing on Arphon and Sun[12] is gone to pieces as a confederated system. We don't spread no germs around and we ain't in any kind of quarantine. So they won't come. But if one of them big gold ships with the hundred men crews come around, why I want to be reasonable. So that's where we talk business. You seem to know the ropes."

"Yes," said Ole Doc. "One has to understand his fellow man to get along. Just why are you worried?"

"Well, doc, it ain't so much the U.M.S. Them Soldiers would never come here and wouldn't stay if they did. No, it's the way taxes have fallen off. I want you to do something about it. People don't pay their taxes. And then there's the fees—"

"Wait. Are you the government?"

"Well, in a way, yes. At least there ain't any other government on Arphon just now and we're a big commercial outfit. So, well we collect taxes for the machines."

"What machines?"

"The health machines of course." And here Big Lem began to laugh again.

"Maybe we can do business of one kind or another," said Ole Doc. "But there's one thing I've got to fix up. I want to get hold of an extraracial being named Bestin Karjoy. You let me find him and then I'll come back—"

Big Lem looked sly. "Some old partner in crime, eh? Well, doc, if that's what you want, you'll get it."

"Now," said Ole Doc.

"When we've settled a thing or two," said Tolliver. "You'll work for me?"

"We'll settle this when you've found this Bestin Karjoy for me," said Ole Doc. "It won't wait."

"I'm afraid it will, my friend. Will you sign on?"

"I'd have to know more," said Ole Doc, restraining a blow-up with difficulty and holding on to his cunning.

"Such as—"

"What taxes? What air? What are you doing?"

"We sell air," said Tolliver. "We sell it in small bombs or in cans and we get a hundred dollars for a flask big enough to keep a man a month. Now that's legal, isn't it?"

"Why air?"

"Why not?" said Tolliver. "Men have to breathe, don't they?"

"What taxes then," said Ole Doc.

"Why, the taxes to keep the machines running. Didn't you see the big machine central when you came into town?"

"I wasn't looking closely," said Ole Doc.

"Well, that's just one. We got hundreds all over the planet. And we keep them going so long as the citizens pay the tax. And when they refuse to pay it, well, we get 'em to put up a bond. And—"

"What kind of a bond?"

"Personal liberty bond, of course. If we don't collect when it's due, then the man's liberty is over and he's repossessed by us."

"Why do you want him?"

"Slaves, of course. Nine-tenths of the people on this planet would rather be slaves than have the machines stop. So there we go."

"You mean nine-tenths are slaves by this action. See here, Tolliver, what do the machines do?"

"Why, they keep the outer spacial gases from settling down and killing people. The gases ruin the oxygen content of the air. So we run the machines and keep the gases going up, not down. That's simple, isn't it? And the air bombs we sell let men breathe when they've been hit by the gases too much."

"What kind of gases?"

Tolliver looked shrewdly at Ole Doc. The crook, thought Tolliver, was pretty intelligent. Well, all the better. "That's where I need an expert," said Tolliver. "Now if you'll just join up and take orders—"

"Let me look this thing over first," said Ole Doc. "Money is money but it just may be that I can't do a thing about it."

Suspicion was a fine quality to find in a man. Tolliver reared up and was about to call when Tinoi, sweating hard from his walk, scuttled in. He saw Ole Doc and left his prepared report unsaid.

"New recruit," said Tolliver. "They all get here, Tinoi?"

"About twelve died on the way in," said Tinoi. "Them Persephons don't have good sense when it comes to driving—"

"How much did you get?" said Tolliver.

Tinoi looked aggrieved and his boss laughed.

"Well, put them in a stockade and . . . no, wait. Here. Take this man around and let him look the place over."

Tinoi twisted his head sideways at Ole Doc in suspicion, and then he caught a secret gesture from Tolliver which said, "Watch him, don't let him see too much, kill if he tries to get away."

"I need this man," added Tolliver.

Ole Doc rose. "If you'll let me know where I can find Bestin—"

"Later, later. Take him along, Tinoi."

Outside Ole Doc tried to regain his weapons and was refused. He would have made a stronger bid if he had not just then seen the slaves waiting before the door.

They were groveling in the dust, lying prone with exhaustion or looking in dumb misery at the huge gold office building which was their doom. These were the same slaves Ole Doc had seen earlier for there was the same grizzled ancient, coughing and whining in their midst, "Air! Air!"

Ole Doc took half a dozen strides and was outside. He saw what he was looking for and went sick inside. There she was, lying on a litter, moaning in semi-consciousness, twisting with fever. The beauty of her was spoiled and her spirit was shredded with pain.

With another pace, Ole Doc tried to approach her. He knew how

she had been burned, why he had been lying outside in the grass. Connoly was standing hugely in his way, lordly drunk by very positive.

"Nobody gets near them slaves," said Connoly. "Orders."

"Come back here, you," said Tinoi. He scuttled down the steps and grabbed Ole Doc from behind.

Ole Doc offered no fight.

"Who's this bloke?" asked Connoly, when they had him back at a decent distance.

"Recruit, the boss said. Just what we don't need is a recruit," grumbled Tinoi. "Too many splits now. Too big a payroll. Connoly, you run these pigs into the stockade. I got to play nursemaid to this kid here. Never get to rest. Never get a drink. Never—" he trailed off. "Come on, you. What are you supposed to do?"

"I'm supposed to repair the machines," said Ole Doc.

"Well, come on, then." He scuttled away and Ole Doc followed.

The machine was above eye level which was why Ole Doc had missed it. It was a huge, gold drum and it stood squarely on top of the office building. They went up to it in an elevator and found it humming to itself.

Ole Doc had pulled his dome on from some instinct. But he was surprised to find Tinoi getting quickly into a mask before he stepped out of the elevator.

"What's wrong with it?" said Tinoi.

Ole Doc spoke at urgent random. "The rheostats."

"The . . . well, you know your business, I guess. There's the port and there's the vats. You work and I'll stay here and rest. Walk a man's legs off and then don't even let him drink. Keep your hands out of the vats, now."

"I'll need some of the things I left in the office," said Ole Doc.

Tinoi went to the phone and called and presently a clerk came up with them in a paper bag. No pellets, no hypo gun, no blaster—Ole Doc spread out his small kit.

"Don't look like tools to me."

"I'm a chemist," said Ole Doc.

"Oh, I get you. I told him the mixture was too strong. I even get it."

Ole Doc smiled and nodded. "We'll see."

He gingerly approached a vat in the dark interior. On looking around he found a simple arrangement. There was a centrifuge in the vat and a molecularizer above it and then there were ports which carried ionized beams out into the surrounding air. He stepped up and saw that a constant stream of fluid in very tiny amounts was being broadcast through the jets to be carried by the wind all around the countryside. He went back to the vats.

With a drop of the mixture on a filter, he rapidly ruled out virus and bacteria with a pocket analyzer. Intrigued now, he made a rapid inspection for inorganic matter and was instantly in the field of naturally produced plant secretions.

He took a bit of "synthetic skin" from his case and got a very violent reaction. On the grid, the thing was an allergy product of a plant. And when he had run through twenty alkaloids, working slowly because of his impoverishment in equipment, he knew what it was.

Ragweed pollen!

He went outside and looked thoughtfully at the town below.

The beams were sufficient to carry jets of it far beyond the town limits and the winds would do more. To the east was a large expanse of greenhouse glass and a monocular told him it was surrounded by Persephon guards and a high, electrified fence. Common sense told him that ragweed was grown there in large quantities.

"Well?" said Tinoi. "Ain't I ever going to get that drink?"

"You were right," said Ole Doc. "It's too strong. I'm satisfied. Let's go."

Tinoi grunted with relief and started down. Then he changed his mind and stood aside to let Ole Doc into the elevator first. But

Tinoi went just the same. He went very inert with a beautiful uppercut to hoist him and lay him down against the far wall.

Ole Doc rubbed his gloved knuckles as he turned Tinoi over with his foot. The cranial structure told him much. Tinoi had been born and bred in the slums of Earth.

"Ragweed," said Ole Doc. "Common, ordinary ragweed. And the older a race gets the more it suffers from allergies. Tinoi, Connoly, Big Lem himself—Earthmen." He was searching Tinoi's pockets now and he came up with a drug so ancient and common that at first he didn't recognize it and thought it was cocaine.

The analyzer set him right. "Benadryl!" said Ole Doc in amazement. "Ragweed, and here's benadryl. Earthman to begin with and not very susceptible. Benadryl to keep him going and to prevent a serious case of asthma. Air—asthma—oxygen for asthma, benadryl for asthma— But it can't be air in those bombs. It wasn't benadryl."

He pushed "Basement" and descended. The door opened on a storeroom guard. He took Tinoi's blaster and put a neat and silent hole through the Persephon guard who stood outside the basement storeroom. The guard had alerted, had seen the body on the floor when the elevator opened and had not had time to shoot first. Ole Doc shot the lock off the storeroom door.

And it was there that he came afoul of another ancient custom.

A bell started ringing faintly somewhere in the upper regions of the building. For a moment he was not alarmed for he had safely bypassed all the offices in the elevator. And then he saw a wire dangling, cut by the opened door. An old-fashioned burglar alarm!

He grabbed up a black bomb with its A.L. lettering and sprinted for the elevator. But the door closed before he got there and the car went up without him, carrying Tinoi's unconscious message.

Ole Doc was shaken into the mistaken idea that this place was further guarded by gas for he began to sneeze. Then he saw that his helmet was not sealed tight and hastily repaired it. Ragweed. He was sneezing from the solution of pollen which still stained his glove. A heavier dose would have left him gasping and as it was his eyes watered and he staggered as he fumbled for the stair door.

It crashed toward him and three Persephons leaped out of the areaway. It was not fair to them just as it had not been fair to their brothers that morning. Ole Doc gripped the searing-hot blaster, picked up the weapons of the first fallen one, stepped over the other two bodies and started on up the stairs. The top door was locked and he shot it open.

The clerks screamed and thrust back away from him for they saw murder in his old-young eyes.

Big Lem was frozen in his office entrance. The burglar alarm gonged *clang-clang-clang* with furious strength over them all.

"What's in this?" shouted Ole Doc, thrusting out the bomb.

"Put that gun down!" bawled Tolliver. "What the devil's wrong—"

Ole Doc heard in his keyed up phone the tiny whisper of leather above the clanging gong. He spun sideways and back and the shot intended for him fired the wood beside Big Lem Tolliver.

Connoly the gunner was ponderously wheeling for a second shot. Ole Doc snapped a quick one across his chest. Connoly's face vanished in a dirty black gout of smoke. He somersaulted backwards down the front steps and landed, dead but still writhing, in the midst of the slaves he had not had time to herd away and now would herd no more.

Ole Doc was still skipping backwards to avoid a counterattack by Big Lem. The elevator door clanged shut and Tolliver was gone.

Ole Doc headed for the stairs and took them four at a time, cloak billowing out behind him. He had wasted too much time already. But he couldn't leave this building until— They weren't on the second floor. Nor the third. But the switch box for the elevator was. Ole Doc shattered its smooth glass with a shot and finished wrecking it with another. Voltage curled and writhed and smoke rose bluely.

That done he went on up with confidence. The only Persephons he found fled down a fire escape in terror. Ole Doc went on up. The roof door was barricaded and he shot it in half.

Big Lem Tolliver might have been the biggest man on Arphon but he didn't have the greatest courage. He was backing toward the "machine" and holding out his hands to fend off a shot as though they could.

"You're not playing fair!" he wailed. "You see the racket and you want it all. You're not playing fair! I'll make it halves—"

"You'll face around and let me search you for a gun," said Ole Doc. "And then we'll get about our business. You've violated—"

"You want it all!" wailed Tolliver, backing through the door of the dome. He tried to shut it quickly but Ole Doc blew the hinges off before it could close.

The shot was too close for Tolliver's nerves. He leaped away from it, he stumbled and fell into a vat.

He screamed and quickly tried to grab the edge and come out. Ole Doc stopped, put down the bomb and dropped a stirring stick to the man's rescue.

Tolliver grabbed it and came out dripping, clothes with green scum running off them, hanging ridiculously upon him. The man was trying to speak and then could not. He clawed at his eyes, he tried to yell. But with each breath he sucked in quantities of poison and his tortured skin began to flame red under the scum.

Ole Doc threw the bomb at his feet where it burst in bright green rays. He expected Tolliver to breathe then, wreathed in the climbing smoke. But Tolliver didn't. He fell down, inarticulate with agony

and lack of breath and within the minute, before Ole Doc could find means of tearing the clothes from him and administering aid now that the "A.L." air bomb had not worked at all, Big Lem Tolliver was dead.

In the elevator Tinoi still lay, struggling now to come up from his nightmare. When he saw Ole Doc standing over him, Tinoi's own gun in hand, the lieutenant of the late Air, Limited could not be convinced that any time had passed. But he was not truculent, not when he saw Tolliver's body. He could not understand, never would understand the sequence of these rapid events. But Tolliver was dead and that broke Tinoi.

"What do you want wif me?" he sniveled.

"I want you to set this place to rights eventually. Meantime, shut off that confounded machine and come with me."

Tinoi shut it off and the ripples in the vats grew still. Ole Doc hiked down the steps behind the cringing Tinoi and so into the main offices on the ground floor.

The clerks stared at the cringing Tinoi.

"You there," said Ole Doc. "In the name of the Universal Medical Society, all operations of Air, Limited are ordered to cease. And find me this instant the whereabouts of Bestin Karjoy, extraracial being."

The clerks stared harder. One of them fell down in a faint.

"The Univ . . . The Universal Medical Society . . ." gaped another. "The real one. I told him I thought he was a Soldier," whimpered the clerk who had first announced it. "When I read that article— Now I'll never get my weekly check—"

Ole Doc wasn't listening. He had Tinoi and another clerk by the collars and they were going down the steps, over the dead Connoly, through the moaning slaves and up the avenue at a rate which had Tinoi's feet half off the ground most of the way.

At ten thousand miles an hour, even freighted with her passengers and the thousand kilos of Bestin and his antennae-waving father, the gig did not take long to reach the injured *Morgue*.

Bestin's father was making heavy weather of trying to unload the bundles he had brought when the gig landed and Ole Doc hurriedly helped him. The old extraracial being hobbled on ahead into the operating room of the *Morgue* and then, when Ole Doc would have come up he found himself heavily barred outside by eight hands. The door clanged shut, didn't quite meet at the bottom, bent and was shut anyway.

Ole Doc stood outside in the trampled grass and stared at the *Morgue*. The girl on her stretcher was forgotten. Tinoi and the clerk might as well have been grass blades.

Tinoi grumbled. He knew that he could run away but where could he run to escape the long arm of a Soldier of Light? "Why didn't you tell me?" he growled at the clerk.

"You punks are supposed to know everything—"

"Be quiet," said the clerk.

There was a sound inside as of plumber's tools being dropped. And then the clatter of pipes. A long time passed and the sun sank lower. Ole Doc came out of his trance and remembered the girl.

She was moaning faintly from the pain of her burns.

Ole Doc timidly knocked on the door of his operating room. "Please. Could I have the red case of ointments on the starboard wall?"

He had to ask three times before Bestin's two right arms shot impatiently out with the red case. Ole Doc took it and the door clanged shut again.

The girl shuddered at the first touch and then a hypo pellet quieted her. Ole Doc worked quickly but absently, one eye on the ship. Tinoi gaped at what Ole Doc was doing and the clerk was ill.

The girl did not move, so strong was the pellet, even when half the skin was off her face and arm. Tinoi had to turn away, rough character though he called himself, but when the click and scrape of instruments didn't sound again, he faced back.

Ole Doc was just giving the girl another shot. She was beginning to stir and turned over so that Tinoi could see her face. He gaped. There wasn't a trace of a scar, not even a red place where the sear had been. And the girl was very, very beautiful.

"Feel better?" asked Ole Doc.

She looked around and saw the clearing. She recalled nothing of the in between. She did not know she had been to Minga and back and thought she was that minute finished dragging Doc from the burning ship. She sat up and stared around her. It took a little soothing talk to convince her of what had happened.

She saw Ole Doc's mind was not on what she was saying nor upon her and she soon understood what was going on in the ship.

"Some one you like?" she asked.

"The best slave any man ever had," said Ole Doc. "I recall . . ." But he stopped, listening. "The best slave a man ever had." he finished quickly.

The sun sank lower and then at last the clicking and chanting inside the ship had stopped. The door opened very slowly and the old man came out, carrying his clumsy bundles. He put them in the gig. In a moment, Bestin came down the twisted ladder and walked stolidly toward the gig.

Ole Doc looked at them and his shoulders sagged. He rose and slowly approached the old being.

"I understand," said Ole Doc, finding it difficult to speak. "It is not easy to lose . . . to lose a patient," he finished. "But you did your best I know. I will fly you back to Min—"

"No, you won't!" howled Hippocrates, leaping down from the *Morgue*. "No you won't! I will do it and you will tell those two stupid humans there and that woman to put things to rights in that ship

they messed up. Put them to rights, you bandits! Wreck my *Morgue*, will you! She's more human than you are!"

He shook four fists in their faces and then turned to beam affectionately at Ole Doc.

The little fellow was a mass of fresh plaster of Paris from neck to belt but otherwise he was very much himself. "New pipes," he said. "Whooeee whoooo whoooo!" he screamed, deafening them. "See? New pipes."

Ole Doc saw and heard. He sat down on the grass weakly and began to laugh. Hippocrates was offended. He did not know that this was from the shock of his own near demise, from the close shave of never getting aid to him. He did not know that the biggest swindle in a thousand systems had had to relax its wealthy sway before he could be cured. He was offended.

"Clean up that ship!" he shouted, jumping into the gig. "And as for you," he declaimed, pointing at his beloved master, "don't you touch that cake. The birthday party will be at six. You invite girl but those stupid humans, never! I go now. Be right back."

And the gig shot tremendously away.

Ole Doc wiped away the tears of near hysteria and took one of his own pills. He got up. "You better do what he says, people. And as for you, Tinoi, tomorrow morning we'll shut off and destroy those 'machines' and get this planet running again. Jump now. You heard him."

The clerk and the girl—who gave Ole Doc a lingering, promising glance—entered the ship to begin their work. But Tinoi lingered.

"Better jump," said Ole Doc.

"Sure. I'll work," said Tinoi. "But one thing, Mister Doctor . . . you're a Soldier of Light and I ain't even good enough to talk to you, I know. But—"

"Well?"

"Sir," plunged Tinoi. "It's them bombs. We had our allergy pills, but them bombs was pretty good, too. If they're so expensive to make like *he* said, how'll we ever get enough to cure up—"

"My man," said Ole Doc, "your precious bombs were one of the oldest known buncombes in medical history. A propellant and ephedrine, that's all. Ephedrine barely permits the allergy patient to breathe. It wasn't 'air' you were selling but a phony, second-rate drug that costs about a dollar a barrel. They'd take a little and needed more. You were clear back in the dark ages of medical history—about a century after they'd stopped using witches for doctors. Ragweed, ephedrine—but they were enough to wreck the lives of nearly everyone on this planet.

