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JANUARY, 1935

No. 9

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9

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T. O'CONNOR SLOANE, Ph.D., *Editor*
Editorial and General Offices: 461 Eighth Avenue, New York, N. Y.

Extravagant Fiction Today Cold Fact Tomorrow

Troposphere, Tropopause and Stratosphere

By T. O'CONNOR SLOANE, Ph.D.

THE surface of small areas of water, or other liquids on the earth, are taken as being level. Thus in taking observations with a sextant when on land, an absolutely level reflecting surface is an essential, and a vessel of mercury is arranged to supply this, although it really has the curvature of the earth. Its mirror-like surface reflects any celestial body whose altitude is to be determined. This gives so nearly level a reflecting surface and so nearly a plane, that the latitude can be determined within a few hundred feet by its use. The surface of the ocean is very nearly spherical. The disturbances due to tides are infinitesimal, when referred to the diameter of the earth. The disturbances due to the true tidal wave, which is carried around the world by the combined effect of the attractions of the sun and of the moon, is modified by the irregular conformation of the

shore lines of the land, so that tides are higher and lower in some places than in others.

The atmosphere includes several layers, distinctive and varying in thickness through relatively large amounts. While we speak of the depth of the ocean in numbers of feet or of fathoms, when we come to the atmosphere, we speak of it in terms of miles. The layers of the perfectly elastic, highly mobile air can be defined and designated with the provision that they vary greatly in relative depth from time to time. The atmosphere in which we live is an ocean of air varying in height, for we measure it upwards, from six to ten miles. The ocean of water we measure in depth or downwards. This layer of the atmosphere has been named the troposphere.

It is the layer of the atmosphere termed the troposphere, whose meteorology affects the drama of our lives.

Storms and temperature-changes, the seasons and clouds and sunshine are a part of our life experiences, and the general history of the troposphere is one of constant change. And there is one point of similarity between our troposphere, taking it as the ocean of air, and the ocean of water—they are rather closely related in their depths. The ocean proper at its deeper portions is about six miles in depth—the troposphere varies from six miles to ten and a half miles in height. And in this range occur the meteorological changes that affect our lives. Its greatest height is at the equator and the least height is in the far north and south latitudes.

Above the troposphere a dividing layer is assumed called the tropopause, where the change is made from the troposphere to another layer of air which is the stratosphere, and which has figured conspicuously in the daily news items of recent years. The stratosphere varies in temperature being coldest where it is farthest from the earth, which place is the equatorial region. It is coldest above the warmest part of the earth.

The stratosphere has no clouds, no rain, and intense cold. The lowest recorded temperature is -134° F. It may be said to have no change in temperature except as related to the troposphere. It appears perfectly obvious that the temperature as we rise into the stratosphere, should constantly fall, following the rule of temperature changes encountered in ascending mountains. Yet for some unexplained reason this does not occur in the stratosphere. The temperature changes in general accordance with its distance from the earth, but the almost regular reduction in temperature with increased height does not hold above the tropopause. We have never gone very far into the stratosphere, but the records of balloon ascents lead to this conclusion. The changes in temperature

in the upper layers of the stratosphere are still a matter of conjecture. We do not know when the problem will be solved if it ever will be. The water supplies the fishes' oxygen. We live by the oxygen of the troposphere.

It has long been known that the temperature of the air falls at higher elevations. This it does with some degree of regularity, the higher a balloon ascends, the higher we ascend a mountain, the lower the thermometer reading will be. But this law obtains only for the troposphere. When the limiting or separating layer called the tropopause is passed the decrease in the readings of the thermometer, the regular fall of temperature encountered in the troposphere, ceases, and a layer filled with rarefied air is reached, beginning at a height of five to ten miles from the surface of the earth, where the temperature of highly rarefied air is approximately uniform or at least has no change due to elevation and is unaffected by distance from the earth's surface. The stratosphere extends from the tropopause to a height of about thirty miles above the earth.

The fact that height from the earth's surface does not effect any graduated regular change in the temperature of the stratosphere, must not be taken as meaning that it possesses a uniform temperature in its distance from the earth's surface, in all its parts. The tropopause varies and where it is nearest to the earth the temperature of the stratosphere overlying it is the highest. The temperature of -76° F. for the troposphere has been registered in the Antarctic at ground level. Over in Batavia in the Dutch East Indies in the tropics a temperature of -134° F at a height of ten miles in the stratosphere has been recorded.

On the earth the troposphere is so irregular in its attributes that we never know what the next hour may bring, we are quite uncertain about the future

weather. But in the stratosphere these uncertainties hardly exist or do so in very small degree. There are no storms, no rains, no clouds. It has been explored by one balloon to a height of about $11\frac{1}{2}$ miles by standard methods. Several balloons with human observers have gone nearly thus far into its mysterious depths. The difficulties involved are very great—the car containing the observers has to be hermetically sealed and several lives have been lost in these ascensions.

But untended balloons with self-registering instruments have been sent adrift and it is reported that in one case a height has been registered of $23\frac{1}{2}$ miles. These balloons are called sounding balloons, and the average of 15 miles is assigned them for the heights attained. The $23\frac{1}{2}$ mile record we are at liberty to doubt.

Sounding balloons are liberated with their equipment of extremely light registering instruments and with a written request for their return, by anyone who should find them. These registrations were for various phenomena and varied greatly in their reliability. Some were quite accurate, but, as already noted, elevations determined by barometric readings are not very reliable. The instruments which the little balloons carry are suspended at the end of a thread about a hundred feet in length, so as not to be affected in any way by the balloon.