"Oh, get into the ship and get busy. It makes me sick to think of it. Besides, if Hippocrates gets back and finds his *Morgue* still messed up, he'll make you wish you'd never been born. Jump now, for by all that's holy, there's the gig coming back now."

THE END

PAPER PLANETS

BY ROBERT S. RICHARDSON

***Postwar** thinking on how the Solar System came into being has been strongly influenced by a series of new facts; four planetary systems are known to exist—and that's too many to allow any assumption that they are caused by the chance encounter of two wandering stars. Now these are the new theories:—*

If you ever take a course in elementary astronomy, there is one question almost sure to be asked on the final examination:

"What is Bode's law and how has it been of use in astronomy?"

Years ago as a student I used to wonder why my professors were so fond of this question and today it still puzzles me. For Bode's law was not discovered by Bode, it is not a law in the usual sense of the word, and has never been of any special value as an astronomical tool. Yet for some reason it has been in the textbooks for two hundred years.

Bode's law is usually stated somewhat as follows:

"Write down a series of 4s. To each 4 add the figures 0, 3, 6, 12, 24, et cetera, doubling the numbers every time to obtain the next one. Divide the sums by 10. The result is the series 0.4, 0.7, 1.0, 1.6, 2.8,—which gives the distances of the planets from the sun with remarkable accuracy in terms of the earth's distance as unity."

This curious little relationship was first announced in 1772 by the German astronomer Daniel Titius, and as far as I am aware constitutes his sole claim to scientific fame. In fact, Titius would probably have been forgotten long ago if it had not been for another German astronomer, Johann Bode, who acted as a sort of self-appointed publicity man for him. Bode became fascinated by the relationship, and through his office as editor of the *Berliner Jahrbuch,* was able to make it widely known. Bode believed that a relationship that gave the distances to the planets so accurately could hardly be the result of chance. At that time one number in the series—2.8 between Mars and Jupiter—did not correspond to the distance of any known body. Bode contended that there must be a small planet at this distance, and that astronomers need only look for it.

When Uranus was discovered in 1781 at a distance of 19.2 astronomical units in practically perfect agreement with prediction, interest in the relation was greatly stimulated. Finally in 1800 a group of astronomers was organized to undertake the search for the missing

planet. But before they even had a chance to start work the missing body was found. On the first day of the first year of the Nineteenth Century—January 1, 1801—the Italian astronomer Piazzi at Palermo announced the discovery of Ceres. It was another triumph for the Bode-Titius relation that the distance of Ceres turned out to be 2.77 astronomical units exactly as predicted.

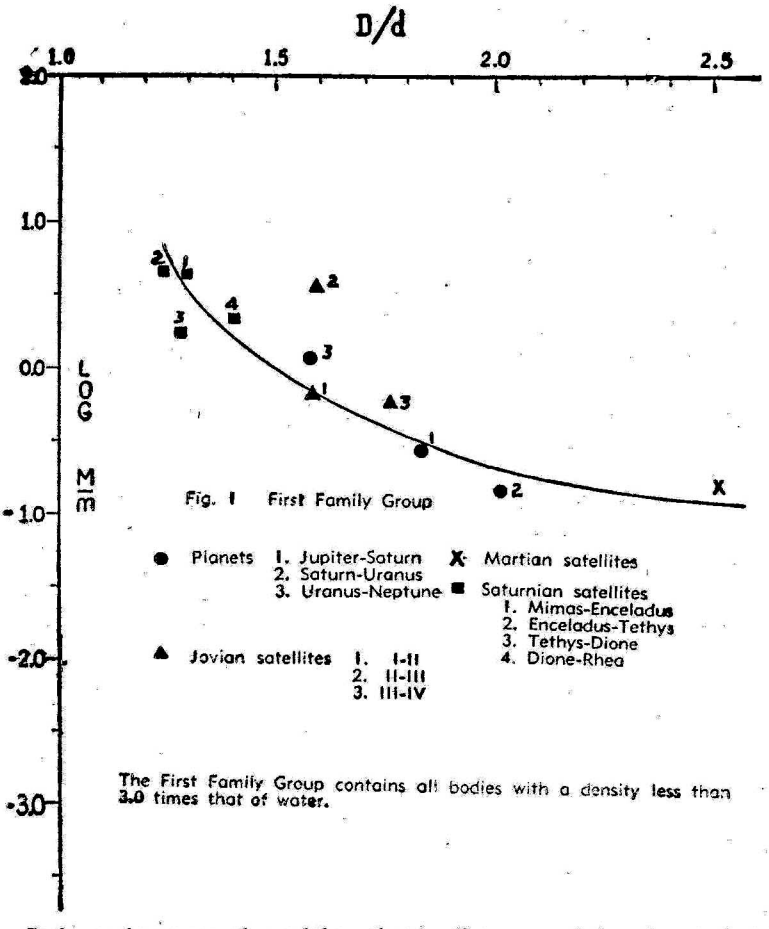
Uranus soon began to deviate so widely from its calculated path that there could be no doubt that a more distant body was disturbing its motion. According to the relation, the next planet beyond Uranus should revolve at a distance of 38.8 astronomical units. It would certainly seem reasonable to proceed upon such an assumption at any rate, and that is exactly what both Adams and Leverrier did in attempting to determine the position of Neptune. In fact, one might say that if ever there was a time for a plunge bet this was it. When, therefore, Neptune was found at a distance of 30.1 astronomical units the form players received a severe setback.

The Bode-Titius relation is really only one example of certain regularities in the solar system that have long intrigued the theoretical men. The most prominent are the fact that the planets all revolve around the sun in the same direction that the sun rotates on its axis; that the orbits of all the planets are nearly circular and lie nearly in the same plane; and that with a few minor exceptions, the satellites also have nearly circular co-planar orbits and revolve in the same direction as the rotation of their primary. It is the business of cosmogonists to devise hypotheses to explain these regularities. Interest has recently been revived in this field by the announcement of a theory which—for the first time I believe—includes the Bode-Titius relation as a natural consequence. But before turning to more serious matters let us take one last look at this so-called law.

No mathematician would ever express a series of numbers as we have done. Such crude directions as "write down a series of 4s, and the figures 0, 3, 6, et cetera, then divide by 10," are highly reprehensible to the mathematical mind. Instead mathematicians like to put everything together in one neat little formula, such as $d = 0.4 + 0.3 \times 2^n$, where d is the distance in astronomical units and n a variable which takes on the successive values $-\infty$ —minus infinity— 0, 1, 2, 3, et cetera. Table 1 gives the predicted and observed distances to the planets on the basis of this formula.

Table 1

Planet	n	Predicted	Observed
Mercury	$-\infty$	0.4	0.39
Venus	0	0.7	0.72
Earth	1	1.0	1.00
Mars	2	1.6	1.52
Ceres	3	2.8	2.77
Jupiter	4	5.2	5.20
Saturn	5	10.0	9.54
Uranus	6	19.6	19.19
Neptune	7	38.8	30.07
Pluto	8	77.2	39.52
Planet X	9	154.0	??



It is perhaps worth noticing that although Neptune and Pluto are badly out of step with prediction, yet the value of 7 for Neptune gives a distance which would agree rather well with the observed distance of Pluto. This has caused some astronomers to suggest that Neptune is an interloper or captured planet in the solar system and not one of the original charter members.

Other "laws" have been formulated which represent not only the distances of the planets but those of the satellites of Jupiter, Saturn, and Uranus, as well. By extrapolation the distances of unknown planets and satellites can be readily calculated. Maybe you can also figure out a law of distances that will lead to the discovery of some of these paper planets.

Theories of the origin of the solar system invariably seem to fall into two general classes which may be

called the *Laplacian* type and the *Encounter* type, and for some reason it seems extraordinarily difficult to dream up one that differs radically from either of these. I think it can be safely assumed that most readers of Astounding are so familiar with their general features that only a brief description is necessary for reference purposes.

Laplace in 1796 assumed that the planets and satellites were evolved from the contraction of a slowly rotating primitive nebula. As the nebula contracted it sloughed off a ring of material occasionally which gradually condensed into a planet. The sun is all that remains of the original vast nebula that once extended beyond the orbit of the farthest planet.

Such a rotating body would have possessed a certain *quantity of rotation* depending upon its size, mass, and speed of rotation. This quantity of rotation is called its total angular momentum, a rather technical term which it seems impossible to avoid. Now as long as the rotating mass is left strictly alone its angular momentum cannot change. For example, if you are sitting still on a piano stool your total angular momentum is zero. Now without letting your feet touch the floor twist your body around toward the left or right. The piano stool immediately twists around in the opposite direction just enough to keep your angular momentum zero.

As the nebula contracted it must have rotated faster in order to keep its angular momentum unchanged. The principle is used by an ice skater who goes into a spin with his arms extended and then speeds up by suddenly wrapping them around his body. If the planets actually originated as Laplace suggested then the distribution of angular momentum in the solar system is curious, to say the least. For the giant planets which have less than one per cent of the total mass of the solar system somehow managed to acquire more than ninety-eight per cent of the total angular momentum. It seems almost inconceivable that such a weird arrangement could ever have been produced in the natural course of events. Hence, cosmogonists have been forced to the conclusion that the natural course of events was rudely upset by some catastrophe that produced the present observed distribution of angular momentum by forcibly putting it there.

The favorite method of injecting angular momentum into the solar system is by the close approach of a passing star. A recent variation on this theme is to give the sun a companion which suffers a collision with the intruder. The debris left after the collision is somehow supposed to have condensed into planets. Although the encounter theory avoids some of the fatal objections to the nebular hypothesis it raises others almost equally formidable. One of the most serious is that the highly heated gas torn from the interior of a star would immediately expand with explosive violence forming a thin distended atmosphere around the sun. Whether planets

could ever form from such unpromising material seems pretty doubtful.

Thus although we can show by the closest reasoning that no combination of mechanical and gravitational forces could have combined to create the solar system, yet we are daily confronted by the fact of its existence! Which makes us wonder if perhaps we have overlooked something along the way.

Two theories of the origin of the solar system are attracting considerable attention right now among astronomers. They have little in common except that both authors have names that are hard to pronounce. One is by Hannes Alfvén of the Stockholm Observatory. The other is by C. F. von Weizsacker, a German, who is one of the discoverers of the carbon-nitrogen cycle that furnishes the source of energy for stars like the sun.

We will consider Alfvén's theory first.

It is believed today that the sun has a weak magnetic field probably about fifty times as intense as the earth's field. Alfvén shows that if such is the case then the sun can exert a force on a proton at the distance of the Earth which is sixty thousand times as great as solar gravitation. Even at the distance of Pluto a proton moving with the speed of that planet of three miles per second would be affected two hundred fifty times more by the solar magnetic force than by solar gravitation. Is solar magnetism the force that so far has been neglected in all the theories of cosmogony?

Suppose that long ago the sun was essentially as it is today except that it had no planets. For thousands of years the sun has been radiating in peace but now these happy days are over. Out in space only a few billion miles away a dark cloud of gas is moving sunward. What will be the course of events when the solar forces begin to make themselves felt upon the gas cloud?

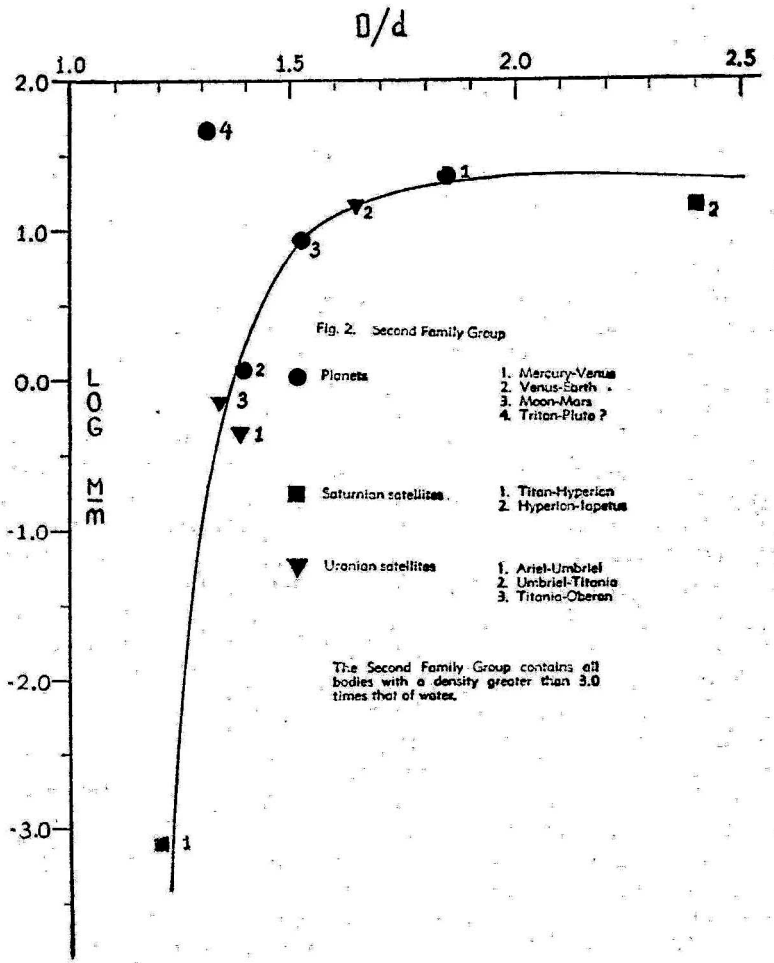
First of all, Alfvén demonstrates that if there were any charged particles in the gas cloud they would be repelled so violently by the sun's magnetic field that they could never approach closer than the distance of the giant planets. Neutral particles would be unaffected, but they would be attracted by solar gravitation and so would fall slowly sunward.

As the neutral particles approached the sun they would be exposed to increasing intensity of radiation so that eventually a large percentage would become ionized. Immediately upon becoming ionized they would be repulsed, but if sufficiently far away they would continue to move toward the sun owing to gravitation. At some certain critical distance, however, the solar magnetic force would exceed solar gravitation so that the particles would be turned back. But after retreating only a short distance solar gravitation would predominate so that the particles would move sunward again. As a result of this balance between opposing solar forces, rings of particles would slowly begin to form around the sun at various distances depending upon the composition of the material. Cal-

culations show that these rings should form at distances corresponding roughly with those of the major planets.

Alfvén is spared the labor of working out the details of a ring-to-planet condensation process, for it happens that one of his colleagues has already advanced a condensation theory which can be taken over bodily. This theory was proposed in 1935 by the distinguished Swedish astrophysicist, Bertil Lindblad.

Imagine a thermometer in space far from any body. It will register a temperature determined by the weak starlight falling upon it. Starlight does not furnish much warmth for your thermometer would not rise above — 455° F. This would be the temperature of a solid body such as the exterior of a spaceship



halfway between the sun and Sirius, for example.

On the other hand, the temperature of very fine particles in space would be quite different. Although there is not much radiation around, what little there is comes from bodies at a high temperature that emit extremely energetic photons. If one of these photons hits an atom, there is a good chance that it will knock off an electron with considerable speed. These electrons fly about colliding with other particles which in turn are set in rapid motion. And since one way of measuring the temperature of a gas is by the average speed of the particles composing it, we can say that a few atoms and electrons in the depths of space have a "temperature" of thousands of degrees.

This leads to the remarkable result that in a dark cloud we can have matter in contact under two extremes of temperature—solid particles such as meteorites at a temperature of —455° F surrounded by a gas at say 20,000° F! Lindblad from his study of matter under such condition concludes that gas condensing upon the cold solid particles would develop into asteroids which later would coalesce into planets. Alfvén assumes that the giant planets were formed by some such condensation process.

The satellites of the giant planets would be formed by the same process as the planets themselves. Although most of the gas would condense into a planet, there would be a small amount left circulating around it. Neutral particles would fall toward the planet attracted by its gravitational field. As the particles move inward they would collide thus becoming heated and ionized. At certain distances depending upon the magnetic field of the planet rings would be formed which ultimately would condense into satellites.

Alfvén also presents reasons for believing that a rotating magnetized sun surrounded by an ionized gas would start currents moving within the cloud. These currents would tend to make the gas cloud rotate faster and retard the rotation of the sun, so that eventually a large amount of the sun's angular momentum would be transferred to the planets. In this way, he endeavors to account for the peculiar distribution of angular momentum in the solar system previously mentioned.

Thus by invoking the aid of solar magnetic forces a fairly plausible theory of the origin of the giant planets can be developed. But the theory fails dismally when applied to the inner planets, for the invading gas cloud could never have penetrated beyond the orbit of Jupiter. To give Alfvén credit, instead of trying to avoid this difficulty he seeks rather to emphasize it. For according to him it can mean only one thing—the planets were not born of a single cataclysm as has always been supposed, but are the product of two and possibly three primeval ordeals.

But if the inner planets did not originate from an invading gas cloud then how were they formed?

Alfvén confesses that he cannot give a definite answer to this question. The most likely kind of raw material for building inner planets would seem to be a meteoritic dust cloud. Such a cloud could penetrate to the region of the inner planets without becoming ionized and repulsed. But after arriving there it is hard to make it condense into planets. If the solid particles got so hot that they changed to a gas and were ionized, presumably they would condense into planets by the same process as the others. But the high density of the inner planets indicates that the dust cloud consisted chiefly of heavy compounds of iron, nickel, and silicon; while the gas cloud from which the giant planets were formed contained an abundance of light elements such as hydrogen, helium, carbon, and oxygen.

Does the solar system still bear the scars of these past invasions? Alfvén thinks so and presents his evidence in an interesting and original way.

Consider for the sake of argument that the planets are formed from some kind of cloud converging upon the sun. At certain distances a ring is formed depending upon local conditions, the cloud continues inward and another ring is formed, and so on, the formation of each planet depending to some extent upon the one preceding.

Now we might find an indication of this screening process by comparing the mass and distance of each planet with the mass and distance of the next planet beyond it from the sun. That is, we would compare the mass and distance of the successive planets in pairs, as for example, Mercury and Venus, Venus and Earth, et cetera. The satellites systems would be studied in the same way. For example, in the case of Saturn we would compare the mass and distance of Mimas and Enceladus, Enceladus and Tethys, and so on. Let us denote by D/d the ratio of distances, and M/m the ratio of masses, where the capital letters always refer to the planet farthest from the sun. Thus for the pair Mercury-Venus, the ratio of distances (D/d) is 0.72/0.39, or 1.85; and the ratio of masses (M/m) is 0.826/0.037, or 22.3. From inspection of these ratios Alfvén finds that the planets and their satellites can be divided into two distinct groups.

The so-called First Family Group includes the giant planets and their inner satellites all of which have low densities of less than 3.0. When their values of D/d and M/m are plotted against each other the points lie upon a descending curve as shown in Figure 1.

The Second Family Group includes Mercury, Venus, Earth, Mars, Pluto, the Moon, the outer satellites of Saturn, and the satellites of Uranus. All members of the Second Family have high densities greater than 3.0, and their values of D/d and M/m lie upon an ascending curve as shown in Figure 2.

The members of the two families and the way they are paired together are given in detail in Table 2.

Table 2

First Family Group

Planets: (Jupiter-Saturn), (Saturn-Uranus), (Uranus-Neptune).

Martian satellites: density unknown.

Jovian satellites: (I-II), (II-III), (III-IV).

Saturnian satellites: (Mimas-Enceladus), (Enceladus-Tethys), (Tethys-Dione), (Dione-Rhea).

Second Family Group

Planets: (Mercury-Venus), (Venus-Earth), (Moon-Mars), (Triton-Pluto), and asteroids.

Saturnian satellites: (Titan-Hyperion), (Hyperion-Iapetus).

Uranian satellites: (Ariel-Umbriel), (Umbriel - Titania), (Titania - Oberon).

Table 2 requires some explanation.

The reader is probably puzzled as to why the Moon and Mars are paired together instead of Earth and Mars. The reason is that if we use the pair Earth and Mars we get values for D/d and M/m that will not fit on to either family of curves. But now suppose that we assume there is nothing wrong with our ratio of distances for the Earth and Mars of 1.52, or in the value for the mass of Mars (M) of 0.108, *but that the whole trouble is in the value for the mass of the Earth (m) of 1.0.* The question is then what value should we use for m in order to give a point that falls on the curve? Taking the value of D/d of 1.52 we read off the corresponding value of log M/m from Figure 2. As nearly as we can tell log M/m is about 0.95 so that the value of M/m itself is 8.91. Substituting the known value for the mass of Mars (M) of 0.108, the value for m comes out 0.012. This is almost precisely the mass of our Moon!

How much significance should be attached to this circumstance is hard to say. Most cosmogonists agree that the Earth and Moon should be regarded as a double planet system rather than a planet and satellite system. The fact that the Earth-Mars dot does not fit on to either curve, while the Moon-Mars dot fits closely on to curve for the Second Family Group, suggests that the Moon and Mars constitute a special pair in the Second Family.

For the same reason, Triton and Pluto are paired together rather than Neptune and Pluto. Among the giant planets Neptune and Triton form a system analogous to the Earth-Moon system among the inner planets. Alfvén took the value of the mass of Pluto to be 0.2 which made the point Triton-Pluto lie close to the Second Family curve. But the latest value for the mass of Pluto of 1.0 throws the point Triton-Pluto far above the Second Family curve, indicating that there is still something wrong with this outermost pair.

We are now in a position to summarize the main features of Alfvén's theory.

1. Originally the sun existed alone in space.

2. First there was an invasion by a *dust cloud* composed of small solid particles which penetrated close to the sun before becoming votalized and ionized. The ionized atoms were repelled by the sun's magnetic field and attracted by solar

gravitation so that at certain distances they accumulated in rings depending upon their constitution. But invasion by the first dust cloud produced only the Moon and Mars.

3. Next there was an invasion by a gas cloud. These atoms which originally were neutral moved toward the sun owing to gravitation. As the gas became heated and ionized the atoms were both repelled and attracted by the sun, so that rings were formed at roughly the distances of the giant planets.

Most of the gas is supposed to have condensed into planets but there was a little left over in the vicinity. This fell inward upon the planets and by the process just described produced the inner satellites of Jupiter and Saturn.

The giant planets and their inner satellites belong to the First Family Group, all members of which have low densities of less than 3.0, and give points that lie along a descending curve as shown in Figure 1.

4. After the gas cloud there was a second dust cloud invasion presumably larger than the first which produced Mercury, Venus, Earth, the satellites of Uranus, and outer satellites of Saturn. The members of the Second Family—including the Moon and Mars—have high densities greater than 3.0 and give points that lie along an ascending curve as shown in Figure 2.

Like the man who took the alarm clock apart, Alfvén finds that after assembling the solar system he has some parts left over and no place to put them. Certain "abnormal" satellites such as the fifth and the sixth to eleventh Jovian, the ninth Saturnian, and the two Martian, are considered to be captured asteroids. (I don't know how Alfvén gets the cross on the First Family curve for the Martian satellites since their size and mass are wholly unknown.) The mose awkward bodies are Triton and Pluto. They are written off as former planets, Triton later being captured at a close approach with Neptune.

Alfvén's theory attracted little attention when first published but has come into prominence recently due to the discovery that stars have magnetic fields much stronger than that of the sun. It would take too long to describe how these fields were detected, except to say that spectrum lines produced by atoms in a magnetic field are split into two or more parts depending upon the intensity of the field, the structure of the atom, and other conditions—the splitting of the lines being known as the Zeeman effect. Often the lines are not split into distinct parts but merely appear to be abnormally broadened.

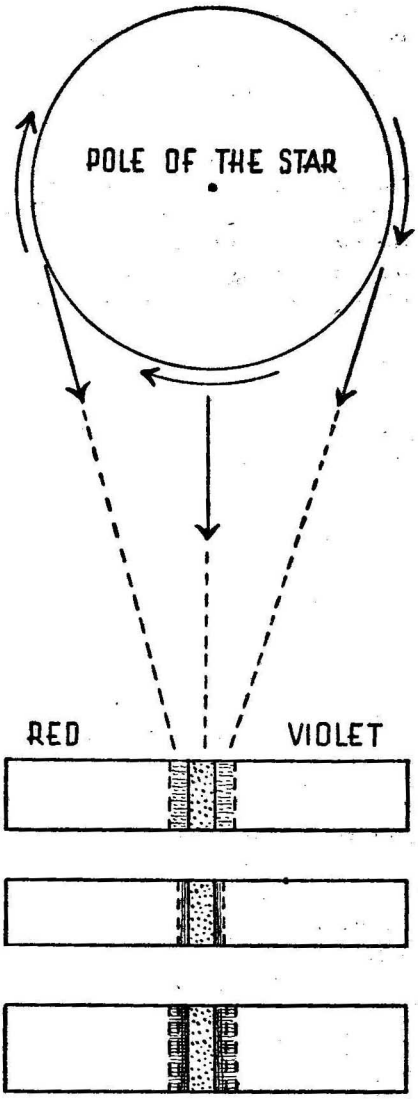
Broadening of the spectrum lines in a star due to the Zeeman effect is hard to detect because if the star is rotating rapidly the lines will also be broadened due to the Doppler effect. That is, light from the side of the star approaching the earth is shifted slightly toward the violet while light from the side receding is shifted slightly toward the red. Broadening due to rotation can be eliminated if we can find a star whose axis happens to be pointed in the direction of the earth.

Figure 3A. The observer is supposed to be looking straight down upon the axis of rotation of the star.

The star is rotating in such a direction that the light from the right hand side is shifted to the violet since this side is approaching the earth.

Light from right hand side which is receding from earth is shifted by a corresponding amount toward the red.

Light from central meridian of star shows no shift since here there is no motion either toward or away from the earth.



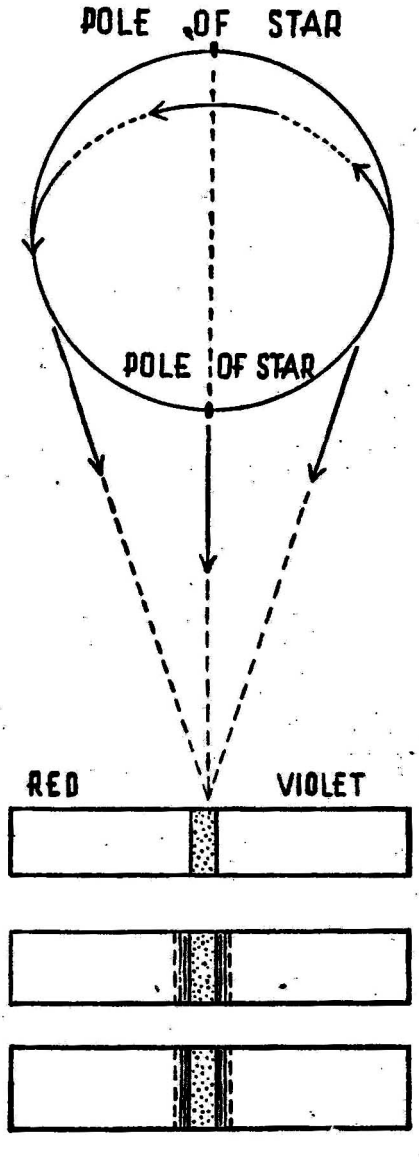
Appearance of spectrum line due to broadening by rotation only.

Appearance of line due to broadening by magnetic field only.

Composite spectrum showing broadening by both rotation and magnetic field. The broadening by the magnetic field is so badly confused with broadening by rotation that it cannot be detected with certainty.

Figure 3B. The observer is supposed to be looking straight down in a direction at right angles to the axis of the star.

An "end-on" star is rotating so that all its motion is across or perpendicular to the direction of the earth. Consequently there is no shift of light to the red and violet due to the Doppler effect.



Spectrum line shows no broadening due to rotation.

Appearance of line due to broadening by magnetic field only.

The broadening due to the star's magnetic field is not confused with broadening by rotation and if strong enough can be photographed and measured.

Although the star may be spinning rapidly, the rotation produces no motion in our line of sight and hence there is no broadening of its spectrum lines by the Doppler shift. (Figure 3.)

The white metallic-line star 78 Virginis appears to be ideal for the study of stellar magnetism since it is identical in type with stars known to be rotating rapidly except that its lines are sharp instead of broad. (A rapidly rotating star was selected because there were theoretical reasons for believing it would have a much stronger magnetic field than a slowly rotating star like the sun.) Evidently 78 Virginis is an "end-on" star whose poles lie in nearly a straight line with the solar system. Measures on the lines in the spectrum of this star made in 1947 by an astronomer at Mount Wilson working with the 100-inch telescope revealed that it has a magnetic field about thirty times as strong as the sun.

Still more amazing was the discovery made while this was being written that the star called BD-18° 3789 has a *reversible* magnetic field. That is, its polarity apparently changes from north to south and back to north again at intervals of about nine days. This discovery, which was wholly unanticipated, makes the mysterious subject of cosmic magnetism even more baffling than it was already. We do not even know why the earth has a permanent magnetic field. Now we not only have to explain why a star has a magnetic field but also why it does a complete change-over every few days.

Probably Alfvén's most valuable contribution consists in showing that solar magnetism may have exerted a greater influence in shaping the planets than solar gravitation. And the discovery of strong magnetic fields in stars *after* the theory was published gives it added interest and plausibility.

The theory of the origin of the solar system proposed by Weizsacker immediately reminds us of Laplace's nebular hypothesis, for he begins with a sun surrounded by a flat rotating shell of gas. But the process by which he evolves his planets is entirely different from that envisaged by Laplace or any other cosmogonist.

This rotating shell consisted of a flat discus shaped nebula about one hundred times as massive as the planets or one-tenth as massive as the sun. The nebula extended out to the present orbit of Neptune and was about one astronomical unit thick. Its average density was one-millionth that of air at sea level. This sounds like spreading it pretty thin but actually it is fairly high as comic densities go. Intermingled with the gas were small particles condensed from the nebula. The temperature throughout the shell was about the same as that of the planets at the same distance.

A point to be emphasized is that the nebulous shell is assumed to have had the same composition as the present sun and not that of the present planets. More and more

astrophysicists are inclining to the view that the sun and stars consist chiefly of hydrogen and helium in which is mingled only a minute percentage of the heavier elements. If we should try to build a planet from material purchased directly from the sun, we would find it a very costly undertaking, for we would probably have to discard ninety-five per cent in order to get the necessary amount of heavy elements.

Since most of the original primitive nebula consisted of the two lightest elements, hydrogen and helium, practically all of it escaped into space long ago. This explains why the planets possess the lion's share of the angular momentum in the solar system—they were condensed out of the trace of heavy elements in the nebula while the sun ended up with the fraction of hydrogen and helium that failed to get away.

In such a nebula each particle will revolve in a separate orbit just as if it were a tiny planet. The speed of rotation will therefore be highest near the center of the nebula and decrease outward, just as in going from Mercury to Pluto the speed of revolution drops from thirty miles per second to three miles per second. But since the nebula is a continuous structure considerable friction will develop between adjacent parts.

Now think of one group of particles revolving around the primitive sun in a circular orbit and a second group revolving in a slightly elliptical orbit but at the same average distance as the first. The time required for the two groups to revolve around the sun will be the same, for the period of revolution of a planet depends not upon the shape of the orbit but only upon its size. That is, one planet may revolve in an orbit shaped like an orange and another planet in an orbit shaped like a cigar, but if both orbits are the same length, then both planets will revolve in the same time.* The only difference is that while the particles in the circular orbit will always revolve at the same rate, those in the elliptical orbit will sometimes be slightly ahead and sometimes slightly behind them.

Suppose that at some instant the group of particles P revolving in the circular orbit are in line with the group of particles Q revolving in the elliptical orbit, as shown in Figure 4.

Then to a man on P moving in the circular orbit the particles Q will appear to be swinging around him in a sort of flattened oval path shaped somewhat like a bun. The man at P would feel that he was at the center of a vortex that is slowly moving around him in a direction opposite to his direction of revolution around the sun. Weizsacker shows that these vortexes will develop only to certain definite sizes depending upon their distances from the sun. Moreover, he shows that the number of vortexes most likely to produce stable systems is limited to five. Thus eventually there will develop at various distances from the sun a series of sets

of five vortexes as shown in Figure 5.

It is upon this criterion of stability that Weizsacker is able to derive Bode's law. The way he deduces it is easy enough to follow whether you care to believe it or not.

Remember that the shape of an ellipse depends upon its eccentricity, so that, if circular, the ellipse has an eccentricity of 0, but, if long and slender like a cigar, the eccentricity is nearly 1. Weizsacker decides that to keep his vortexes stable he cannot allow a maximum eccentricity (e_{max}) exceeding ⅓, corresponding roughly to the shape of a grapefruit.

Next he imposes a condition upon his vortexes which reminds us of Bohr's "allowed" orbits in atoms. This is that the distance (d) of successive orbits from the sun must satisfy the condition,

$$\frac{d_n}{d_{n-1}} = \frac{1 + e_{max}}{1 - e_{max}} = \text{constant} = h$$

Going outward from the sun we would have for the first two orbits the fraction, $d_1/d_0 = h$. Similarly for the other orbits in succession we have $d_2/d_1 = h$, $d_3/d_2 = h$, et cetera, out finally to the last two orbits for which $d_n/d_{n-1} = h$. Now if all these fractions are multiplied together everything cancels out leaving only the ratio, $d_n/d_0 = h^n$. If we substitute the value of ⅓ for e_{max} in the preceding equation then h is found to equal 2, which means that $d_n/d_0 = 2^n$. And this is of the same form as Bode's law expressed by the formula $d = 0.4 + 0.3 \times 2^n$.

After trying to keep all this discussion straight about the vortexes, it is discouraging to relate that the planets are supposed to originate some place else. Weizsacker feels that the vortexes themselves are not the most likely place for planets to develop but rather the little wedge-shaped whirlpools between the vortexes. It is here that the most violent motion will occur in the form of rapidly whirling currents, which constitute crude sort of ball-bearings upon which the vortexes run with a retrograde motion. Weizsacker does not specify just how his planets are supposed to grow by accretion in these ball-bearing whirlpools except that it will be in a manner "difficult to visualize," a point upon which most of us will be quite willing to agree.

If you have followed the theory this far, it will be no additional strain on the imagination to concede that satellites could be formed from sub-whirlpools in the vicinity of the planets. Retrograde satellites are as usual dismissed as captured asteroids, while comets are the fragmentary remains of planets that were spoiled in the making.

Weizsacker's original paper is not available to me, and in the secondhand accounts that I have read the theory seems so involved and intricate, that it is hard to appraise it fairly. Some valuable features are the suggestion that the troublesome angular momentum

* What I am trying to say is that the period of a planet is independent of every element except the major axis.

which the sun should now possess was dissipated away owing to the high hydrogen and helium content of the primeval nebula, and an explanation of why the famous Bode-Titius relation holds throughout most of the solar system. There would seem to be little hope of obtaining observational evidence to support the theory, since a star with a gaseous shell no larger than the orbit of Neptune could not be detected directly. It may be worth mentioning, however, that the spectrograph has revealed a hydrogen ring around the star RW Tauri which resembles the flat discoidal gas cloud postulated by Weizsacker.

In almost any type of collision process the large particles will usually grow rapidly at the expense of the small ones. For example, Weizsacker argues that, if two particles of equal size collide, the result will probably be further fragmentation; whereas if a small particle hits a large one it will generally be captured. In a mixture of particles of all sizes the big particles should not only grow at the expense of the small ones but they should also grow much faster. Weizsacker even considers the possibility that an especially large mass might start growing so fast that it would become a star instead of a planet, presumably a low-grade red dwarf. Thus we might wind up with a double-star system on our hands instead of a planetary system.

In the last few years several ingenious theories of star rather than planetary theories have been advanced, starting from a condensation of high density in a dark cloud. The dense nucleus "shadows" the surrounding region from the faint starlight streaming through it in all directions. Since light pressure upon particles in the vicinity of the nucleus is not balanced by light particles in the opposite direction, interstellar material will gradually be concentrated toward the nucleus. The rate of concentration is exceedingly slow, so slow that only in the darkest clouds would the rate of growth begin to satisfy the time scale generally accepted for the universe. Granted sufficiently favorable conditions, however, eventually a huge rarified dark sphere would begin to form. When the sphere became so dense that it was no longer transparent, gravitational attraction would begin to predominate over light pressure in drawing particles inward. The total time calculated for the growth of a sphere equal to the mass of the sun is around a billion years.

So much for stars molded from the dark clouds of space. Now let us indulge in a little playful fancy with these highly speculative ideas.

Suppose that the sun in the course of its journey toward the constellation of Cygnus begins to penetrate a dense interstellar cloud, in which conditions are exceptionally favorable for the rapid growth of dark stars. In fact, they are so favorable that the process of growth is accelerated a thousand million fold. Thus far beyond the orbit of Pluto

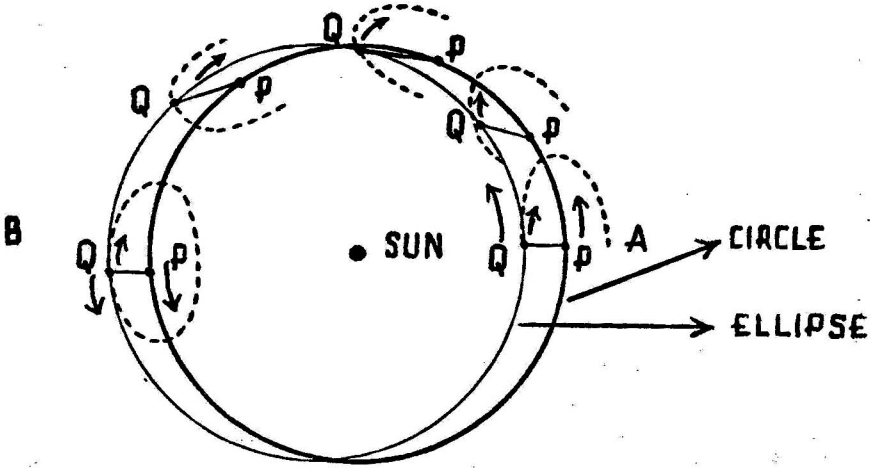


Figure 4. Rotating vortex cells within a revolving mass of gas. The particles at P are revolving around the sun in a circle. Those at Q are revolving around the sun in an ellipse of small eccentricity. At A the particles forming Q will be moving slightly faster than those forming P, since at this point Q is nearer the sun than P. But at B, Q is farther from the sun than P and will move more slowly.