A comparatively recent system of construction for sounding balloons is to use two balloons, one small one inside the other larger one. It was determined at what rarefaction of air the larger one would burst. When this occurs the smaller interior balloon acts as a parachute and descends gently to the earth with its load of tiny instruments. This method is due to Regener of Stuttgart and the ascent of $17\frac{1}{2}$ miles is credited to one of his balloons.

The history of balloon ascensions is one of flotation. But it is interesting to note that the highest elevation ever reached by man's instrumentality was attained by a steel projectile. The celebrated "German guns" that bombed the city of Paris from a distance of some seventy miles, did it by giving a very high angle of projection to the gun. The shell in a few seconds penetrated the troposphere and went on through the almost airless regions of the stratosphere, and above it so that by far the greater portion of the course was made through an approximate vacuum.

The curve followed by a projectile near the earth, the ballistic curve by name, is unsymmetrical due to the presence of the air, whose resistance distorts it. If there were no air the curve would be a parabola. But the shells of the guns bombarding Paris, did so much of their journey in an approximate vacuum, that they approached the parabola in the course they followed. It has been calculated that they attained a height of thirty-four miles, or nearly one two hundred and fortieth of the diameter of the earth. On the eight inch globe, we referred to last month, this would be about the thirtieth of an inch.

An interesting coincidence as it may be termed in the troposphere is to be found in the height of Mount Everest. This is probably the highest mountain on earth and its summit has an elevation almost equal to the minimum depth of the troposphere. And man has never been able to climb to the summit of this giant of the Himalayas.

The many changes that occur in the stratosphere, its perpetual unrest, have done much for mankind, much good and a little evil. For long years the winds have driven machinery and ships for him, but at last have been given their holiday from mechanical uses. Sailing vessels, whose driving power was the wind, are rapidly disappearing from ocean

and lake; windmills are nearly extinct, except small ones for country houses. So the wind, except as a possible source of destruction in tornadoes and cyclones, ceases to directly interest us, although it is still working for our benefit in developing the beneficial weather changes especially rain. This phenomenon of the troposphere is in a sense the greatest triumph of nature over man. For while heat motors and electric motors have displaced much of the possibilities of using the wind, man has not yet succeeded, and has naturally not even tried, to distill pure water from the salt water of the ocean and to distribute the distillate on mountain tops to produce cataracts, and on many vast regions to supply rivers and to keep lakes from evaporating to dryness, and to give life to vegetation. The cataracts in the mountains of Switzerland drive machinery, and in doing so utilize the energy of the sun.

Man has striven for years to produce a solar engine, but every water turbine, large or small, is driven by the solar heat and by the disturbances of the air by the winds of the troposphere. Without the heat of the sun the water charged with salt would stay in the ocean. Even when the sun draws it up, the operation is incomplete for here the wind comes into play and blows the humid air over the land area, where it does its work by forming rain for mankind. Wind, water and the heat of the sun working in a sort of unison are what make the earth habitable. We could not exist on the earth without these three factors interlocking in their actions. And how few of us realize that the wind, strong or gentle, does the all important action of distributing the water distilled from the ocean over the land. The very glaciers of the earth, the great rivers of ice, are maintained by the wind. The iceberg is a product of wind, sun and ocean, and when it breaks off

from the edge of a glacier and floats off to melt in the ocean, it is only going back to its parent source.

Our arithmetically disposed readers can calculate how much of the heat of the sun is used by the earth. It is an infinitesimal proportion of the total heat of the great luminary yet if we did not receive our infinitesimal proportion of the sun's radiations we would perish on an earth sinking into desolation. And this shows how active is the troposphere in taking care of the earth.

But go above the tropopause and a region is reached, rainless and bitterly cold, a place of comparative rest, which humanity is striving to explore; it is a truly desert stratum of our atmosphere. There is an absence of clouds and it is virtually of the one temperature.

The great peaks of the Himalayas, Everest, Kinchingunga and Dapsang would pierce the lower levels of the stratosphere were they in another latitude. Man in his passionate desire to reach mountain summits has tried several times to climb Mount Everest, but its summit, about 29,000 feet elevation, has never been reached. It has a record of several deaths in the efforts to ascend to its summit. But in the latitude of the Himalayas the troposphere is far more than 29,000 feet in depth. At this height few men can climb without an oxygen supply, so rarefied is the air. The balloon with an hermetically sealed car can reach well into the stratosphere.

There is a theory that the stratosphere is the ideal locale for air travel. Its physical constitution, its comparative freedom from atmospheric disturbances, would favor the operation of dirigibles. The disadvantage of an hermetically sealed car with artificial supply of oxygen would seem to mitigate strongly against the idea. There would be a good opportunity to obtain the full benefit of rocket propulsion in space so nearly vacuous,

The Contest of the Planets

MOTHER WORLD

By JOHN W. CAMPBELL, JR.

In this interesting story, Mr. Campbell pictures the future of what may be termed interplanetary life and tells of how the inhabitants of earth contrast with those of distant spheres. There is no doubt that if mankind ever did succeed in conquering space it is an open question whether what he found there would increase the good opinion which so many of us often unjustly hold of our own characters or whether it would diminish what may be called the self-conceit of mankind.

Part I

Prologue

THE crowded men, a full hundred and twelve cramped in a tiny concrete room, were unbelievably quiet and tense. Only one small light, thrown on the tuning controls of the big set, relieved the absolute darkness that seemed to push in from the windows. McLaughlin, at the controls, was quietest of all. His ears were intensely aware of the strange rushing roar, like heavy ocean surf, that beat out through the loudspeaker.