Although both P and Q are revolving around the sun in a counter-clockwise direction as shown by the large arrows, to an observer at P the effect is the same as if Q were revolving around him in a clockwise direction in the small dotted bun shaped path.

From "l'Astronomie."

a giant INFRASUN begins to form with terrifying rapidity.

Readers who scoff at our infrasun as the figment of an overwrought imagination may be surprised to learn that bodies of this type have been known to astronomers for years.* One of the best examples is the invisible component in the eclipsing binary system of epsilon Aurigae. This body cannot be observed directly owing to its low luminosity but there can be no doubt of its existence. The star that we see in the sky is the bright component of the system which is revolving around a supergiant three thousand one hundred times the diameter of the sun. If this star were placed in the center of the solar system, it would extend out to the orbit of Uranus. Its surface temperature is only about 1100° K, much lower than that of Betelgeuse or Mira Ceti, so that it is barely luminous. There are reasons also for believing that the body is at least semitransparent.

* For example, see the paper on "The Interpretation of Epsilon Aurigae," by G. P. Kuiper, O. Struve, and B. Strongren of the Yerkes Observatory, published in the *Astrophysical Journal*, vol. 86, page 570, 1937.

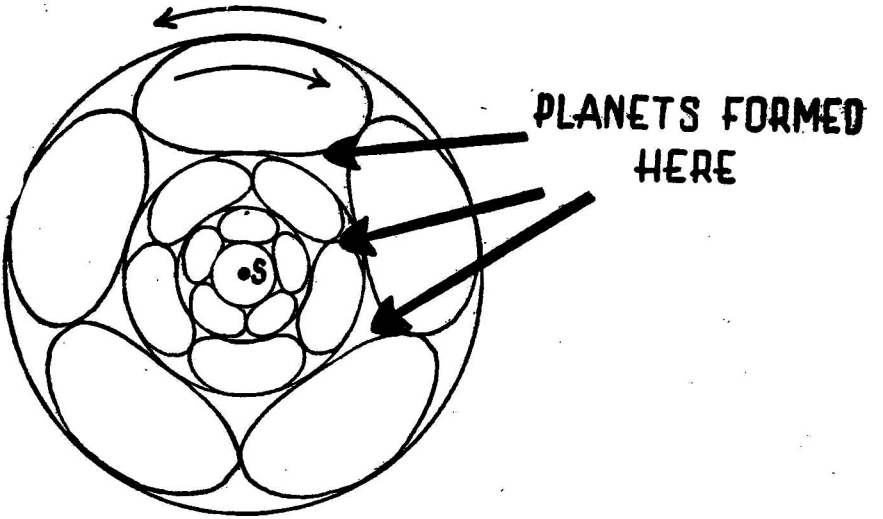


Figure 5. Rotating vortex cells within a revolving mass of gas. The vortex cells are assumed to be formed as shown in Figure 3, by particles revolving in circular and near-circular orbits. Formation of planets is considered most likely to occur in the wedge-shaped spaces between the vortexes where turbulence is greatest, and particles have greatest chance of collision so that large masses grow by gradual accretion of material.

From "Astronomy," by Skilling and Richardson
Henry Holt and Company.

Existence of an infrasun near the solar system would be suspected long before it was hot enough to shine. First its gravitational attraction would begin to disturb the motion of the outer planets. Then looking in the direction indicated by the disturbing force sensitive photometers would trace the body's outline among the stars. Even if too cool to be self-luminous, the total heat radiated from such a huge mass might exceed that of the sun.

Can we conceive of the consternation that would spread when the infrasun first becomes dimly visible in the sky? Astronomers would be deluged with questions. Millions of people would be convinced that the end of the world was at hand. Some would start praying for forgiveness with desperate haste while others would seek escape in a frenzy of dissipation. A few would be stirred by the deepest scientific interest and follow the bulletins from the astronomical observatories with eager attention. And still others would probably proceed about their business as usual, unable to believe that anything could disturb their carefully regulated little lives.

The picture upon the cover of Astounding for this month shows how the infrasun might look when it first becomes visible in the sky. The artist, Chesley Bonestell, instead of depicting wild scenes of panic has chosen to portray a solitary expanse of desert with the ghostly disk of the infrasun hanging overhead in the late evening twilight. The only living things are the rows of cactus plants standing motionless under its pale radiance. Yet do not these lowly plants remind us of people staring mutely at an object whose presence they are utterly incapable of comprehending among the once familiar stars?

THE END.

THE ANALYTICAL LABORATORY

The Lab is short this time; due to the very considerable length of the first installment of "Dreadful Sanctuary," there was not room for the usual five to six stories. Hence, of course, no fifth place.

The scores, however, stood as follows:

June, 1948 Issue

Place	Story	Author	Points
1.	Dreadful Sanctuary (1)	Eric Frank Russell	1.41
2.	That Only A Mother	Judith Merril	2.40
3.	No Connection	Isaac Asimov	2.47
4.	War Of Intangibles	Erick Fennel	3.55

Incidentally, in taking second place—against Russell and Asimov—on her first time out, Judith Merril has established a sound record indeed. As another new author—*not* a new penname, you pen-name hounds!—we hope and expect we'll be hearing more from her.

THE EDITOR.

THE GORGONS

BY MACK CHAPMAN LEA

The Natives were so peaceable they wouldn't hurt a flea—but what they did to the fleeing criminal was interesting indeed . . .

Illustrated by Timmins

The cutter came in with her siren screaming, her braking jets choked through orifices more than half closed.

"She's going to crash!" Caffery thought. "The first ship—and she's going to crash!"

The Akraltan natives, attracted as Caffery had been by the siren, were crowding into the clearing, fascinated by the sight of the great silver egg spitting fire in the sky above them. It did not occur to the natives that there might be danger, for they had never before seen a spacecraft of any description save the lifeboat which had brought Caffery and a mortally injured shipmate to their planet years earlier.

"Back with you!" The Earthman's deep voice roared under the shrill keening from the ship. He tugged at the arms of those nearest him, shoving them toward the doubtful safety of the trees. "Back with you, and quickly! Back!"

Those who heard him obeyed, not realizing the nature of the peril, but sensing the frightened urgency of the shouts. They knew Caffery. This was something he understood and they didn't. They broke for the surrounding forest, and relayed the warning as they ran. The ship dropped into an empty field, the shock of the crash snapping brittle branches from trees a hundred yards off.

The cutter's hull showed rips and scars of a nasty fight with somebody whose gunnery had been very good indeed, but Caffery did not notice this until later. His immediate concern, as he struggled with the emergency port, was for possible survivors. A ship's surgeon, he had never paid much attention to port latches anyhow, and now, after so long a time, his memory refused to give up the combination of a Bronson space lock. He finally got the hatch open by pure accident and stepped into a jungle of tangled cables and twisted piping ripped from the bulkheads. It was a tribute to metallurgists of Earth that the bulkheads themselves were relatively undamaged. Whatever gear not welded down had survived the shock of gunfire had been knocked adrift by the crash.

There had been ten in the crew,

apparently. Eight of them were at the gun embrasures, rather grisly to look at. The four heavy atomic rifles, jarred from the trunnions, had, without exception, fallen back across the cradles of the gunners. Number nine was in the tiny engine room, a crimson mess against the forward bulkhead. One foolhardy engineer had scorned a landing cradle once too often, had overestimated the agility of his space legs and the strength of his grip on a stanchion.

The pilot was unconscious but alive. Caffery found him with a terrific welt where a sprung cradle had smashed his head into the instrument board. He was a little man with an ugly slit of a mouth queerly lopsided over a chin which receded almost to the point of deformity. On his forehead a large letter "V" had been tattooed in scarlet. Caffery stared, remembering his first trip out as a Space Patrol surgeon. There had been a sullen, cold-eyed prisoner brought aboard just before take-off and hustled through the wardroom on his way to the brig. The prisoner's forehead had borne that same bright design, the mark of a criminal four times convicted of piracy, murder, or worse. Under life sentence to the Venusburg penal colony, there had been for him no hope of reprieve, no time off for good behavior.

The doctor cursed aloud in a slow, grinding monotone until the steady flow of his profanity ended in a wrenching sob. He shook himself like a wet spaniel, fighting for self-control, and began to fumble with the cradle straps. Knowledge of Earthly anatomy, half forgotten during the long years in which he had learned to adapt his skills to the incredible structure and metabolism of Akraltan bodies, flooded back to the mind and hands of the young surgeon as his fingers probed swiftly over the pilot's limp form. Satisfied that no bones were broken, Caffery rolled the man savagely from the cradle and carried him out of the ship.

The crowded natives fell back as he stepped through the open hatch with the still unconscious pilot in his arms.

"This one," he said, "lives, but he is hurt. Inside are nine who will not speak again. If it please you, there is need of graves." He caught the edge of the hatch against his shoulder, slammed it closed with a twist of his body. His eyes singled out a native from the group before him.

"I will return presently. Sargol, will you come?"

Caffery's hut was a quarter of a mile, more or less, from the clearing in which the cutter had crashed. He kicked open the unlatched door, crossed the single room with the native at his heels, and laid the pilot on the cot. The little man groaned and stirred, turning his head so that light from the doorway fell on the scarlet "V." He did not, however, wake up. With Sargol's help the doctor stripped him and examined him carefully. Except the welt on his forehead, the man had suffered

no obvious injuries. Caffery decided that he would probably waken shortly with nothing worse than a monstrous headache, and turned his attention to the pilot's clothing.

The man had carried no identification. His pockets held two Jorgensen blasters in addition to the one in the belt holster, which surprised Caffery a little. Most spacemen, even outlaws such as this one, considered a single weapon ample protection against the unknown dangers of alien planets. There was a small, plastic box, about four inches square and an inch thick. On one side were two small dials marked "Frequency" and "Intensity," a small meter, and a toggle switch with a protective lock to prevent accidental movement of the toggle. Caffery decided it was some sort of pocket communicator. And that was all.

The pilot moved suddenly, opened his eyes, and tried, not too enthusiastically, to sit upright. Sargol clucked like an impatient hen and pushed him back down, holding him flat with a hand on the narrow chest. Caffery turned at the sound.

"All right, Sargol," he said, and went over to the cot. The native moved aside, found a stool, and sat down to await further instructions. The pilot tried again to sit up, succeeding this time with the aid of Caffery's arm behind his shoulders. He grunted, shut his eyes, and opened them again very slowly.

"Gawd! Lemme down again, fella!" he pleaded.

Caffery lowered the man's shoulders and withdrew his arm.

"How's your head, mister? Bad?"

"Who're you? What's this dump?"

"I'm a doctor," Caffery answered patiently. "How does your head feel? You smacked it pretty hard."

"Doctor?" The pilot squinted at Caffery's thick blond beard and raggedly bobbed hair. The last razor blade in the lifeboat's emergency kit had long ago been dulled, and the Akraltans had never mastered the finer points of barbering with scissors from a first-aid packet. Barefooted, his only garment the now thoroughly disreputable trousers in which he had been cast away years before, Caffery had to admit that his six-foot frame lacked something of the dignity usually associated with the medical profession.

"Doctor! You ain't no doctor, you—" The pilot jerked himself up, turned white, and collapsed back onto the cot groaning. Caffery turned to the native.

"Sargol, if it please you, in that box the brown bottle with a red stripe around it."

"That box" was the lifeboat's medicine chest, its original contents almost intact. Earth medicines were ineffective against the aches and ills afflicting Akraltans, were, in most cases, actively poisonous to their alien systems. Sargol found the bottle and handed it to the doctor, who took out a small pill and offered it to the pilot.

"Here," he said. "Chew this up. You'll go back to sleep and after awhile you'll wake up without that headache."

The little man slapped the pill onto the floor.

"You ain't putting me to sleep, fella. Soon as I can stand up I'm leaving."

Caffery took another pill out of the bottle.

"Look, mister, there isn't any place to go except out in the woods until somebody brings another ship in here. Now, will you chew this, or do I cram it down your throat?"

The pilot stared for a moment at the husky, unkempt figure, took the pill, and began chewing slowly.

"O.K., doc, O.K. Don't . . . get . . . sore . . . just . . . because—" The voice trailed off.

Caffery, his face twisting in a humorless grin, picked up the three Jorgensens, beckoned the native to follow, and walked from the hut. He buried the blasters under the spread roots of a tree, carefully raking and reraking the raw dirt until no sign of digging remained. Then he turned toward the clearing, moving slowly, his eyes on the ground. Sargol walked beside him, started to speak, was silent a moment, and then said:

"Your kinsman is badly hurt? He will not speak again, perhaps? I am sorry, K'aa-free."

"No," Caffery answered, "his hurt is very slight. He will speak again, and soon."

"Then your sorrow is for the nine of whom you spoke before. But you will no longer be alone of your race. That is good."

"It is hard," said the doctor, "to feel alone among your people, Sargol. There is much that my people could learn from your race. He in the hut is—"

Caffery stopped. How explain the meaning of that prisoner's mark? There was no word for "criminal" in the Akraltan language except a term long obsolete and known only to a few scholars. How explain murder to a member of a race to whom violence of any sort had been completely unknown for centuries?

"He in the hut," the doctor said abruptly, "has willingly caused a kinsman to speak no more."

Sargol halted and snatched at the Earthman's arm, pulling him half around.

"But, K'aa-free, such a thing has not happened for untold ages! Not since . . . not since—"

"—not since the Great-War-Fought-With-Engines," Caffery finished. "Not on your world, Sargol, has such a thing happened, but on my world of Earth— I have said that my race could learn much from yours!"

The graves were dug, nine raw red slits in the green of the clearing. The natives had disappeared, leaving a spade leaning against the cutter's hull in anticipation of Caffery's need. It was nearly sundown, and the doctor knew that following the brief Akraltan twilight the natives would fall into a sleep deeper than any surgical anaesthesia, to lie unmoving through the night wherever they happened to drop when darkness caught them. It was physically impossible for any Akraltan to remain awake in the

complete absence of sunlight. They might sleep in the woods, in the fields, in the streets of the villages, or, if they happened to be at home when sunset came, in their own huts. It made no difference to them.

"I can help you, K'aa-free?"

The doctor shook his head.

"Thank you, but you would be sick afterward, Sargol. Those nine are sights such as your people do not love. I will manage alone."

The native turned away, obviously relieved. Caffery walked slowly toward the cutter.

The pilot stirred under the blanket and mumbled something unintelligible. Caffery looked up, then, seeing that the man was still asleep, turned back to the thin metal page of the book in his lap. He realized for the first time that he had been staring at the same passage for over an hour, no part of the content reaching his mind. Tossing the volume onto the table, he

sat and watched the slow, slight movements of the pilot's breathing. The scarlet tattoo showed iridescent against skin from which Caffery's drug had drained whatever color the Venusburg fogs had not steamed away. Caffery wondered how the man had ever escaped from the Swamp, where and how he had stolen the ship in which he had obviously fought off pursuit successfully only to crash on an uncharted planet in an unexplored pocket of the galaxy.

Akralta would not remain uncharted much longer, a fact of which the doctor was joyfully certain. Sooner or later there would be Patrol cruisers nosing down through the thin air. That none had appeared already in the twenty-odd hours since the crash proved that the ship whose guns had scarred the hulk in the clearing had been crippled in the fight, possibly blasted out of space. But there would be others, squadrons fanning out in carefully calculated search curves originating at the last reported point of contact. Caffery prayed only that when they came they would arrive in daylight, that no landing party exploring by the light of the planet's triple moons should stumble across any native sleeping in the open where sunset had found him.

The man on the cot awoke and sat up, kicking the blanket into a heap on the floor. He glanced around the hut, then stared blankly at Caffery.

"Where am I?"

Caffery jerked a thumb at the space gear crumpled on a stool at the foot of the cot.

"Put on your clothes, mister. How's your head?"

"My head's all right, soldier. It was good enough to get me away from you lousy Patrolmen before, and if it's good enough I'll get away again." He reached unsteadily for his pants, holding the edge of the cot for support. "How'd you catch me?"

The doctor had found a barber's kit in the wrecked cutter. With the help of a highly amused native he had managed a fairly decent haircut, and had shaved. He had also found space gear similar to Patrol work clothing and had carefully transferred the insignia from his ragged uniform. He said:

"I didn't catch you, mister. You crashed your ship in my front yard and killed your crew doing it. What's your name?"

"Killed my crew? All of 'em?" The man shrugged. "They were Venusburg muckers. But does the lieutenant"—the voice became a mocking falsetto—"really want to know my name? Why, lieutenant, I thought you tin soldiers knew everything already."

"Why, you cheap punk—!" Caffery rose from his stool intending to slap the smirk from the other's face. The pilot drew back, whining in sudden fear. Caffery sat down again, relaxing. He looked at the man thoughtfully for a minute.

"Look here, mister," he said, "I don't like you, and I don't like your kind. But you're the first Earth-

man I've seen in five years, and I'd hate to hurt you. There's nobody on this planet but you and me and a bunch of very peculiar natives. If you behave yourself, you can be comfortable until the Patrol gets here and picks you up. If you'd rather play rough, I'll play rough." He touched the caduceus on his collar. "Not 'lieutenant,' 'flight surgeon.' Flight Surgeon Robert Caffery. Now, what do I call you?"

"You mean," the other was astounded, "you don't know me? Me? Grimaldi? Johnny Grimaldi, the first guy smart enough to skip the Swamp in fifty years, and you don't know me?" There was injured pride in the tone, followed by sharp suspicion.

"Wait a minute, fella! What are you handing me—first Earthman in five years? The Patrol don't put no sawbones on a lone outpost, and they don't leave no outpost for five years without coming to look at it. You think I'm dumb, fella, you're making a big mistake. Who are you, and what's your racket, and where am I?"

The little man twisted on the edge of the cot, brushing his holster as if by accident. Startled, he noticed for the first time that the holster was empty. He glanced quickly around the room, at the bare top of the small table, at Caffery's few belongings arranged neatly on rough shelving beside a dozen or so metal bound books borrowed from native elders. He slapped at the large patchpockets of his flying suit. Finally he looked apprehensively at Caffery.

"You can forget your Jorgensens," the doctor said. "I buried 'em where you won't find 'em, mister. And I'm not handing you a line. I was surgeon of the *Aurora* when she hit a meteor storm three light-years sun-side of Arcturus five years ago. We took a three-hundred-ton rock through the bow screens and I spent two weeks in a lifeboat nursing an engineer with a broken back. He died a couple of days before we landed here, wherever we are. I've been here alone ever since waiting for somebody to come along and discover this God-forsaken mud ball.

"So," he added bitterly, "when a ship does come it's a stinking swamp rat! I tell you again, mister, I don't like your kind, but I'm that happy to see any Earthman I'll be glad of even your company for awhile. The Patrol will be in on your tail before long. It's up to you whether or not I build a jail and put you in it till they get here."