A voice struggled through the washing sound. "Elevation about twenty-five miles now. Incredibly jagged rock. This side much rougher than other. Found a small crater-bottom—we're aiming for that—looks smooth." Again only the washing roar of short-wave static and the tense silence. "Elevation twenty miles. Dropping on rockets. Almost no gravity pull, however. The big boy is pulling us around a bit though. Hard to handle. Tricky motion. Fifteen miles. We've got an horizon now. There is no axial rotation, or we would never make it. Ten miles." Silence. Washing static. Five miles, the voice reported.

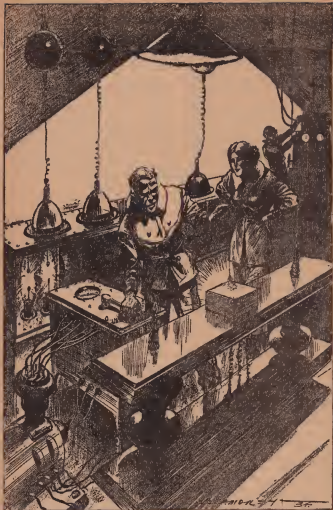
"We've almost stopped—comparatively—now. About a mile and a half to go. Stopped, and falling back. Can you hear the rockets now? They're working fairly loudly. A thousand feet—eight hundred—five hundred—we'll know in a second, and if it's bad—we had a nice time. Try again!"

"We're floating on the rockets. Stevens is doing a wonderful job of it. There's a big pinnacle of rock near us. This floor wasn't so smooth as it looked. We're sinking—we've——" The loud speaker crackled with a tinny, broken rattle, and then only the washing static sounded in it.

A low, heavy groan came from the hundred and twelve men. Three near the door darted out, headed for their offices. The second attempt had failed.

McLaughlin sat just as quietly, and tensely as ever. "They smashed a tube, anyway," he snapped softly. "That doesn't mean they're broken. A tube's a hell of a lot more tender than a man!"

The hundred and nine men were rustling and weaving. Listening to the static sounds. "Whatever happened, it happened a long time ago—it takes time even for radio on that hop," someone



"She's hot. Now watch." Slowly he began turning a control dial on one of his machines.

said. His voice was low, but it seemed a shout in the bare concrete room.

The loudspeaker cracked, hummed and silenced again to washing roar, but an instantaneous quiver ran through the men. "Sorry," said the voice, "probably worried you. Tube gave out. We made a perfect landing, but the slight jar cracked a tube's air-seal."

The rest was lost as a roar went up from the men in the room. A jammed stream squeezed out of the door, like toothpaste from a tube. They squirted out, sprinted for the monorail line near by. Over charred, blackened earth they stumbled and sprawled, cheering.

Five men remained in the room. McLaughlin was talking into his own transmitter now, while the recorder took down every detail of the message coming in from space.

Philip Laurie, the little narrow chested dreamer who had designed the "Ion," was dreaming out loud to big, broad-shouldered John Cummings, the man who had had intelligence and interest enough to listen to the man and his strange ideas.

"It's done, John," said Laurie dreamily. "They've made it."

"They're not on Mars, yet, only Phobos," Cummings replied.

"No difference. Mars is easy now. The little rocket can do it and land with her wings. No trick. They aren't back, either. That's harder. But it doesn't count. To them it does of course, but I mean to earth. Earth has crossed space. Earth-men have reached another world. That's just the first. In twenty years, John, you will be able to make the trip in a regular, commercial liner-freighter. New colonies! Earth-men colonizing other planets.

"John, that's always been my dream. I can't go—I won't. You gave me control of this. That was my one stipulation. The profits are yours—and there

will be profits I promise you—but—" he looked down at himself, and then to the towering, powerful body of his friend. "No more half-men like me. The conditions on those other planets are hard and harder than men ever faced before, and I'm going to set up a control board. There'll be plenty of men willing to go. Look at the thousands on thousands of applications we both got for this trip. But I'm going to combine several of my dreams in this. I'm going to make a greater race of earth-men, a more powerful, finer, more adventurous race of earth-men. I hate this body of mine and its weakness. I want all men to have bodies and minds like yours. I will have reason enough to forbid it—and I'm going to forbid the acceptance of one single man or woman who is not physically and mentally perfect.

"Earth is greater this day, and henceforth, she will grow as her children grow!" said Philip Laurie.

It was inevitable. His decision perhaps made it a bit more radical and more rapid, but the result was as inevitable as fate. There were no barbarians to pour in on civilization any more, but Philip Laurie had cut open earth's veins, where flowed the richest life-blood of the planet. It was not a greater planet he'd created, not a mightier earth.

And it was not merely his plan. The very forces that made life harder on those planets would have done it as effectively. Earth's greatness died that day, that hour, it died the very second Robert Gady said, "Sorry, probably worried you. We made a perfect landing."

But the corpse was very large, and it took many centuries for the corruption to spread, and the ultimate decay to destroy it.

* * * * *

Bruce Robert Laurie, great grandson

of the inventor of the first ship to make the crossing to Mars, was an humble employee in the office of the Interplanetary Transport Examination Service. Bruce Laurie or Tom Jones got the same treatment here. Old Philip Laurie, back in 1983, had fashioned well when he fashioned it. And John Cummings had been willing to trust Laurie. The result had been a board of scientists who had to pass on every man who made that trip, and for four generations that office had been all but flooded, for only an intermittent service was possible. The air ships of that day, even a full century after Laurie's invention, were not free of all troubles. For instance, while they had been able to reach Mars, and the Jovian satellites and the Saturnian satellites, no ship had ever returned from Jupiter's surface. Jupiter's mighty gravity stopped them.

There was much room on those Jovian worlds, and even on Mars, although the colonies were growing swiftly. But there were few ships, and many people trying to go. Interplanetary Transportation had their chance to pick and took it.

Bruce Laurie was hopeful—but fearful. He was twenty-five, just three weeks past the necessary twenty-fifth birthday in fact. He stood five-feet, five, rather light in build, but already he had a reputation in engineering.

The girl at the Statistics Desk looked up at him as his turn came.

"Name?" In a moment she had his Vital Statistics card. "Dr. Thomas Drew will see you. Room four-fifty-seven down the hall to the left." Laurie took the card with its series of punched holes on a perfectly blank white card. The indexing machines would read it for Dr. Drew. Laurie entered four-fifty-seven, handed the card to the brisk, pleasant-looking doctor, and sat down. The in-

dexing machine had interpreted it for the physician in seconds.

"This is your second visit, is it not, Laurie?"

"Yes, sir. I came immediately after my twenty-fifth birthday."

"Right. The card contains not only all the information you handed in, but, of course, much more that we gathered, *plus* the decision we reached, and why. The decision was against you, I'm sorry to say. You're a fine engineer as your reputation already shows. You have excellent heredity of mental characteristics—but as you know, your famous great-grandfather died of tuberculosis. Your grandfather didn't, probably because we'd conquered the disease by then, but he died at forty-seven of heart disease. Your father died two years ago at fifty-two, of hardening of the arteries, and attendant physical degeneration.

"I'm sorry, Laurie. We need your mentality in the new race we're trying to build up, but your physique isn't designed for hard wear, even here on earth. I'm not sure you would survive even the space trip. The effects are very severe, due to lack of equalization of blood pressure in the absence of gravitational or other acceleration. If you did survive—your great-grandfather, who of all men had a right to emigrate to Mars, refused to go. You remember when his application automatically came up, he turned it down himself, and he alone voted against it?"

"He was right. There is some taint of weakness in your inheritance that has, time after time, robbed the world of powerful minds in their prime. What I have mentioned in connection with your direct descent is equally true of your uncles and grand-uncles.

"But—go on, Laurie. Your type is needed here on earth, too. That weakness will be driven out, through the genera-

tions. You may not make the trip, but neither did your great-grandfather. Perhaps your great-grandson will."

Laurie was not greatly surprised as he made his way out of the office and took the moving ways toward the airport for New York once more. But he was vastly disappointed. The moon shone pale in the daylight sky. No Laurie had ever reached even so far.

Some day, he was determined that one of them would. In the meantime, there were still opportunities to make a name for himself here on earth. Even though there were only two dozen business organizations in the United States, there was room for their ramifications.

* * * * *

Ban Miller had reached that acme of human aims, for the average man of 2243—he had been accepted. Accepted, of course, meant that within two years he would be given a berth in one of the crowded Planetary Transports. Wherefore, since Ban Miller's particular field of mental activity had been news reporting and interpreting, he was now acting as trainer to the Unlicked Cub. The Cub was not wholly unlicked, naturally, but he was inexperienced as far as this field of reporting was concerned. Televisonews was a highly interesting and effective means of spreading the stories, but the average man did not care to sit before his television and watch the International Conference on Planetary Affairs for fifteen all-day sessions, and further, he didn't have the time. The Conference was scheduled to run fifteen days, and the nations were spoiling for a real, good battle-royal. It would be a battle-royal, too, because the Industrial Committees were fearing a violent depression, and realized that they had the choice of fifteen million unemployed in the United States, and proportionate numbers elsewhere, or a war

which would make the fifteen million and proportionate numbers unproductive consumers in the armies of the world. Further, the war was indicated by falling profits. The customers needed a good reason before they'd accept a price boost. A war would be ideal.

Then incidentally of course, there was real enmity arising from the Planetary Affairs Commissions. For nearly three centuries, the Interplanetary Transportation Company had had practical control and ownership of the planets. Interplanetary had gotten off to such a flying start, it had simply bought up all competition at first, and since then no one had been interested in starting a rival company. The only government of the Planets had been the Interplanetary's own Executive Office. Now however, there had arisen considerable feeling on earth, that some nation had a definite claim to the control of those planets.

"They'll argue," Miller explained to the Cub, "on the basis of the claims made way back in the late 1900's and the early 2000's. The United States has an iron-clad claim on Mars, really, because it was an all-American crew that took old Laurie's ship up there. But her navigator, and her captain, happened to be of French descent, and France has laws to the effect that no Frenchman can become a national of any other country. Therefore, the captain, when he claimed the planet for the United States had no right to do so, and further, the second ship to make the crossing was actually French, and also claimed half the planet. But Germany pointed out that neither ship had fully explored the planet, and not until their ship made the crossing in 1989 was a complete survey in detail available. Therefore they claim about a third of Mars.

"Now the Jovian Worlds were explored by nationals of all the Terrestrial

countries, and lo was explored by an American-born Martian. The big fight of course is over Mars. And—I sort of have a hunch old Terra is in for the shock of her life."

"Why?" asked the Cub.

"Wait and see. We'll know within twenty-four hours."

"Who's that coming in now?" asked the Cub.

"M. Poireau. French Premier. Elected by the Steel interests. He's naturally for war. Steel in France includes aircraft and rockets."

"Who's following him there? I don't recognize him at all."

"Oh—oh! Watch the fireworks! I knew that would happen. Terra is definitely in for a shock. That's John Montgomery, terrestrial president of Interplanetary. 'Mystery Montgomery.' Every time he does show his face, somebody gets blown off the map—look at those delegates there! Every one of them is trembling in his boots right now. Cartwright from 'these United' represents Metals and Allied Utilities, and he's wondering what's up. If he works against Montgomery, he may lose business for Metals—and if he doesn't, why he may lose his job. Metals can have his election 'recounted' any time they want to, and find fraud in it of course."