A sudden speculative flicker in Grimaldi's eyes was masked by studied hopelessness before the doctor noticed it. The little man rose shakily from the cot, the discolored welt on his forehead forming a symmetrical pattern with the brilliant tattoo.

"O.K., doc," he said, "I guess you ain't lying. I thought another doc with a beard had turned me in. I must have dreamed him. Funny, ain't it?"

"No," said Caffery. "That was me. I had a beard yesterday." He stood up, moved to the door, and opened it. "I'm going after chow.

You lie down till I get back and you'll feel better. You're not strong enough right now to run away, and if you were there's no place to run to, so don't bust your buttons while I'm gone."

A few yards from the hut a metal tool chest from the lifeboat, set in a rock basin filled with near-freezing spring water, was Caffery's ice box. The natives kept the small chest filled with an assortment of curiously formed fruit and vegetables, nutritious and reasonably palatable. In return they asked only that they be permitted occasionally to watch Caffery eat what they had provided. As yokels gape at the side show performer chewing broken glass and razor blades, so the Akraltans watched the doctor eat. They had learned that he would not die from the menu, but they never ceased to marvel at this fact.

Grimaldi, his face vicious, watched the door close. He started across the hut, realized his weakness, and stumbled back to the cot. He spat.

"Sawbones or not, you're still a lousy Patrolman to me. We'll see whether there's no place to go or not, soldier. Johny Grimaldi's too smart to go back to the Swamp—!"

But when Caffery returned a few moments later the little man wore as friendly an expression as his twisted mouth and cold, squinting eyes could manage.

Caffery built a fire in the hut's tiny fireplace and made vegetable stew in a native pot. Grimaldi bolted the food noisily, like an animal, barely chewing one mouthful before gulping the next. The doctor, nibbling at a pear-shaped crimson fruit, watched him intently. Pirate and murderer the man might be, he yet represented to the castaway first contact with the wide reach of galactic civilization. Caffery saw him as symbol of and messenger from a universe so long lost as to have faded to a forgotten dream. A hundred questions crowded each other for utterance and by their very number choked him into silence. He bit at the crimson pear and waited for Grimaldi to finish eating.

"What's the range on that radio you carried?"

"What ra—? Oh!" The last mouthful of stew spilled down the front of the convict's tunic. "Oh, quarter of a light-year, maybe half a light-year. I forgot the radio. Gimme, if you got it. You got to know how to work it."

Caffery pulled from his pocket the little box he had found with the blasters in the other's clothing. He should have been warned by Grimaldi's eagerness. He wasn't. He shoved the box across the table and Grimaldi snatched it, unlocked the switch, and snapped the toggle upright. One side of the box fell away on tiny hinges, exposing a metal grid.

"That's the speaker, doc. You'll have to lean close to hear it." The little man turned the grid in Caffery's direction. The doctor, unsuspecting, watched the needle of the meter swing over the scale,

swing slowly back as Grimaldi turned the dial marked "Frequency." When the needle rested again on zero, Grimaldi spun the "Intensity" dial to about a third of its full range and threw the toggle to the side.

Caffery stiffened as the ray caught him. There was no pain, just an icy numbness. He could move, but only with great effort, his muscles pulling sluggishly against terrific inertia as in the nightmares of his childhood. His fingers, curling slowly, felt as if being forced through cold, incredibly viscous glue. Grimaldi, savage eyes fixed on the clenching hands, carefully adjusted the output, and the numbness shaded into frigid paralysis. The doctor swayed and fell sideways to lie motionless on the floor, arms half extended, hips and knees still bent in the attitude of one sitting. Grimaldi moved unsteadily around the table and sat on the stool from which Caffery had fallen.

"Sucker!" he snarled. "All you shiny tin soldiers are suckers. Forgot what a cramping box looks like, didn't you? No, I guess you never saw one before if you been here five years, because these babies ain't that old. Anyhow, sawbones, before I turn this gadget off, remember it'll kick you over anywhere within fifty yards of it once it's tuned on your nerve frequency. I'm telling you just so you don't get no funny ideas when I let you up.

"And remember this, too, sawbones: Right now you're catching low output. I'm gonna turn it up a little, and you're gonna find out what can happen any time I don't like the way you part your hair." Grimaldi picked the box off the table.

"This is gonna hurt," he said. "This is gonna hurt you a lot more than it hurts me."

Grimaldi inspected the wreck in the morning, locking the doctor in a provision store room while he went through the craft. On the way to the clearing they had seen natives trotting singly or in small groups back and forth through the forest, but none stopped at the sight of the Earthmen. Those who passed close enough called a salutation, which Caffery returned, and looked curiously at Grimaldi without pausing on their way. Grimaldi thought the natives were afraid of him. Caffery knew better, knew that they were deliberately staying clear until he should call for them. Sargol had relayed the doctor's description of the stranger. If Caffery called for help, they would gladly give such aid as they could. Meanwhile they stayed away lest they inadvertently cause embarrassment or actual trouble to their friend.

When Grimaldi let him out of the store room, Caffery saw with dismay that the man had found another Jorgensen. He cursed himself for not stripping the arms racks when searching the ship the night before. As they stepped out of the hatch, Grimaldi asked:

"Where's this lifeboat of yours, sawbones?"

Caffery hesitated, realizing that

thoughts of escape lay behind the question. But the boat lay less than a half mile from the cabin, and the forest, free of underbrush with the trees widely spaced, offered no particular concealment for it from the most casual search.

"I'll show you," he answered. "You'd find it anyway."

After a lengthy examination of the tiny craft, during which he forestalled any possible interference on Caffery's part by the brutal expedient of half paralyzing him with the cramping box and rolling him against a tree, the convict was jubilant.

"Look, doc, I can rig that puddle jumper with parts from the cutter! You get them good friends of yours to move me some thrust-blocks and a generator, and we'll both get out of here. If you don't try any double cross, I'll even drop you somewhere you can get home from. How about it? Well? Oh, I forgot!"

He snapped off the ray. Caffery rolled to his feet and leaned shakily against the tree, stretching his stiffened muscles.

"No!" he said. "No, mister. I can't stop you as long as you've got that box, but I won't help you. If you can't move your own gear, you'll be here for the Patrol to find. And if you kill me, God help you when the Patrol gets here, because there's a couple of hundred of those natives learned pretty fair English since I landed, and they'll talk. If you don't kill me, I'll talk. Either way you lose, but you lose more if you manhandle me."

"Don't be a sap, doc." The voice was almost plaintive. "I feel good, like a kid, since I see how easy I can fix the boat and scram. When I feel good I don't like to hurt nobody, not even a soldier. All I'm asking is your pals move some stuff from my ship up here. All you gotta do is tell 'em, and nobody gets hurt. O.K.?"

"No!"

Grimaldi's good humor vanished, replaced by the blind fury of a thwarted guttersnipe. He flicked the dial of the cramping box to full output.

"O.K., then, you brass-bound hero! You want it the hard way, sawbones, you get it the hard way!"

He squatted on the short turf and watched, with sadistic eyes, the knots of twisted, contracting muscles springing out in almost unbroken ridges over Caffery's entire body, discernible even through the heavy cloth of his flying gear. Grimaldi began counting slowly. At "sixty" he snapped off the ray.

"Take a deep breath, sawbones. I don't want you suffocated—yet!"

Caffery gasped as the paralysis wore off his chest and the knots smoothed out of relaxing muscles. He closed his eyes and lay motionless, conscious only of cool air in his throat and the ache of ligaments overstrained.

"Once more, sawbones, just to prove you ain't really no hero. Slow, this time."

"K'aa-free!"

A dozen natives had come silently around the lifeboat's bow, seen Caffery stretched on the ground, and stopped. Grimaldi sprang up, slip-

ping the safety of his Jorgensen.

"Hold it, you gooks! Hold it!" He was badly startled, chattering like a scared monkey, but the blaster in his hand was steady. The natives paid no attention to him. The blaster meant nothing to them because they had never seen one fired. One of the Akraltans stepped forward. Caffery had painfully pulled up to a sitting position, leaning against a tree trunk. Now he tried to stand, clawing at the bark for support.

"No!" he shouted. "Turahn, stand where you are. All of you stand where you are!"

He spoke in native dialect. Grimaldi, his nerves under better control, snarled:

"Talk English to 'em, sawbones, if you're gonna talk at all! And if these ain't any of 'em the ones you said could talk English, don't talk!"

Caffery got his feet under him, clutching the tree with both arms. His knees, wrenched almost to dislocation by the opposing pull of powerful calf and thigh muscles cramping under the ray a few moments before, wobbled and knocked agonizingly against each other. It was the native addressed as "Turahn" who answered. He spoke with metallic resonance in an odd, halting accent.

"I talk En-gliss, as do three of these others. K'aa-free is hurt. What has hap-pened?"

"You guessed it, gook," Grimaldi said. " 'K'aa-free' is hurt. Now get this, Tureen, or whatever your name is, and get it straight the first time: The first sign of trouble out of you gooks, the first move you make, K'aa-free will be dead and a lot of you gooks will be dead. Get it? Savvy? Understand?"

The native looked at him calmly.

"Yes-ss. Is that all?"

"No, that's not all. I want some stuff moved up here from the wreck, heavy stuff, and I want it quick. You're gonna move it."

"Per-haps. But, for you, I think not."

"Think again, gook. Watch." Grimaldi fingered the dial of the cramping box. Caffery fell stiffly away from the tree and thumped the ground.

"Your pal ain't dead yet," Grimaldi answered the question in the natives' horrified eyes, "but he will be. You gonna move my gear?"

"Yes-ss, if you will not hurt K'aa-free."

"O.K., gook, it's a deal. But you cross me up just once and—"

The natives blinked at the flash of the Jorgensen, stared dumfounded at the smoking stump of the tree at which Grimaldi had fired. The trunk, from which the blaster had cut a three-foot section, hung swaying from branches interlocked with those of its neighbors.

"Understand?" Grimaldi asked.

"Yes-ss."

"Then get going. I'm right behind you to tell you the way if you start getting lost. Oh—you better carry him"—jerking a thumb at Caffery—"because I don't think he can walk right now."

Which was true; Caffery had

passed out. Turahn signed to a native who picked up the doctor's limp two hundred pounds without obvious effort, a performance which caused Grimaldi's squint eyes to widen. He would have guessed the native to weigh not over a hundred and thirty.

"One must go to the village," Turahn said. "Else, they will seek us. Also, there will be need of a cart, per-haps?"

Grimaldi nodded. "O.K. But no funny business. I can burn your whole village like I burned that tree, so don't try to gang up on me."

Caffery could have told him, if Caffery had been awake, that the threat of the blaster was unnecessary. The natives would not attack him, or anyone else, under any circumstances. They could never deliberately harm him in any way. For over a thousand generations following the war which had destroyed Akraltan civilization and all but exterminated the race, the Akraltans had carefully bred out of themselves all capacity for physical violence. Deep-set psychological barriers made it completely impossible for them to hurt purposely any living thing, even in self-defense. Likewise, fear had been bred out. The shattered tree inspired amazement, but not the terror Grimaldi had intended. The natives' only emotions as they moved toward the clearing were concern for Caffery, whom they had long accepted as friend and brother, and loathing for Grimaldi. They obeyed the man in the hope of saving Caffery further agony, not because they were afraid.

And the Jorgensen in which Grimaldi placed so much faith would have been useless had the natives been able to reawaken within themselves the faintest atavistic spark of the instinct for combat. By their very nature they possessed a weapon against which Grimaldi could not fight. But by their very nature they could not willfully employ this weapon.

In something over three hours the thrust-blocks and generator were moved. In six more Grimaldi crawled out of the lifeboat, grimy and triumphant. Like most space pirates, the little man was an excellent practical engineer. If the drive circuits he had just completed were rigged more by rule of thumb than according to formal theory, they would nevertheless kick the craft through space farther and considerably faster than her original engines ever could have done.

Two of Akralta's three moons were already in the sky. Grimaldi leaned against the hull, wiping grease from his face with his sleeve. Caffery lay on the ground a few feet away in the midst of the natives who had carried the machinery from the cutter. Behind them, in a great semicircle under the trees, a packed mass of natives, almost the entire population of the neighboring countryside, stood or sat on the clean grass. Turahn's runner had talked in the nearest village, and the tale had spread. The natives, still with no idea how to deal with the unpleasant stranger from

the skies, had come to see for themselves what would happen next. The harsh gutturals of their speech sounded a bullfrog cacophony against the rustling of leaves stirring in the slight breeze.

Grimaldi asked wearily: "How long before dark?"

Caffery glanced at the sky. "About twenty minutes," he said.

"O.K., doc. Let's take off. I'll still take you with me if you want to come. If you don't—" He shrugged and fingered his Jorgensen. "I ain't scared of what the gooks can tell your pals if they get here, but I ain't leaving you behind to talk. But you did pull me out of that cutter, and I guess I owe you something for that. What do you say?"

"I'll go," Caffery answered slowly. He looked thoughtfully at the sky again, gauging the height of the pale sun. He seemed to be debating something within himself as he rose painfully to his feet. Grimaldi stood clear of the hatch and motioned the doctor to go ahead of him into the boat.

"First smart thing you've done since I got here, sawbones. In with you, and let's go. This place gives me the willies."

Caffery reached a decision.

"Look, mister, a few more minutes won't matter, and I've got stuff in the hut I'd hate to leave behind me. Come with me and bring your box if you don't trust me, but give me half an hour to get my gear."

Grimaldi hesitated.

"O.K., doc," he said. "I'm coming with you, and you better make it fast."

Caffery buckled the musette bag, slung it across an aching shoulder, and turned to the impatient little man fidgeting in the door of the hut.

"Let's go," he said.

The breeze had stopped with the setting of the sun a few moments before, and with it the rustling of the leaves had died. Also, a sudden silence had dropped over the natives who had followed the two men back from the boat and remained outside the hut. Grimaldi had noticed.

"Them gooks is awful quiet all of a sudden!"

"They go to sleep at sundown," Caffery answered shortly without interrupting his packing. "I'll be ready in a minute." There was a determined grimness in his voice, and he did not look at the little man as he spoke.

As the doctor finished strapping the bag, Grimaldi motioned him through the door and stepped behind him out into the moonlight. There was an odd expectancy in the doctor's bearing as he started through the trees, approaching the nearest of the slumbering natives. When he reached the first of the sprawled bodies he stopped.

"You better come see this, mister. It might change your plans."

Grimaldi stepped close and glanced down at the still form under the doctor's pointing finger. Caffery caught him as his knees buckled, and dragged him, a screaming idiot, back to the hut.

"—a terrible thing to do to any man, sir, but—well, what would you have done?"

Captain Ellsworth Hague, skipper of the cruiser *Antares*, set his cup carefully in the geometrical center of the saucer and looked up at Caffery.

"The same thing you did, I think, doctor. But I know how you feel. More coffee? Is the man in the booby hatch for keeps, or will he recover enough to stand trial?"

"I don't know. A little more cream, please, sir. Same thing happened to me when I landed here, and I got over it, so I imagine he will. The natives told me later it took me about two months to stop gibbering, and during that time they fed me from the lifeboat stores like a helpless brat. Next thing I remember when I began to come out of it, they'd figured out what happened. They're smart, sir, in lots of ways, and they're survivors of a race so advanced they'd have made us look like schoolboys. Anyhow, they'd camouflaged themselves for my benefit, some kind of a mental screen they trained themselves to throw out automatically so you think they look human when actually they're not. When they go to sleep, the screen drops, and—you saw Grimaldi when I turned him over to your master-at-arms."

Caffery took a long swallow of coffee.

"Judging from my own case," he continued, "I'd say that once you've been exposed and recovered you develop a kind of immunity, or you'd have found me in the same shape as our friend in the brig. Or maybe it's just that when you get to know 'em you don't give a hoot what they look like really. I don't know."

"I don't think I want to find out," said Hague, dryly. "I'm pulling the survey parties back aboard before nightfall. But tell me, if you can, just what do these inhuman saints of yours look like underneath?"

Caffery shook his head.

"I can't, sir. They're indescribable." He reached for a pencil and paper on the captain's desk. "Something like this, only more so."

The captain watched the incredible outline taking shape under the pencil point. He slapped a broad hand over the paper.

"That'll do, doctor. I get as much of the idea as I want to get. I think," he added, "that technically we are in port. Anyhow, I'll take a chance on bending Article 31 of the 'Regulations' just a little." He reached in the back of a desk drawer.

"Rinse your cup from the water jug, doctor. This is fine Scotch."

THE END

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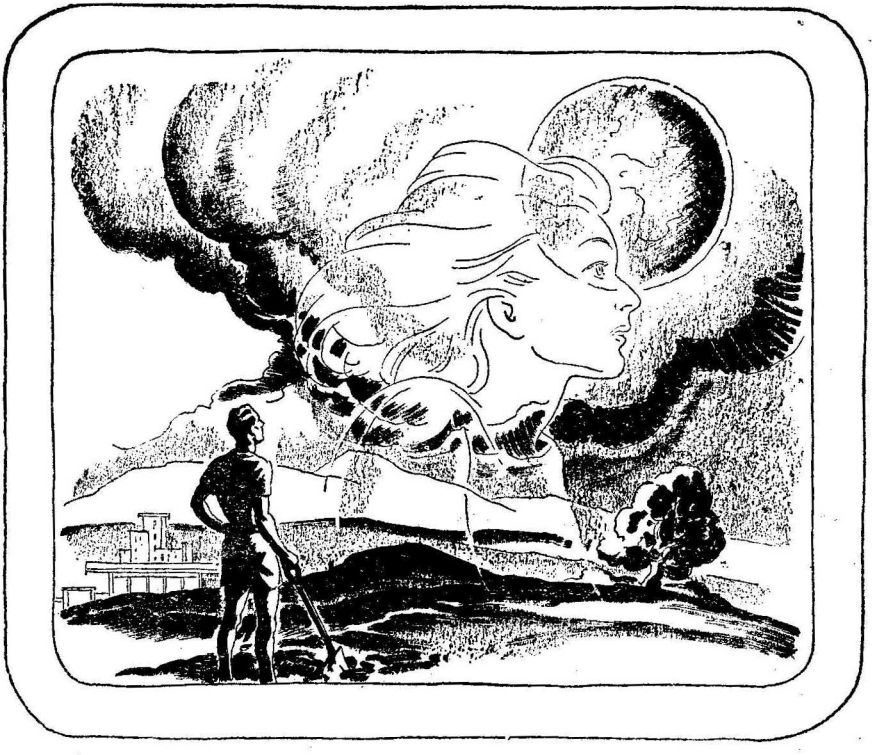


DANCE OF A NEW WORLD

BY JOHN D. MacDONALD

***If you** can't find the man who can do the job that has to be done—there's always one answer!*

Illustrated by Orban

Shane Brent sat in the air-conditioned personnel office of the Solaray Plantations near Allada, Venus, and stared sleepily at the brown, powerful man across the table from him. Shane was an angular blond man, dressed in the pale-gray uniform of Space Con-

trol. On his left lapel was the interlocked C.A. of Central Assignment and on the right lapel was the small gold question mark of Investigation Section. Shane Brent had the faculty of complete relaxation, almost an animal stillness.