"And I, in my innocence, thought there were still some traces of the ancient democratic government left on earth."

"Funny, lots of people still do. Clerks and so forth think their votes really get counted. Of course, some of the votes do. They may all be counted pretty quickly, though. I hear Metals is going to start taking their employees' fingerprints so they can check up on who voted and how, when they find it necessary."

"The Secret Ballot! What a secret!"

"That gang is worried. All those delegates are worked-up. Montgomery's presence means real trouble. You know

they have a true democratic government on the Planets now—something on the order of the old Socialistic schemes proposed here on earth back in the twentieth century and which Russia even tried out. But what the planets have is supposed to be a corporation-voting idea. Actually—well you'll see, I'm willing to bet. Of course their socialism is a whole lot different from anything they proposed back in the twentieth century. Started that way, you might say, because everything on Mars was owned by Interplanetary to begin with, and every immigrant of course paid his fare by buying 'stock.' But—you'll probably see."

The gentleman from France had been appointed temporary chairman, and so French was the official language of the Conference till the permanent Chairman was elected. He was calling the meeting to order now. The delegates took their places and order ensued. Montgomery had taken a place in the Distinguished Visitors' gallery. More eyes were turned to him than to the Chairman. Montgomery's presence was like the tick of a time-bomb. When would it explode?

Sir Reginald Barry of England was made Permanent Chairman according to schedule in rapid fire order. Almost at once, M. Poireau rose, and in beautiful diplomatic English, beating all around the bush and Robin Hood's barn, stated that France declared one half of Mar's surface area as hers, that half being delineated carefully. It included Mars Center, New Denver, New Berlin, and Salamance. France knew, of course, that the nations would realize the justice of her claims at once, and withdraw any claims of their own. However, France was fully prepared to stand up for her rights—and intended to.

Cartwright of the United States rose, and read his speech. "Notice he's read-

ing a typed speech, and answering all of Poircau's points? That speech of Poircau's was a complete surprise, of course," chuckled Miller. "Now watch Hans Schenkie answer both speeches from his own typed script. Man, this Conference is going to explode in a hurry. Montgomery is the cause of this; they'd have delayed these speeches over a period of days, but they want him to hear their claims. He's taking it all in himself—and they'd just expected a few vice-assistant-seconds to be listening in. Say—hold on here, will you? I want to make a call." Miller rose, and vanished along the corridor.

In perhaps fifteen minutes he was back. Cartwright was answering Poircau's third point by this time, with only eleven more to go. Miller glanced at the Cub's notes and laughed. "Too serious, man, too intent. Here's the way." He condensed the Cub's three pages, to two paragraphs, and explained: "At that rate, you'll fill several large volumes at the average conference, and never be able to find what you wanted again. Those points he's making are all in the Terrestrial Encyclopedia.

"But here's a note to make. The 'New Denver' is due to land to-morrow at noon in New York. But—they've spotted a life-boat leaving her. The life-boat broke out five hours ago, and will land in about an hour. I'm waiting. The bomb explodes then. I'll bet it lands right here in Geneva, too."

Cartwright had nearly finished his speech, when the man entered the Distinguished Visitors' Gallery. He was clad in the loose-looking, dust-tight Martian garments, and his face was dark and lean with Martian sunlight. He moved somewhat heavily on earth here, but there was a certain alertness and energy about him. He went directly to John Montgomery, and spoke softly to him. From a brief-case he drew a large

envelope of papers, and passed them over with a smile of confidence, and a handshake.

"Ah—it's come. Now, the bomb explodes."

Cartwright had been watching. In remarkable fashion, he concluded his address almost at once. The conclusion was that France's claims were wholly baseless and false according to international law. Mars belonged wholly and singly to the United States of America.

Montgomery rose in his seat.

"Mr. Chairman."

"Mr. Montgomery," acknowledged Sir Reginald, "You have no official status at this meeting, but I am sure we would all be glad to hear your views, as an expert on Martian affairs."

"Mr. Chairman, I should like to present these credentials." Montgomery stalked forward, and passed over to Sir Reginald the papers he had so recently received from the messenger.

Sir Reginald looked at them hurriedly, then stopped. He looked again, then smiled slowly at Montgomery. "Surprising, isn't it, how the obvious will escape attention. Gentlemen," he went on, addressing the Conference, "I beg to present Mr. Montgomery, Delegate from the United Planetary Council, and Ambassador Plenipotentiary for Mars. He will explain Mars' answer."

"Thank you, Mr. Chairman," Montgomery replied, interrupting the sudden hushed murmur of surprise and anger. "Gentlemen, I have little to say, but I believe you will agree with Sir Reginald, that it is obvious. Mars does not belong solely and singly to the United States. She does not belong half to France, or one-third to Germany; neither do the Jovian Worlds, nor the Saturnian Worlds. Mars belongs solely and singly to the citizens of Mars.

"The Jovian Worlds belong singly

and solely to the colonists of those Jovian Worlds, as the Saturnian Worlds belong to their inhabitants.

"I am, I realize, setting forth a great principle, but it is yet an old principle. It is the principle that set up the United States, that men should determine their own courses of action. We of the Planets desire to do so.

"I fully realize the feelings that will be stirred up, but I intend now in open conference to say, and say bluntly, what we are all thinking.

"Mars, and the Planets, all represent great wealth. Further, they represent room for colonization. Interplanetary has long held absolute control, and only so because of the vast wealth and consumptive power it represented. This very conference represents the culmination of a recent tendency we, who are interested in Planetary affairs, have watched with alarm. Terrestrials want more ships built, more accommodations for interplanetary travel, so that all can move to the Planets who want to, and this pressure of public opinion has gradually been bringing forth legislation that would weaken Interplanetary to a point where an undesired rush of colonists would be possible.

"The Planetarians have been carefully selected, and are quite literally a chosen race. The result has been a bit of superiority on their part, but there has always been the opportunity for Terrestrials to be chosen, and this hope has prevented any strong feeling against them.

"But the reason we have given for this selection, so rigorous that we have refused ninety per cent of all applicants, has been limited transportation facilities. Terrestrial governments could build more ships, say the people, and take us there.

"Frankly—Mars doesn't want too heavy an unselected immigration."

"That is the reason for this change, really. Mars is now in theory as well as in fact, a self governing world. She has been. You all realize that fact, although technically it has been a corporation called Interplanetary Transport. Now the name has been changed to the Martian Planetary Union, a state with powers similar to those of the individual states of the United States of America, in the greater government of the Interplanetary Union.

"We have combined against an undesirable immigration. We need more people, need them badly, and will continue our present system, and expand it—but we will select them. The Interplanetary Union government will appoint as officers the entire staff of the present Interplanetary Transport, renaming them according to the more usual diplomatic practice as Consuls and Ambassadors.

"The immediate reaction on the part of the Terrestrial nations having claims to the Planets will of course be a desire for war. There is a strong economic need for war right now, I understand," Montgomery added bitterly, "but I would like to point out the absurdity of such a course. Mars is not wealthy enough in human and economic capital to desire such a war—but I think it should be remembered that all the existing ships, capable of the Interplanetary crossing, belong solely and exclusively to the newly-created Interplanetary Union.

"Oh, no doubt you could build ships, and attack, within two or three years. What would you gain? You cannot armour a space-ship. They are very tender machines, as we well know. Therefore they could not attack readily, nor effectively. Further, they could not carry fuel for the round trip, and still maneuver. The result would be a fleet of derelict, helpless machines in space,

hanging off Mars powerless to move, and completely at the mercy of our own small, swift battle-rockets.

"I believe you will agree that war is out of the question—purely so from a mechanical standpoint. However, I doubt that the people would support such a venture, for they all hope, and secretly expect, to get to Mars themselves. Every man with any self-respect believes himself worthy of choice. Those that feel sure they won't be chosen are cripples, weaklings, or completely spiritless. Of such you cannot make an army. When England tried to put down the rebellion of her American colonies, she failed, not because her men were not brave, or strong or spirited, but because the men of England agreed with their brothers and cousins in the colonies, and refused to fight them. Mercenaries had to be hired, with deplorable results.

"Well—you may find mercenaries. But every worthy citizen of Terra has a real, and genuine chance to join us in the greatest work man has undertaken: the colonization of new worlds by new and better races of mankind."

Montgomery sat down. Suddenly the Cub became aware of the fact that Miller had vanished. In his place was an International Newsmen with his television projector.

There was an angry mutter of discontent rising from the Conference, and officials were heading for the International Newsmen.

"That scene was not directly broadcast of course?" demanded the sergeant-at-arms?

Miller reappeared before the International man could speak. "No, Rafferty, it wasn't. We wouldn't care to put that red-hot stuff on the air. But it's being groomed for broadcast right now. We canned it temporarily."

"'Fraid it won't go, Miller," said Rafferty, shaking his head. "They all

agreed on that. It's bad for the people."

"I'm afraid it has," said a new voice. The messenger from the Interplanetary Union had appeared. "There was nothing we were ashamed to have on the air, and it has all gone out. I have a new ultravisor in the bag here, and it was relayed from my life-boat. The Conference will have to answer that frank challenge as frankly, if they want the sympathy of the people."

"But don't worry," Miller replied ironically, "those boys will cook up some kind of hash. Or their companies will."

A voice pierced suddenly through the mounting angry buzz from the floor of the Conference. "—all realize that this is the desperate move of a traitorous, jealous German Government to prevent the just claims of France being realized and—" The voice was drowned in a bel-low of denunciation from the German Delegate.

"I guess they have already," grinned the Cub. "They've got their war, anyway. I'll send the pictures to you, Miller, if you Martians should be interested."

* * * * *

Moon-faced, fat Simon Wallowy was Chairman of the Conference. Simon Wallowy was also Chairman, of the Industrial Committee of the United States of North America, the son of a long line of Wallowys who had been Chairmen of the Committee naturally, because of the vast properties owned by the Wallowy interests.

Simon Wallowy was very much annoyed by this conference, as it had called him away from a very pleasant time he had been having at his country home with a number of Plehb girls he had directed to go there. But—this annoying conference had been necessary. The trouble with the world was that there were a number of semi-Plehbs with a

little property, and some influence that could make so much noise, that they influenced opinions adversely. Now if Mortan's idea would just be accepted by some of the other men, this last annoyance could be done away with in another two decades.

However, since things were as they were, the disarmament conference would have to be gone through with. Naturally it would come just when war had almost been decided on by the Sino-Japs and the Americans. Wallowy didn't see what he was going to do with the present unemployment situation, if they didn't have a war fairly soon.

Also he was annoyed by the attitude that John Montgomery had displayed, that annoying attitude of indifferent superiority, as though he was not a descendant of middle-class incompetents, squeezed out of and off earth by the strife of business. The Planetarians acted as though they had wanted to leave earth. A billion incompetents and dreamers earth had gotten rid of, so that a real, stable society could be established, and now these same exiles were 'acting superior.'