His hair was a cropped golden cap and his eyes a quiet gray. Below the edge of the gray shorts the hair, tight curled on his brown legs, had been burned white by the sun.

The man on the other side of the table was stocky, sullen and powerful. His face was livid with the seamed burns of space radiation before the days of adequate pilot protection. His name was Hiram Lee.

The conversation had lasted more than an hour and as yet Shane Brent was no closer to a solution. He had been carefully trained in all the arts of persuasion, of mental and emotional appeals. Hiram Lee had resisted them all.

Shane Brent said: "Lee, the whole thing is ridiculous. You're thirty-eight now. At least seven years of piloting ahead of you."

Lee snorted. "Piloting! Tell your boss that I'm unadjusted or something."

"Let's review the case again. You, at the age of eighteen, were the first third-generation space pilot in history. Your grandfather was John Lee who was an army pilot and who ran out of soup on the second swing around the Moon. As a memorial they left the little silver ship in orbit."

Lee's expression softened for the first time. "That's the way he would have wanted it."

"And your father, David Lee, was kicked off the spaceways for getting tight and balancing the old *Los Angeles* of the Donnovan Lines on its tail fifty feet in the air for ten minutes."

"And he won his bet of fifty bucks, junior. Don't forget that."

"And that brings us down to you, Hiram Lee. You made eighty-three trips with Space Combo in the VME triangle. Your education cost Central Assignment a lot of time and money. There aren't enough trained pilots who can stand the responsibility."

"The monotony, you mean." Lee stood up suddenly, his fists on his slim waist. "I told you before and I'll tell you again. When I started, it was a fine racket. You took off on manual controls and got your corrections en route from Central Astro. You made the corrections manually. You ripped off in those rusty buckets and the acceleration nearly tore your guts out. When I started we had a mean time of one five nine days from Earth to Venus. The trip was rugged. As a pilot you were somebody.

"Then some bright gent had to invent the Tapeworm. Central Astro plots your entire trip and sends the tape over. You co-ordinate the Tapeworm with takeoff time and feed in the tape. You've got a stand-by Tapeworm with a duplicate tape and you've got an escape tape which you feed in if anything goes too far off.

"The pilot sits there like a stuffed doll and the tape does everything. You don't even have to worry about meteorites. The Pusher obliques the little ones off and the Change-Scanner gives you an automatic course correction around the big one. It just got too dull, Brent. I'm not a guy who wants to play up to the rich passengers and tickle the babies under the chin and say kitch-eekoo. I took three years of rocking chair circuits and then I quit. And I won't go back."

"What makes the job you've got so attractive, Lee? You're just a foreman and nursemaid to a bunch of Harids working in your herb patches."

Lee smiled tightly. "I keep 'em working and I tell 'em what to do and I try to keep them happy. You know the final psycho report on them. Their culture is much like the culture of ants on Earth—with one exception. They have a high degree of emotional instability. Did you ever see a Harid run berserk? A bunch of them are picking away and all of a sudden one will stop and start swaying his head from side to side. The others light out for far places. The one who has gone over the edge starts clicking those teeth of his. He lets out a scream that would split your head wide open and comes at you with his arms all coiled to strike. Bullets won't stop them. You haven't got time to mess with a powerpack and turn a ray on him. All you need is a knife. You just step inside the arms, slice his head clean off and get out of the way fast. See this scar? I didn't move fast enough six months ago."

Shane looked puzzled. "Then danger is an integral part of your pattern of living. Are you trying to tell me there's no danger in space?"

"It's a different kind, Brent. Once every few years a ship gets it. The people on it don't even know what happened. I like a little danger all the time."

"Would you consent to an alteration of glandular secretions to take away this yen for danger?"

"And start kissing babies again? Not a chance! Every Saturday I draw my pay and I hit all the joints along the Allada Strip. You meet some interesting people. All Sunday I have a head and a half. On Monday I'm out in the weeds again with my crew of Harids."

"Central Assignment isn't going to like my report on this."

Lee chuckled. "I sure weep for you pretty boys in gray. Tell them to mark my file closed and tell them where to file it for me, will you?"

Shane Brent stood up slowly, looking more than ever like a big sleepy animal. "Suppose, Lee, that you could take a route on one of the old ships? Manual controls, magnetic shoes, creaking plates—all the fixings."

Lee stared down at the table top for a few seconds. He said softly: "Nothing in this world would keep me out of space, brother. Nothing!"

Shane Brent asked: "And what if you had control of a modern job and had orders to take it so far

that Central Astro couldn't give you a tape?"

Lee grinned. "That'd be O. K., too. I hate those smug characters sitting there in their ivory tower and supplying little strips of plastic to do the job that good pilots should be doing."

Shane Brent looked rueful. "Well, I guess you've licked me, Hiram. This will be the first time I've ever had to report back a complete failure."

"Do them good back there," Lee said, grinning. He stared curiously at Brent. "You know, Brent, you don't look like a guy who'd get much of a bang out of all this investigation junk. Why don't you take a break? I'll get you a gang of Harids. These Solaray people are O. K. to work for. Stick around. On Saturday we'll hit the Strip. There's a little gal dancing at Brownie's. A Seattle gal. Blond. She won't even give me the right time, but you just might manage to—"

Brent grinned. "I better think that one over. Sorry to have taken so much of your time, Lee. See you around."

Shane Brent stood at the window and watched Hiram Lee walk off in the direction of the drying sheds. Already the thick heat had put a sheen of perspiration across the broad muscular shoulders of Lee. He walked with the carefree swing of an independent man of strength and courage. Shane Brent sighed, walked out into the heat and headed for the Solaray Communications Building.

He showed his credentials to the pretty clerk and said: "I'll need a private screen and a closed circuit and the usual guarantee of secrecy. It will be a charge to Central Assignment."

He went into the small room she had indicated, and opened the switch under the dead screen. A muted hum filled the room.

"Central Assignment," he said.

Thirty seconds later a clear feminine voice said: "Central Assignment."

"Brent calling. Give me Allison, please."

Allison's face suddenly filled the screen. He was a white-haired man with a florid face and an air of nervousness and vitality.

"Hello, Shane," he said quietly. "Closed circuit?"

"Of course, Frank. I've got a report on Hiram Lee."

"Good! Let's have it. I've got the recorder on."

"Here goes. Memorandum to F. A. Allison. From Shane Brent. Subject: Personnel for Project 81—Pilot Investigation. Case of Hiram Lee. Hiram Lee has been carefully investigated and it is recommended that permission be given the undersigned to approach Lee with an offer to join Project 81. Lee is alert, capable, strong, dependable to a sufficient degree. His training is excellent. He will need little indoctrination. Quinn is to be commended for recommending him to Central Assignment. It is believed that the probable seven-

year duration of the trip will not discourage Lee. It is also believed that the calculated risk of one in four of returning from the Project flight will not deter Lee. Permission is requested to contact Lee and furthermore to sound him out on becoming a colonist, dependent, of course, on his finding a suitable woman to accompany him."

Allison, who had been listening with interest, said: "Good work! You have the authority you request."

"Have you got a line on the executive officer for Project 81 yet, Frank?"

Allison frowned. "Not yet, Shane. But something will turn up. Foster and Brady have filled most of the remaining slots. Denvers will go along as head physicist for the refinement of the drive brick for the return. Central Astro had given us the takeoff date as, let me see, ninety-three days from today."

"Pushing us, hey?"

"Can't be helped. It's either then or about three years from then. Say, Shane, instead of returning right away, see what you can find there in the line of an executive officer. Report if you get a line on anybody. Good-by, Shane."

"Good-by, Frank."

As the screen went blank, Shane sighed, cut the switch and walked out. At the front exit he went up the stairs to the platform, stepped into the waiting monorail suspension bus, found an empty seat. He felt drained and weary. Frank Allison was a difficult taskmaster. His personal affection for Allison made the job no easier.

At the scheduled time the bus slid smoothly away from Solaray, and braked to a stop in Allada seventy miles away in fifteen minutes. Shane Brent realized with a tight smile that it was the first time he had made any trip on Venus without paying any attention to the lush bluish-black vegetation below. The vegetation had standards of vitality and growth completely different from Earth vegetation. If the port city of Allada hadn't been originally constructed on a vitrified surface, thousands of laborers would have been required to slash the tendrils which would have grown each day. In fact, when the spot for Allada had been originally vitrified, it had only been done to a two-foot depth. Tendrils broke through on the third day, heaving and cracking the surface. After that experience, spaceships had hung, tail down, over the Allada site for ten days. When the molten rock had finally cooled, the experts had estimated that the black soil was vitrified to a depth of sixty feet. No plant life had broken through since that time. The electrified cables surrounding Allada constantly spit and crackled as the searching vine tips touched them.

Shane Brent went up to his room in Hostel B, shut the door wearily, listlessly pushed the News button under the wall screen and watched the news of the day with little interest as he slowly undressed. Crowds demonstrating in Asia-Block against the new nutrition

laws. Project 80, two years out said to be nearing Planet K. Skirts once again to be midway between knee and hip next season. The first bachelor parenthood case comes up to decide whether a child born of the fertilization of a laboratory ovum can legally inherit. Brent frowned. Soon a clear definition of the legal rights of "Synthetics" would have to be made. He stopped suddenly as he had an idea. He decided to submit it to Frank. Why not get Inter-Federal Aid for a project to develop Synthetics to fill personnel requirements for future project flights? But would humanity agree to colonization by Synthetics? It still wasn't clearly understood whether or not they'd breed true.

He turned off the news, took a slow shower and dressed in fresh clothes. It was a nuisance changing the insignia. He wadded up the clothes he had removed and shoved them into the disposal chute.

At five o'clock he got on the call screen and got hold of the general manager at Allada. The man recognized him immediately. "What can I do for you, Brent?"

"As soon as Hiram Lee gets off duty, send him in to see me at Hostel B."

"I hope you don't steal him away from us, Brent. He's the best man we've got with the Harids. He doesn't scare easy."

Brent grinned. "I'll try to scare him away from me, sir."

He walked away from the screen, went into the shower room and examined the drinkmaster. It was one of the old type. No choice of brands. He set the master dial to one ounce. He pushed the gin button three times, the dry vermouth button once. He turned the stir lever and held it on for a few seconds before he turned it off. He looked in the side compartment and found no lemon, no olives, no pickled onions. That was the trouble with Central Assignment only approving the second-class places. He took the right size glass off the rack, put it under the spout and lifted it until the rim tripped the lever. The Martini poured smoothly into the glass, beading the outside of it with moisture. Down in the lobby the centralized accounting circuit buzzed and the price of the Martini was neatly stamped on his bill.

He walked back into the other room, sat in the deep chair and sipped the Martini, thinking it odd that with all the scientific experimentation in taste effects, no one had yet come up with any substitute for the delicacy and aroma of a dry Martini.

Hiram Lee arrived as he was sipping his third.

Twenty minutes later Hiram Lee stood at the windows, his lips compressed, pounding his fist into his palm in monotonous rhythm.

He turned suddenly. "I don't know what I'm waiting for, Shane. Yes! Count me in. When do we leave?"

"Hold up there, boy. You've got to go to school for a while. And how about the colonization angle. Will you want to stay?"

Lee grinned. "If I could talk that little Seattle blonde into going along, three years would be a short, short trip."

"Providing she could pass."

"Oh, sure. I think she'd pass. But she's too smart to tie up with me. Maybe. At least I'll give it a try. When have I got to tell you about whether or not I want to stay on this brand new world you boys have located?"

"Let me see. Ninety-three days from now is takeoff. Thirty days would be needed to approve and train a woman. You have sixty-three days to convince this blonde of yours that you're a very attractive guy. And then you'll have to talk her into taking a little three-year trip and settling down in the brush with you."

Lee looked at him curiously. "You knew all this early this afternoon and you gave me that song and dance with a straight face."

"That's my profession, Hiram."

"You're good at it, but I still have got an urge to bust you one."

"We'll arrange that some time. Right now I'm looking for recommendations for somebody to fill the slot of executive officer aboard the Project flight. Any ideas?"

Lee frowned. "None of those boys at Solaray will do. I can tell you that quick. They're either slowly congealing in their own juice or they're making too good a thing out of their job. Better hunt around in the other plantations. There's a guy named Mosey over at Factri-grown on the other side of Allada that has a good reputation."

"I'll take a look. And by the way, Hiram. All this is under the hat."

"Natürlich, *mein herr*. May I respectfully recommend that we embark on an evening of wine and song? I hold out little hope for the other ingredient."

One big meal and two hours later, Shane Brent and Hiram Lee walked into the club on the strip—the club called Brownie's.

The air was chilled, thinned and scented with the crispness of pine. The place was lighted by glowing amber disks set into the walls. It was packed with the usual type of crowd. Bug-eyed tourists trying to pretend that it was old stuff to them; hard-drinking, hard-fisted men from the plantations; neat, careful kids from the ship crews in Allada port; the odd-job drifters who had become parasites on the social structure of Allada; a big party of Allada politicos, wining and dining two inspectors from Asia-block.

By luck they found an empty table for two not far from the dance floor. Hiram Lee was on hard liquor and Brent, feeling his limit near, had shifted to beer.

Lee said, slurring his words: "You're smart to get over onto beer, friend. You got to drink in this climate quite a while before you pick up a good head for the stuff." He glanced at his watch. "Floor show in ten minutes. Then you can see my blondie."

Shane Brent felt the artificial gayety draining out of him. He

looked around at the other tables, seeing suddenly the facial lines of viciousness and stupidity and greed. He remembered his reading of history and guessed that there must have been faces just like these in the early days of the American West. California in 1849 and 1850. Easy money attracted those who had been unable to make a proper adjustment to their accustomed environment. Actually it was the result of exploitation. The Harids, with their ant culture, had put up suicidal defense until General Brayton had discovered the wave length of the beamed thought waves which directed the Harids of each colony. Science had devised stronger sending devices than the colony waves and suddenly the Harids were servants.

Each foreman, such as Hiram Lee, carried one of the wave boxes and directed his crew. Central Economics had proven that the use of Harids in the culture—picking and drying of the herbs—was cheaper than any mechanical devices which could be set up.

Several couples danced to the music which came directly from New York. The oversize screen, a special three-dimensional job with good color values, covered most of the wall beyond the dance floor, showed a full orchestra. Brent guessed that when the floor show came on the management would either use live music or cut off the New York program and feed recordings onto the screen.

The second guess proved right. The screen darkened and the couples left the floor. It brightened again, showing a canned vision of a small group completely equipped with electrical instruments. The M.C. walked out as the spot came on. He carried a small hand mike. After the initial fanfare, the music gave him a soft background and he said: "This show costs a lot of money to put on. All you folks drinking beer kindly turn your chairs around with your backs toward the floor. It is my pleasure to present a young lady who doesn't belong out here on Venus, wasting her time and talents on you space-burnt wanderers. On the other hand, Venus is a very appropriate spot for her to be. I give you Caren Ames and her famous Dance of a New World!" He grinned and backed out of the spot which widened until it covered most of the small dance floor.

The music shifted into a low, throbbing beat, an insistent jungle rhythm. Brent smiled cynically at the build-up, thought it was pretty fancy for what would probably turn out to be an aging stripper.

She backed slowly onto the floor, staring into the shadows from which she backed. Brent's breath caught in his throat. She was a faintly angular girl who should have had no grace. She wore a stylized version of the jungle clothes of the foremen on the plantations. Across her shoulder was slung a glittering replica of one of the thought boxes. She carried in her right hand a shining knife of silver.

She moved with such an intense representation of great fear that Brent felt the uneasy shifting of the crowd. The music was a frightened heartbeat. Her grace was angular, perfect and beautiful. Her face was a rigid mask of fear, her blond hair a frozen gout of gold that fell across one shoulder.

The throng gasped as the thing followed her into the middle of the floor, stood weaving, with its eyes on her. At first glance Brent thought that it was actually one of the Harids, but then he realized that it was a clever costume, worn by a rather small person. It had all the swaying obscenity of one of the tiny praying mantis of Earth. The swollen abdomen, the little triangular head, the knotted forearms held high—all of it covered with the fine soft gray scales of a Harid. The three digits of each hand waved aimlessly about like the antennae of a mammoth insect.

The expanding spot showed a small bush covered with the blue-black oily foliage of Venus. The girl stood her ground, lifted the thought box to her lips. She swayed slightly in rhythm with the Harid and her shoulders straightened as the Harid turned away from her, went over toward the bush. It began to pluck at the leaves with the perky, incredibly fast motions of the genuine Harid. Her dance of fear turned slowly into a dance of joy of release from fear. The tempo of the music increased and she danced ever closer to the squat form of the Harid, the knife in her hand cutting joyous sparkling arcs in the flood of tinted light.

She danced ever faster, and Brent said to Lee out of the corner of his mouth: "What is she doing here? She's wonderful!"

"I told you she was, boy."

A movement to Brent's right caught his eye. A bulky man from one of the plantations, very drunk, wavered on his chair as he watched the dance with slitted eyes. The lines around his mouth were taut. Brent felt wonder that the girl's artistry could have such an effect on one of the hardened foremen.

The music increased to a crescendo, and suddenly stopped. The girl stood motionless, her arms widespread. A very slow beat began. The Harid began to sway its head slowly from side to side in time with the beat. A woman in the darkness screamed softly. Head swaying, the Harid turned slowly and faced the girl. Her face once again became a face of fear. The knotted arms of the thing lifted high. The girl took a slow step backward. The tension was a physical thing—it could be felt in the utter silence of the audience.

At that moment the man whom

Brent had noticed earlier roared, and jumped to his feet. There was a knife in his hand. He started for the mock Harid. Shane Brent left his chair in a quick smooth motion. His shoulder slammed against the thick thigh of the man with the knife and the two of them fell and slid across the polished floor. The room was in an uproar. The foreman bounded up, his drunken face twisted with rage. He drew the knife hand back to slash at Brent. Brent fell inside the thrust and struck the man a hammer blow across the side of his throat with the edge of his palm. The lights came on as the man dropped heavily onto his face. No one had thought of the music. It continued on. The mock Harid stood up and turned into a pale slight man who held the head portion of his costume in his hand. His pale lips trembled. He said, with great wonder: "That fellow would have cut my head off!"

The M.C. came out and said to the girl: "Want to try again from scratch, Miss Ames?"

Her eyes were still wide with shock. "No . . . I couldn't. Not right now. The next show maybe."

The M.C. turned to Brent. "Your check will be on the house, of course. The management is grateful."

The pale young man said: "I'm a little more grateful than the management."

"Thank you," Caren said simply.

Brent grinned at her. "You can return the favor by coming to our table after you change, Miss Ames. We're right over there."

She looked uncertain for a moment. "I don't usually—"

"Just this time, Miss Ames," the M.C. said.

Her smile was brilliant as she turned and left the floor. "See you in a few minutes Mr. —."

"Brent. Shane Brent."