They scarcely carried on any trade with earth any more, but then Wallowy didn't want it really. He'd have had to make some concessions on the tariffs if he had, and those cheap all-machine made goods of the Planets would have caused trouble among the workers.

Ah well. Wallowy wandered across the park toward the Conference building. The beautiful, white, silica building, set among the green of trees on the shore of the blue lake, backed by snow-capped mountains, was shimmering pink in the twilight. Above it, a great tongue of azure and golden atomic flame hung motionless and steady, unmoved by the gentle breeze—the azure and gold of the Peace building.

Wallowy had always been annoyed by

it. It reminded him so forcefully of the trouble his grandfather had had when the atomic flames were first invented by David Laurie of Io. The tremendous increase in the available energy had made it possible to throw thousands of workers out, and still maintain production, but it had brought a great deal of trouble, till the British-American war had gotten rid of the excess, and brought Canada into the Union. But it had had the beneficial effect of opening up the Major Planets and Venus and Mercury to colonization, so that a great many of the remaining semi-plebbs had left earth, and made things quieter. Anti-gravity had come almost simultaneously, and completely opened the system to colonization, but by that time the Interplanetary Union got nasty, and wouldn't permit any further emigration from earth.

Wallowy passed through the door of the Peace Palace with a determined waddle. He might be able to induce the Heinrichs and the Derriers to join him in declaring war on the Interplanetary. That would solve the unemployment problem, and might get them a little satisfaction on the score of Interplanetary's superior attitude. He frowned though, as he remembered that Interplanetary wouldn't respect his properties properly. They might cause damage.

An hour later he called the meeting to order. He had intended calling on Karl Heinrich as the first speaker, but he discovered to his annoyance that Montgomery of Interplanetary Union wanted the floor. He ignored him, and called Heinrich to speak.

"I think," said Montgomery interrupting, "that it would be wisest to hear me first. Mr. Chairman, may I have the floor?"

"Very well, Mr. Montgomery. Your manners however, are execrable."

Montgomery smiled slightly, and nodded to him. "Worse, according to

your ideas. However, my message has not been heard by you—er—men before." He continued more soberly.

"Interplanetary Union has decided that we have made a bad mistake. Earth, the Mother World, has always been regarded with some feeling of interest and sympathy. However, we have come more and more to realize that in giving birth to the children, old earth has been sacrificing her life-blood. I am sadly afraid that the children have been stupid, and selfish. The result is inevitable, of course, but our own interest in our own problems and the vast work that we had to accomplish, in making civilization possible on such bleak worlds as Pluto and Athena, turned our attention from earth. We have neglected her interests. "Now," he smiled, "we have decided that earth's only hope is that we completely neglect her.

"Interplanetary Union has decided to completely withdraw all relations with earth. We will withdraw our consuls, ambassadors all our interests. We will send no further ships to earth. We will send no messenger. We will receive none."

"This should be put on record for future generations. When earth first sends a ship again to Interplanetary at Mars Center, a new ship, with some new invention of importance, then Interplanetary will revisit earth, and help her finish settling her problem.

"You do not understand me. Poor earth has given her life-blood in giving life to the Planets. Earth is nearly dead. We will leave her, for no effort of ours can bring new life to her, only the slow cleansing of Time can do it.

"The planets have, for nearly seven centuries, through thirty generations of men, robbed earth of her greatest heritage, the near-genius. We have accepted only the strong, the intelligent and the healthy. Generation after gen-

eration we have taken from earth everything that makes the human race strong, we have left only the dregs, the weak, the stupid, the unadventurous, and—the contented.

"The result—we can see all too clearly now. Earth still has a remnant of hope—the so-called semi-plebbs. We know that genius arises slowly. If a thousand morons mate, a few normal men will result. If a thousand normal men mate, a few near-geniuses will result. If a hundred near-geniuses mate, perhaps one genius will rise to lead all the others onward. The planets took every genius earth produced and nearly every near-genius. They did this not once, but time and time again, through thirty generations. The result was that now nearly all the genes of intelligence and health and wisdom that the human race carried, have been isolated on the planets. The genes of stupidity, and disease, and every form of weakness have concentrated on earth. Your death rate shows that, and that is a benefit. Fortunately, in a machine age, the genes of stupidity lead only to death—sudden and violent death. So, we of the planets have this hope for earth. Through perhaps another thirty generations, the genes of weakness and disease will kill off their bearers. More and more they will concentrate in certain strains, and bring death.

"Even among your plebbs there is some opportunity for intelligence, there will be such a divisioning, that the more intelligent will be thrown together, and there will slowly rise a group of normal, healthy, intelligent people, then from them, a group of near geniuses, and finally a real genius who will fly his ship to Mars Center, and redeem earth.

"It was the selfishness of the planets that brought it about in its present acute form—but it was inevitable. All the near-geniuses would have gone. We accelerated the process, true, but it would

have been just those intelligent, restless ones, who sought greater opportunities, who would have made the trip anyway.

"America led the earth when she was young for just one reason. She was populated by only those people who had intelligence enough to earn their passage-money, who had ambition enough to seek new opportunity, and brains enough to permit them to cut loose from the land where they were born. America lost her advantage slowly as a new race of settled people rose. For a time, all the restless, driving genes of the Caucasian race were concentrated in America. In Europe, there remained the stupid, land-loving peasant who could not see beyond the horizon.

"The planets inevitably were populated by a race of men who could see beyond the horizon, even beyond the skies, and up to the stars. They inevitably got the restless, ambitious men and women who sought new room for their abilities.