By that time the foreman was back on his feet, pale and shaking. He didn't understand what had happened. His friends led him back through the tables and out the door. He was protesting plaintively.

She sat quietly at the table between them and talked generalities in a quiet, cultured voice. Her between-acts dress was dark and conservative, her blond hair pulled back with determined severity.

She rebuffed the clumsy verbal advances of Hiram Lee very politely. By the time Shane Brent sat through the next show, enthralled anew by her artistry, Hiram Lee had his head on the table and was snoring softly.

During the dull act which followed Caren's, two heavily built men came over to the table and shook their heads sadly. "Poor ole Hiram! *Tch! Tch!* You mind, mister, if we lug ole Hiram back with us to Solaray. The poor boy needs a nice soft bunk."

Hiram protested feebly, but walked unsteadily between them, half supported by them as he left. Caren came back a few moments later.

They sat and talked of many things. At last she smiled and said: "I was silly when I was afraid to

sit with you. Usually such things become a bit . . . messy."

He grinned. "I'm harmless. It does seem a little funny to me to find somebody like you in . . . this place."

Her eyes hardened. "I know how it goes from here on. Caren, you're too nice for a place like this. Let me take you away with me. I know the whole routine, Mr. Brent."

"It's not like that, Caren. Honestly. If I've asked a clumsy question, I'm sorry. It wasn't a buildup."

She looked into his eyes for long seconds. "All right, Shane. I believe you. I'll tell you how it happened. I was trained for ballet. When I was nineteen I married a very rich and very weak young man. After two years life became impossible. I managed to get a divorce. Every minute I spend on Earth is spent keeping out of his way. He manages to queer me in every dancing job I get. He has a weak heart. They won't accept him for space travel. I'm safe here. I can keep this job. But I can't ever go back."

She didn't ask for pity as she told him. It was as though she spoke of someone else.

"What kind of a career can you have here, Caren?"

She smiled and for once it wasn't a pretty smile. "I can make a living here. Some day there will be other cities beside Allada. Some day there will be a civilization on Venus which will be cultured enough so that my kind of career can exist here. But I won't live to see it."

"What do you want out of your life?" he asked gently.

"Peace. Freedom to do as I please." Her eyes were troubled.

"Is that all?" he asked insistently.

"No!" she flared. "I want more than that, but I don't know what I want. I'm just restless." She stopped and looked at him for long moments. "You are too, Shane. Aren't you?"

He tried to pass it off lightly. "Things have been a little dull lately."

"Take me for a walk through the city, Shane. When I feel like this I have to walk it off."

They walked to the edge of the wire near the constant sparking and crackling as the electricity crisped the searching tendrils. Above them the strange stars shone dimly through the constant heavy mist.

She stood with her head tilted back, her eyes half shut. On an impulse he reached out and unclasped the heavy pin that bound her hair so tightly. It fell in a shining flood over her shoulders.

"Why—" she said, startled.

"It just had to be. I feel like we've both been caught up in something outside of us and we're being hurtled along. Everything from here on will be because it has to be."

Without another word she came quickly into his arms. She was as intensely alive as during the intricate figures of her strange dance.

Once again the pretty clerk pointed out the small room to Shane

Brent. He walked slowly, reluctantly, shut the door quietly behind him. In a short time he had a closed circuit to Central Assignment and moments later the alert face of Frank Allison filled the screen.

"What's the matter, Shane? You look done in. Rough night?"

"You could call it that I guess."

"How about Lee?"

"Everything is set, Frank. He'll leave on Flight Seven a week from today. Have somebody meet him and get him cleared and out to the school, will you?"

"Sure thing. What else have you got on your mind? From your tone that isn't all you called about."

"It isn't. I've got an exec for you, Frank."

"Good! A competent man?"

"I guess so. At least he's had the proper background for it."

"Don't keep me in suspense. Who is the man?"

"Me," Shane said flatly.

Frank Allison looked at him for long seconds, no trace of expression on his face. "Are you serious, Shane?"

"Completely, Frank."

Allison moved away from the screen. Shane waited impatiently. In a few moments Allison was back and Shane was mildly shocked to see that the man was smiling broadly. "I had a little detail to attend to, Shane. I had to collect ten bucks. You see, I had a bet with West. We had you picked for the job for the last seven months, but in order for you to qualify for it, the idea had to originate with you. If it didn't, Psycho wouldn't approve your arbitrary assignment to the spot. Congratulations!"

Shane Brent wanted to laugh as he realized Allison had been playing almost the same game with him that he had been playing with Hiram Lee.

"I won't be back, Frank," he said quietly.

Allison sobered. "I had hoped you would, Shane. It's your privilege to make your own choice. I had hoped that seven years from now, with your experience on this project, you'd be fitted to come in here and take my job."

"I'm sorry, Frank," Shane said.

Allison sighed. "So be it. When will you be in?"

"I'll wait until she can come with me. It'll be Flight Eight probably. I'll confirm."

There was deep affection in Allison's smile. "Whoever she is, boy, I'm sure that she's a very lovely person. See you when you get here."

The screen darkened. He stood for a moment and looked at its opaque dead grayness. He didn't see the screen. He saw, instead, a distant planet. He saw himself standing in a clearing, his hands hardened with pioneer labor. Above him was an alien sky. Beside him was a tall girl. Her hair of purest gold blew in the soft breeze.

Shane Brent turned and walked quickly from the small room. Caren would be waiting.

THE END

INHERITANCE

BY ARTHUR C. CLARKE

He had a strange protection against death; he knew how he was going to die, and hence had no fear of anything till that came up. But it happened somewhat otherwise . . .

Illustrated by Timmins

As David said, when one falls on Africa from a height of two hundred and fifty kilometers, a broken ankle may be an anticlimax but is none the less uncomfortable for that. But what hurt him most, he pretended, was the way we had all rushed out into the desert to see what had happened to the A20 and hadn't come near him until hours later.

"Be logical, David," Jimmy Langford had protested. "We knew that *you* were O.K. because the base 'copter radioed when you were picked up. But for all that

we knew, the A20 might have been a complete write-off."

"There's only one A20," I said, trying to be helpful, "but rocket test pilots are . . . well, almost plentiful."

David glared back at us from beneath his bushy eyebrows and said something in Welsh.

"The Druid's curse," Jimmy remarked to me. "Any moment now you'll turn into a leek or a scale model of Stonehenge."

You see, we were still pretty lightheaded and it wouldn't do to be serious for a while. Even David's iron nerve must have taken a terrific beating, yet somehow he seemed the calmest of us all. I couldn't understand it—then.

The A20 had come down fifty kilometers from her launching point. We'd followed her by radar for the whole trajectory, so we knew her position to within a few meters—though we didn't know at the time that David had landed ten kilometers further east.

The first warning of disaster had come seventy seconds after takeoff. The A20 had reached fifty kilometers and was following the correct trajectory to within a few per cent. As far as the eye could tell, the luminous track on the radar screen had scarcely deviated from the pre-computed path. David was doing two kilometers a second—not much, but the fastest any man had ever traveled up to that time. And *Goliath* was just about to be jettisoned.

The A20 was a two-step rocket. It had to be, for it was using chemical fuels. The upper component, with its tiny cabin, its folded airfoils and flaps, weighed just under twenty tons when fully fueled. It was to be lifted by a lower two-hundred-ton booster which would take it up to fifty kilometers, after which it could carry on quite happily under its own power. The big fellow would then drop back to Earth by parachute. It wouldn't weigh much when its fuel was burnt. Meanwhile, the upper step would have built up enough speed to reach the six hundred kilometer level before falling back and going into a glide that would take David halfway round the world if he wished.

I don't remember who called the two rockets *David* and *Goliath*, but the names caught on at once. Having two Davids around caused a lot of confusion, not all of it accidental.

Well, that was the theory, but as we watched the tiny green spot on the radar screen fall away from its calculated course, we knew that something had gone wrong. And we guessed what it was.

At fifty kilometers the spot should have divided in two. The brighter echo should have continued to rise as a free projectile, and then fallen back to Earth. But the other should have gone on, still accelerating, drawing swiftly away from the discarded booster.

Instead, there had been no separation. The empty *Goliath* had refused to come free and was dragging *David* back to Earth—helplessly, for *David's* motors could not be used. Their exhausts were blocked by the machine beneath.

We saw all this in about ten seconds. We waited just long enough to calculate the new trajectory, and then we climbed into the 'copters and set off for the target area.

All we expected to find, of course, was a heap of magnesium looking as if a bulldozer had gone over it. We knew that *Goliath* couldn't eject his parachute while *David* was sitting on top of him, any more than *David* could use his motors while *Goliath* was clinging beneath. I remember wondering who was going to break the news to Mavis, and then realizing that she'd be listening to the radio anyway and would know all about it as soon as anyone.

We could scarcely believe our eyes when we found the two rockets coupled together, lying undamaged beneath the big parachute. There was no sign of David, but a few minutes later Base called to say that he'd been found. The plotters at Number Two Station had picked up the tiny echo from his parachute and sent a 'copter to collect him. He was in hospital twenty minutes later, but we stayed out in the desert for several hours checking over the machines and making arrangements to retrieve them.

When at last we got back to Base, we were pleased to see our best-hated science reporters among the mob being held at bay. We waved aside their protests and sailed on into the ward.

The shock and the subsequent relief had left us all feeling rather irresponsible and perhaps childish. Only David seemed unaffected—the fact that he'd just had one of the most miraculous escapes in human history hadn't made him turn a hair. He sat there in bed pretending to be annoyed at our jibes until we'd calmed down.

"Well," said Jimmy at last, "what went wrong?"

"That's for you to discover," said David. "*Goliath* went like a dream until fuel-cutoff point. I waited then for the five-second pause before the explosive bolts detonated and the springs threw him clear, but nothing happened. So I punched the emergency release. The lights dimmed, but the kick I'd expected never came. I tried a couple more times, but somehow I knew it was useless. I guessed that something had shorted in the detonator circuit and was earthing the power supply.

"Well, I did some rather rapid calculations from the flight charts and Abacs in the cabin. At my present speed I'd continue to rise for another two hundred kilometers and would reach the peak of my trajectory in about three minutes. Then I'd start the two hundred and fifty kilometer fall and should make a nice hole in Africa four minutes later. All told, I seemed to have a good seven minutes of life left—ignoring air-resistance, to use your favorite phrase. That might add a couple of minutes to my expectation of life.

"I knew that I couldn't get the big parachute out, and *David's* wings would be useless with the forty-ton mass of *Goliath* on his tail. I'd used up two of my seven

minutes before I decided what to do.

"It's a good thing I made you widen that air lock. Even so, it was a squeeze to get through it in my spacesuit. I tied the end of the safety rope to a locking lever on the door and crawled along the hull until I reached the junction of the two steps.

"The parachute compartment couldn't be opened from the outside, but I'd taken the emergency ax from the pilot's cabin. It didn't take long to get through the magnesium skin; once it had been punctured I could almost tear it apart with my hands. A few seconds later I'd released the 'chute. The silk floated aimlessly around me: I'd half expected some trace of air resistance at this speed, but there wasn't a sign of it. I could only hope that when we re-entered atmosphere it would spread itself without fouling the rocket.

"I thought I had a fairly good chance of getting away with it. The additional weight of *David* would increase the loading of the parachute by less than twenty per cent, but there was always the chance that the shrouds would chafe against the broken metal and be worn through before I could reach Earth. In addition the canopy would be distorted when it did open, owing to the unequal length of the cords. There was nothing I could do about that.

"When I'd finished, I looked about me for the first time. I couldn't see very well, for perspiration had misted over the glass of my suit. Someone had better look into that—it can be dangerous. I was still rising, though very slowly now. To the northeast I could see the whole of Sicily and some of the Italian mainland; further south I could follow the Libyan coast as far as Benghazi. Spread out beneath me was all the land over which Alexander and Montgomery and Rommel had fought when I was a boy. It seemed rather surprising that anyone had ever made such a fuss about it.

"I didn't stay outside long; in three minutes I'd be entering the atmosphere. I took a last look at the flaccid parachute, straightened some of the shrouds, and climbed back into the cabin. Then I jettisoned *David's* fuel—first the oxygen, and then, as soon as it had time to disperse, the alcohol.

"That three minutes seemed an awful long time. I was just over twenty-five kilometers high when I heard the first sound. It was a very high-pitched whistle, so faint that I could scarcely hear it, but it built up quickly to a thin, continuous scream that set my teeth on edge. Glancing through the portholes I saw that the parachute shrouds were becoming taut and that the canopy was beginning to billow above me. At the same time I felt weight returning as the rocket began to decelerate.

"The calculation wasn't very encouraging. I'd fallen free for over two hundred kilometers and if I was to stop in time I'd need an *average* deceleration of ten gravities. The peaks might be twice that,

but I'd stood fifteen G before now in a lesser cause. So I gave myself a double shot of dynocaine and uncaged the gimbals of my seat. I remember wondering whether I should let out *David's* little wings, and decided that it wouldn't help. Then I must have blacked out.

"When I came round again I had normal weight. I felt very stiff and sore, and to make matters worse the cabin was oscillating violently. I struggled to the port and saw that the desert was uncomfortably close. The big parachute had done its work, but I thought that the impact was going to be rather too violent for comfort. So I jumped.

"From what you tell me I'd have done better to have stayed in the ship. But I don't suppose I can grumble."

We sat in silence for a while. Then Jimmy remarked casually:

"The accelerometer shows that you touched twenty-one gravities on the way down—only for three seconds though. Most of the time it was between twelve and fifteen."

David didn't seem to hear and presently I said:

"Well, we can't hold the reporters off much longer. Do you feel like seeing them?"

David hesitated.

"No," he answered, "not now."

He read our faces and shook his head violently.

"No," he said with emphasis, "it's not that at all. I'd be willing to take off again right now. But I want to sit and think things over for a while."

His voice sank, and when he spoke again it was to show the real David behind the perpetual mask of extraversion.

"You think I haven't any nerves," he said, "and that I take risks without bothering about the consequences. Well, that isn't quite true and I'd like you to know why. I've never told anyone this, not even Mavis.

"You know I'm not superstitious," he began, a little apologetically, "but most materialists have some secret reservations, even if they won't admit them.

"Many years ago I had a peculiarly vivid dream. By itself, it wouldn't have meant much, but later I discovered that two other men had put almost identical experiences on record. One you've probably read, for the man was J. W. Dunne.

"In his famous book, 'An Experiment With Time,' Dunne tells how he once dreamed that he was sitting at the controls of a curious flying machine with swept-back wings, and years later the whole experience came true when he was testing his inherent stability airplane. Remembering my own dream, which I'd had before reading Dunne's book, this made a considerable impression on me. But the second incident I found even more striking.

"You know Igor Sigorsky; he designed the first transatlantic Clippers and made the modern helicopter possible. In his autobiography, 'The Story of the Flying S,'

he tells us how he had a dream very similar to Dunne's.

"He was walking along a corridor with doors opening on either side and electric lights glowing overhead. There was a slight vibration beneath his feet and somehow he knew that he was in a flying machine. Yet at that time there were no airplanes in the world and few people believed there ever would be.

"Sigorsky's dream, like Dunne's, came true many years later. He was on the maiden flight of his first Clipper when he found himself walking along that familiar corridor."

David laughed, a little self-consciously.

"You've probably guessed what *my* dream was about," he continued. "Remember, it would have made no permanent impression if I hadn't come across these parallel cases.

"I was in a small, bare room with no windows. There were two other men with me, and we were all wearing what I thought at the time were diving suits—though I know better now. I had a curious control panel in front of me, with a circular screen built into it. There was a picture on the screen, but it didn't mean anything to me and I can't recall it now, though I've tried many times since. All I remember is turning to the other two men and saying: 'Five minutes to go, boys'—though I'm not sure if those were the exact words. And then, of course, I woke up.

"That dream has haunted me ever since I became a test-pilot. No—haunted isn't the right word. It's given me confidence that in the long run everything would be all right—at least until I'm in that cabin with those two other men. What happens after that I don't know. But now you understand why I felt quite safe when I brought down the A20 and when I crash-landed the A15 off Pantelleria.

"So now you know. You can laugh if you please—I sometimes do myself. But even if there's nothing in it, that dream's given my subconscious a boost that's been pretty useful."

We didn't laugh, and presently Jimmy said with careful unconcern: "Those other men—did you recognize them?"

David looked doubtful.

"I've never made up my mind," he answered. "Remember, they were wearing spacesuits and I didn't see their faces clearly. But one of them looked a lot like you, though he seemed a good deal older than you are now. I'm afraid you weren't there, Charlie. Sorry. I don't know who the second man was."

"That suits me," I said, very nearly meaning it. "As I've told you before, I'll have to stay behind to explain what went wrong. I'm quite content to wait until the passenger service starts."

Jimmy rose to his feet.

"O.K., David," he said. "I'll deal with the gang outside. Get some sleep now—with or without dreams. And by the way, the A20

will be ready again in a few weeks. I think she'll be the last of the chemical rockets; they say the atomic drive's nearly ready for us."

We never spoke of David's dream again, but I think it was often in our minds. Three months later he took the A20 up to six hundred and eight kilometers—a record which will never be broken by a machine of this type, because no one will ever build a chemical rocket again. David's uneventful landing in the Nile Valley marked the end of the epoch which had begun in Germany in the 1920s.

It was three years before the A21 was ready. She looked very small compared with her giant predecessors, and it was hard to believe that she was the nearest thing to a true spaceship that man had yet built. This time the takeoff was from sea level, and the Atlas Mountains, which had witnessed the start of our earlier shots, were now merely the distant background to the scene.

We walked with David out to the launching site, talking in the inconsequential way one does on such occasions. He was as confident as ever, and we, too, had begun to share his belief in his own destiny. I remember asking him if he'd told Mavis about his dream, for I'd often thought that hers was the hardest part of all. She could do with some of his assurance during the long hours of waiting. He hesitated for a moment before he answered.

"No," he said, "I've not told her. She's very—practical—you know. Besides, young Dave keeps her from worrying about me."

"He's nearly fifteen now, isn't he?" I asked. "Is he going to follow in his father's footsteps?"

"No fear," said David firmly. "He's not old enough to know his own mind yet, but I hope he'll take up architecture, so that there'll be someone to carry on the family business now that I've let them down so badly."

We paused for a moment in the air lock while the cameras watched us with hungry eyes. Then Jimmy said softly, so that no one could overhear:

"It won't be long now, David, before we build that three-man ship of yours."

And I knew that he was only half joking.

We watched through tinted glasses as the A21 tore up into the sky, trailing behind her the terrible beauty of the atomic blast. Within a minute the machine was lost from sight and we raced to the plotting room so that we could still follow her on the way to space.

When we got there the signal was just fading from the radar screens, and the detonation reached us a little later. It was a very small explosion, for if the machine had been much higher there would have been no sound at all. And that was the end of David and his dreams.

The next I recall of that period is flying down the Conway Valley in Jimmy's 'copter, with Snowdon gleaming far away on our right.

We had never been to David's home before and we were not looking forward to this visit. But it was the least that we could do.

As the mountains drifted beneath us we talked about the suddenly darkened future and wondered what the next step would be. Apart from the shock of personal loss, we were beginning to realize how much of David's confidence we had come to share ourselves. That confidence, and much else, had been utterly destroyed.

We wondered what Mavis would do, and discussed the boy's future. I had not seen him for several years, and Jimmy had never met him at all.

Mavis was quite calm and collected, though she seemed much older than when I had last met her. For a while we talked about business matters and the disposal of David's estate. I'd never been an executor before, but tried to pretend that I knew all about it.

We had started to discuss the boy when we heard the front door open and he came into the house. Mavis called to him and his footsteps came slowly along the passage. We could tell that he didn't want to meet us, and his eyes were still red when he entered the room.

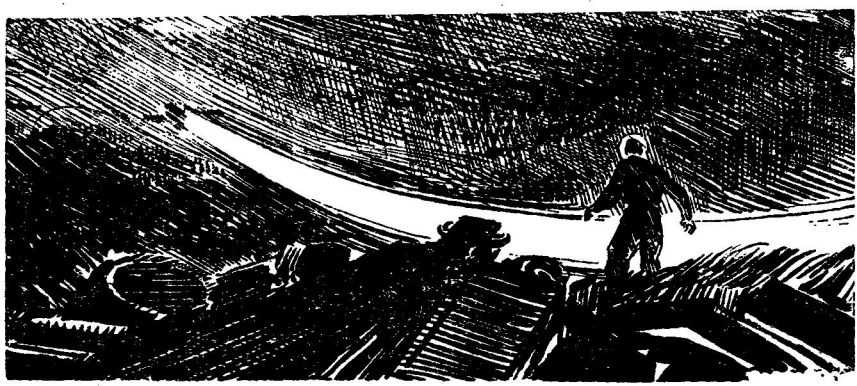
I had forgotten how much like his father he was, and I heard a little gasp from Jimmy.

"Hello, David," I said. "I expect you remember me. This is Jimmy Langford."

David never looked at me. He stood quite still, staring at Jimmy with that puzzled expression of a man who has seen someone before but can't remember where.

And in that moment I knew, with a certainty beyond all proof and all reason, that young David was never going to be an architect.

THE END



BOOK REVIEW

"The Science And Engineering Of Nuclear Power," Edited by Clark Goodman. 503 pp., Addison-Wesley Press, Cambridge, Mass. $7.50.

If the Smyth Report was the first spadeful dug in the foundation of our coming atomic civilization, the present massive volume represents a good part of the excavation. "Nuclear Power," the first of two volumes, is the result of a series of seminars initiated at MIT in October, 1946. Eleven physicists, including Victor F. Weisskopf and E. P. Wigner, collaborated in the work, which covers the subject of atomic energy from the fundamentals of nuclear physics up to the design, control, and operation of a uranium pile.

To those not acquainted with the extent of declassification of atomic information during the past two years, this book will come as a great surprise. We need no better proof that there is no such thing as an atomic "secret." For here is practically a cookbook on how to build a pile in several not-so-easy lessons.

This is not to imply that everything is divulged. All through the book the reader is faced with the uneasy knowledge that important details are being omitted. While general equations for the design of a pile are derived, it is still necessary to substitute numbers into the formulae to obtain working information. These numbers are mainly various nuclear cross-sections, and as one of the authors puts it: ". . . we have chosen, at random, constants from the prewar published literature, without prejudice as to whether these constants agree or disagree with those measured in the Manhattan Project laboratories. It is worth emphasizing again that the pile here designed has no resemblance to any actual pile, living or unborn."

Very little is mentioned in this book concerning atomic propulsion, aside from a short description of two very impractical rocket devices. The reason for this lack is no doubt to avoid sidetracking the main purpose of the book—the discussion of large nuclear power plants of the steam-boiler type. Also, no doubt, because atomic propulsion is still very much classified material.

MILTON A. ROTHMAN.

BRASS TACKS

We have a series of articles on computers on hand, coming up as rapidly as possible.

Dear Mr. Campbell:

Here's how I rate 'em. See how I agree, or should I say disagree, with the Analytical Lab:

(1) ". . . And Searching Mind" —Shows promise of being better than "With Folded Hands" and one of the finer stories of the year.

(2) "Her Majesty's Aberration" —Confirmed pleasurable expectations upon seeing Old Doc Methuselah again.

(3 & 4) "West Wind" and "Film of Death"—Average for Astounding.

(5) "The Incredible Invasion"—A let-down from George O. Smith's usual style.

The articles were good as usual, and I would like to second the motion by R. A. Marble for something about electronic digital computers. I know of two more now in the making and they are rousing my curiosity more and more.

Oh, yes, the problems propounded by Mr. Geffe:

(1) The Second man is a Puritan for we heard the First make the statement which the Second claims that the First made. Since both a Puritan and a Cavalier would claim to be a Puritan, the First may be either. The Third is what the First is not since he disagrees with the First. Therefore, the First or the Third is a Puritan and the other a Cavalier, and so there were two Puritans and one Cavalier in the trio.

(2) No, an inner tube cannot be turned inside out through a simple hole since the tube contains a doubly-connected region; i.e., the region cannot be deformed into a sphere without breaking through—discon-

necting—it in one place. Therefore, the inclosed region cannot be removed through the simple hole without tearing the hole so that the remaining tube contains only a simply connected region, either forming a cylinder or removing the hole from the center of the doughnut shaped region.

(3) Another problem in Topology and the answer is yes. A flat rubber band may be stretched around a broom handle so as to lie flat—without twisting relative to the surfact of the broom handle—*any odd* number of times within the limit of the stretch of the band. The twist incurred in the even numbered round can be compensated in the next odd numbered round.

(4) The maximum number of consecutive integers that can be formed by the addition and/or subtraction of 'n' integers is the sum of $3^0 + 3^1 + 3^2 + \ldots + 3^{n-1}$. And so the integers 1 to 40 can be formed in this manner by 3^0, 3^1, 3^2 and 3^3 or 1, 3, 9 and 27.

(5) This problem, as you noted in your caption to Mr. Geffe's letter, is known as Russell's Paradox. It has no direct answer since the definition of Class O to contain all ordinary classes and only ordinary classes is, in itself, contradictory when combined with the definition of an ordinary class as one which does not contain itself.

If anyone desires saturation with problems of this nature, I suggest "Mathematics for the Imagination," by Kasner and Newman, although I cannot name the publisher. These types and many others from "goo-gool" to the Tower of Hanoi, sometimes called the Tower of Benares.

—Paul W. Burke, Mechanical Engineer, 2714 Valley Street, Dayton 3, Ohio.

We have specified to our authors that the "atomic doom" stories are not wanted, for precisely the reasons you give. "From Unknown Worlds," an authology of Unknown *will be out in September; how it sells will determine* Unknown's *fate.*

Dear Sir:

Most of us are getting quite used to such futuristic trifles as radar and the atomic bomb being prognosticated fictionally if not editorially, in the pages of our magazine. In fact the Editor has at times become quite smug about it. This may be explained by his failure fully to realize that Astounding is now "accepted" by the intellectual longhairs who formerly counted its readers among the lunatic fringe. Let us realize, sir, that Astounding is no longer "pulp" except in format, and with that realization will cease the need to compensate for that inferior feeling!

However much has been claimed for Astounding in the way of forecasting, the late lamented *Unknown* was never heard to make such a claim.

Please enter another plea for *Unknown*. Have had every copy of Astounding and *Unknown* which came into Canada, with the exception of three wartime years spent

in England, and even there managed to get a number of the rather aborted British publication. Now that Astounding is excluded from Canada as a "pulp" in our efforts to conserve exchange, I am fortunate enough to have seven months to go on a subscription which just got under the wire. Before that time, I hope the restrictions are lifted, or you are publishing in this country. If *Unknown* starts before that time, please dream up some method of teleportation through the customs. You can count on lots of co-operation from this end.

I count myself one of the old-timers when it comes to reading Science Fiction, and request that you don't publish any more Lensman stories. Dr. Smith has expanded his sphere so much that his writing is as tenuous as the atmosphere of Mira, and here's one man with a stage of mind that doesn't get it. He has created a whole new nomenclature, so far divorced from reality that it just doesn't register, and between galaxies you can hear the galloping. I have enjoyed Dr. Smith's writings as much as the next man, but I feel that he has overexpanded, and that it would benefit all of us to have him get his feet on the ground again.

If we accept as a tentative definition for Science Fiction, "the extrapolation of known scientific facts" and as long as we don't adhere to it with the tenacity of a government employee, I think we have what the average reader can read and appreciate. I note with pleasure the humorous touches in Lewis Padgett's current "Ex Machina" as every once in a while I emerge from my study of one of your fifty-seven varieties of atomic war with a nostalgic longing for something simple and slapstick, in the line of "Hicks' Inventions With a Kick."

Maybe the foregoing explains why you are having so many requests for *Unknown*. People are getting atomic warfare thrown at them from all angles these days. I for one am heartily sick of it. You are no longer a prophet crying in the wilderness. I've been reading enough of this type of story to have a reasonable idea of what ravening energies lie in the heart of the atom, and I want a bit of pure escapism. That is a primary need that many of your stories are not filling, because they contain a crusading slant, and thus their future comes too near to the terrible possibilities of the present. So before you accept or commission a single story for the new *Unknown*, please read the statement of policy, particularly paras. 3 and 6 on page 5 of Volume 1, Number 1 of the old *Unknown*:

Para. 3:

One rule only we apply as limitation to an author's imagination; that the resultant story be pure entertainment . . . (and) must stimulate imagination and enjoyment.

Para. 6:

And each month we shall bring you a magazine wherein the authors are bound by but one rule—pure entertainment.

God help you, Mr. Editor, if a single atom gets into the new *Unknown*.—W. N. McBain, 11227-125 Street, Edmonton, Canada.

I have a feeling that any philosophy consistently adhered to would help a lot; the trouble is most people have no conscious set of evaluations—no philosophy.

Dear Mr. Campbell:

Having pondered at some length on Mr. McNelly's letter in Brass Tacks which dealt in part with the "Non-Sanity of Non-Aristotelian Systems," I would like to offer some information on Korzybski's system which may be of interest to some readers.

To clear the air first, though, I would like to comment on the work that introduced the non-A system to many readers of Astounding—van Vogt's "World of Ā." It was, in my opinion, a first-class yarn—perhaps it might be classified as a great yarn—but it bore so little relation to Korzybski's work that nothing but the terminology was recognizable to any serious student of the system.

Mr. McNelly's objection appeared to be purely a product of his own nervous system. The "non-logical" step of reasoning which he described and attributed to Korzybski will not be found, expressed or implied, in Korzybski's writings.

After a long period of study and research in many fields, Korzybski developed what might be called a system of evaluation which was, as far as possible, in accord with the structure of the world. That is to say, in accord with the body of knowledge which we label science, including the non-E and non-N systems. He developed techniques which make it possible to evaluate situations on the basis of the structure of those situations. The magnitude of that little statement, and of Korzybski's achievement will not be readily apparent to one who has not made an extensive study of human behavior. To this painfully acquired field of knowledge, he applied a term—Non-Aristotelian—a label which carries no cosmic significance other than the fact that it designates his work. He specifically stated that his system was only one of many possible systems to which the term might apply.

It is rather unfortunate that there is no capsule method for gaining an understanding of the formulations of General Semantics. The very far-reaching beneficial effects resulting from the application of its techniques are not attained by reading Hayakawa or Stuart Chase nor by a once-over-lightly of "Science and Sanity." It is a system which repays its students in direct ratio to the time and effort expended on it.

The glib identification of non-A with established systems of "semantic" and the resulting classification of students of the system as "semanticists" is a source of confusion. Although Korzybski applied the term General Semantics to his work —and, I suspect, regrets it on occasion—its connection with any of the various schools of semantics is very tenuous indeed. General Semantics deals only incidentally with words and languages, with "referents" and "operations," and other paraphernalia of the various semantic systems. Basically, Korzybski made a study of human reactions and evaluations. This did involve an exhaustive study of linguistics, of course, but also very complete investigation and study of psychologies, neuro-psychiatry, colloid chemistry and mathematics; to name only a few. From these investigations, Korzybski developed a system which dealt more with the mechanics and structure of living and with the structure and processes of the world, rather than with the manipulation of verbal symbols which is the prerogative of the "logician" and the classical "semanticist." This broad foundation and its lack of dependence on verbalisms, explains why the non-A system failed to totter and disintegrate under the impact of Mr. McNelly's criticism.

An understanding of General Semantics is not possible without a thorough study of "Science and Sanity." Recently, however, an excellent introduction to the subject has appeared. This is a small book titled, "Introductory Lectures," by Francis Chisholm and can be purchased from the Institute of General Semantics at Lakeville, Connecticut. The individual who doesn't feel quite up to tackling Korzybski's monumental work, or who thinks he

hasn't time, will gain more and better information from it than I have been able to give here.—Philip C. Good, Route 8. Box 1100, Salem, Oregon.

This noble savage business isn't what it's cracked up to be, I understand.

Dear Mr. Campbell:

After reading Astounding Science-Fiction for a number of years and defending myself as best I could against the ridicule of most of my friends—winning over a few—I found myself in a triumphant position due to events at Hiroshima and basked in the adulation of those who thought me a prophet, but in the last couple of years sweet revenge has turned to ashes in my mouth. Since I can read, I cannot avoid seeing huge headlines, to my dismay, and I've been saving electricity by leaving the radio silent for the most part—I'm doing my thinking in solitude, which is probably the only way one can really think, but thought without action is as unfruitful as action without thought.

I've enjoyed the stories you publish so much that I abandoned all other s-f magazines long ago, and occasionally I skim an article or two, but mathematics is not my strong point. This leads to a suggestion: since the knowledge of nuclear physics, et cetera, will not prevent a war, how about something solid along the sociological or psychological line? Maybe Van Vogt, who did

"World of A," could dish out an article or a series on semantics, which, short of psychoanalysis for everybody, seems the best method of fighting this trend toward world suicide? Admitted that your editorials have cut into the problem clearly for some time, and that the readers of Astounding Science-Fiction are better oriented than the average run, I still think a comprehensive treatise would be very helpful.

Failing this, would two or three hundred people representing the basic trades and professions care to join me in setting up a self-sufficient community in a nice deep valley somewhere to watch the radioactive clouds roll by? I'm about ready to throw in my cards and take my chips to a new game. Think of all the time you'd have to read the 781 great books and to learn to play the double bassoon—while you weren't plowing, feeding the cattle, weaving next winter's clothes and trying to find a substitute for the machine-made steel needle, of course.—Albert Manley, 1900 F Street N.W., Washington 6, D.C.

I have a slight suspicion that even Asimov hasn't figured out where that Second Foundation is!

Dear Mr. Campbell:

I hardly have the conceit to think my suggestion of several months ago influenced you or the policy of ASF, but for some reason, Brass Tacks has been improving, for which I offer congratulations. You still leave it out at times, but when you do include it there are many more letters than formerly, and more editorial comment, which helps a lot. There is still room for improvement, though.

But the covers! The covers continue to get better and better every month. How good can you get? Alejandro and Bonestell are both wonderful, although the effect of the April cover was somewhat spoiled by the black bands at top and bottom.

". . . And Searching Mind" so far is magnificent, but I'll reserve comment until the final installment is out. So often an otherwise truly great and powerful story is ruined by a weak ending—and if it isn't ruined, a great deal of the effect is lost. "Children Of The Lens" was beautifully done, and in the best Smith tradition, until that last part when he just had to bring Kim back to make dear little Chris and everybody happy. Maybe they were happy, but it took away the "punch," somehow. The same way with "The End Is Not Yet." Although not up to the standard of "Final Blackout," it was still a fine, well-done story, until the ending, which seemed rather hastily tacked together, as if the author was meeting a deadline.

"Ex Machina" is funny and clever, best story in the April issue. (Except ASM.) There is very little humor in the stf field—*real* humor—and Gallegher provides a welcome change from the "doom" stories. The liquor organ is too reminiscent of a bottle baby, how-

ever. For me, it injects a slightly repulsive note into an otherwise highly amusing story.

"New Wings" was very good, but could have been really unusual if it had been longer, more slowly and carefully worked out. The author had a fine idea, but didn't give it enough scope.

"Man On Mira" was *good,* as Richardson's articles always are. I have a failing for astronomy, anyway, but I think many of your other readers would welcome more articles of this type, also. As for the endochronic properties of resublimated thiotimoline—the article was very informative as far as it went, but the author didn't quite cover all the possibilities of this interesting substance. Personally, I prefer a good strong compound of benzedrine and activated scuffodroxyphilus to solute my thiotimoline. This gives it more color and ionization, as well as flmph, which is especially desirable if you intend to use it in lemonade.

In closing, I have one question to ask. "Now You See It" was a wonderful story, deeply interesting as are all the Foundation stories; but I failed to get one point. Where was the *Second* Foundation? Will someone please explain?—Margaret McIntyre, Box 1066, Y.W.C.A., Cincinnati, Ohio.

By gad, the man has a point there!

Dear Mr. Campbell:

"Ex Machina" takes first place with me in the April issue because

I like Joe, the insufferable robot; but Gallegher's plan to provide danger safely to jaded souls reminds me of my asthma.

I've been plagued with this malady ever since I can remember, and when I get into a real paroxysm, with my face turning blue and black, either a doctor or some kindly relative shoots me with adrenalin, which soon brings me out of the attack.

But once a few years ago I happened to be miles away from a doctor without my supply of adrenalin, and was seized with a violent attack. My friends began rushing me to the nearest town with frantic haste, all the time my breath getting shorter and my cyanosis more pronounced. I began to lose consciousness, and the conviction swept over me, accompanied by a great wave of panic, that I was dying. Almost immediately my breathing got easier, and when we finally reached a doctor's office, I was in pretty good shape.

The doctor said my spectacular recovery was due to the flood of adrenalin my fear of death released into my blood stream, acting much as an artificial injection of the stuff would have acted. He told me this often happened to asthmatics, and helped to explain why those of us with good tickers seldom died as a direct result of an attack. I needn't be afraid of dying, he said, if I ever got into such a stage again.

Now the heck of it is, armed with the doctor's assurance, I can't get scared when I have an attack. "I won't die," I say calmly. "My adrenals won't let me." Thus assured, my adrenals sleep on, and refuse to co-operate, and I get worse and worse until somebody gives me a shot of adrenalin.

I wonder if Padgett's adventurers might not react the same way?

Can a man get scared enough to stimulate his adrenals to release adrenalin to set off the catalyst to start the accelerator to take him out of danger when all the time he knows the end result is going to be his removal from danger?

It might work once, but after that I'd hate to risk it. I remember my asthma.

I'll rate the other stories without comment:

1. "Ex Machina"
2. "... And Searching Mind"
3. "The House Dutiful"
4. "He Walked around the Horses"
5. "New Wings"

"Man on Mira" was all well enough, but, as I've mentioned before, I'd like to see the name "Astounding Science *Fiction*" taken literally.—Grover Ables, Box *72*, Warner Robins, Georgia.

★ ★ ★ ★ ★ ★ ★ ★ ★

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