"Why—earth was doomed to decay when Laurie sent his first rocket to Mars nearly seven hundred years ago. We of the planets made it worse still by our selection, generation after generation, of the finest and best blood earth had to offer.

"Now, we are leaving earth. We will send no ships. We will send no messages, nor receive any from earth. We will send no men. Most of all, we will take none. Thirty generations brought about the downfall of earth. Thirty more may see it rebuilt.

"We leave within a month. I leave this evening.

"We hope to hear from you, or better, from the people of earth, in another seven or eight hundred years. But no matter how long it may take, earth will be completely isolated so far as we are concerned. It is impossible for us to do any positive thing to aid earth. Only time, and generations of men can do it.

"One other thing," he added with a faint smile, "I may hope to greet the first man of the New Earth. James Steven Munro has discovered a system of prolonging life for a period as yet unknown. I am proud to say that I am one of the few who have been chosen to receive this treatment.

"We of the planets have decided, thanks to the example of earth, that death is a necessary evil. It alone purges the race, and makes room for the new generations. Only the coming of new, and newer generations can bring the new and better men. Evolution did not stop when men arose from the mud.

"We have seen evolution. You have seen the short, inhumanly powerful men of Jupiter, and the lean, dry, dark men of Mars.

"But I may live to receive the first of the new men of earth.

"Now I am leaving. The decision is final."

"Do you mean to say that Interplanetary considers earth unworthy of their high and mighty society?" roared Wallowy, his face crimson with rage.

Montgomery stood up slowly, and smiled at him.

"I'm afraid it does. Of yours, at any rate. I might add, for your interested consideration, that we thought of teaching you how to live for centuries. It would prevent any increase in your intelligence. If you become intelligent, you may prevent the re-evolution of intelligence in the plehbs. We decided against it, because you would probably give it to the plehbs also, so that new workers would not have to be trained, so that less time would be lost during their infancy. That would prevent new generations, so we decided against it."

Montgomery smiled, and despite the storm of anger bellowing from enraged and life-hungry men, he walked out, protected by the same, short, powerful Jo-

vian guard he had previously mentioned.

The interplanetary transport-cruiser "Terra" rose gently, its weight destroyed, and lifted across the white, calm tip of Mt. Blanc. Her ion-rockets flared to pale bluish flames as she shot upward.

Interplanetary was leaving earth.

END OF PROLOGUE.

CHAPTER I

BRAVELY the nine-year-old boy swung along the passages, through the almost deserted main corridors, past the roaring workshops. Polshin guards stationed here and there paid little attention to him. Plehb workers plodding about their work heavily, or walking more briskly, carrying messages, paid no attention to him. He was the sole care of his parents and himself. No one would pay any attention, if one more child was caught in a machine or crushed under a heavy truck.

Bruce Lawry, actually was considerably frightened, for he had bravely determined to reach the far-away Deserted Passages!

Jon Lawry, Bruce's father had told him about those Deserted Passages. Jon was a mechanic, a Plehb of the 'A class' in consequence, and fairly free to roam, his blue garb a protection from Polshin guards. Jon had seen and entered these deserted passages, when a mysterious short circuit in a power circuit had to be located. Far back in the Deserted Passages, the power line had long since been dead-ended, and never removed. A fall of stone from the passage roof had shorted it. Bruce was determined to see them. He had told Don he would. He had taken one of his father's little light-tubes so that he could see.

It was nearly four miles across the

city, and all the distance had to be traversed on foot. Once, his father had told him, the streets had moved, and you could ride on them, but that had been stopped, to discourage the wandering of the Plehbs.

His father had been apprenticed to a man who knew the story of the great city of N'yak of long ago. Then, his father had told him not only the Polshins had surface homes, but even the Plehbs had lived above ground. Only because it was cheaper to create artificial light from atomic power and maintain air conditioning, than to maintain both of these and also buildings that the weather constantly wore down, had the Plehbs been moved below the surface, into the rocks.

Jon had even been to the surface sometimes, to fix power lines leading to the Polshin homes.

Bruce walked more slowly as he came at last to the edge of the city. There were few people in the streets here now. The Polshin guards were far apart, and the light-tubes were scanty. Bruce looked down the corridor he was following, and saw where the light ended. There was no Polshin stationed there, for it was a little side-street, where no people lived.

HURRIEDLY Bruce scuttled beyond the lighted zone, and looked back. No Polshin had seen him. He went on, stumbling in the dark, afraid to light his hand-torch. Something tripped him suddenly, and he fell with a little cry of fear. Quickly he turned his light on it. It was a strange, white, lattice work of rounded bars. It was only when he saw that it was an outline, about his own size, and that, draped over it was the metal-cord belt such as he wore, that he realized what it must be—a skeleton.

He almost went back. But he looked,

and saw there was no light-tube beside this skeleton, and determinedly he started on. He wondered how many more might have come this way, and died.

With the super-developed sense of direction he had acquired from many walks about the lighted part of the city, he felt no fear of getting lost. Instead he went on and on, his light-tube glowing now.

He passed long rows of deserted dwellings. Then he came to a section, the like of which he had never seen. The corridor had grown wider and wider as he advanced, with incoming passages adding to it. Here at last he came to a great Cube, far greater than Cube Center in the part of the city he knew. In the center of the Cube was a building, not made of the universal granite, grey and cold, but of white stone, of marble had he known it. It was utterly different from anything he had ever seen, beautiful and clean and white. In the spread light of the tiny, but wonderfully powerful hand-light, he could dimly see the graceful columns and the roof. That was something he had never seen before, in this weather-less place. He did not know that this was a copy of Greek architecture.

Breathlessly, excited as he had never been before, he looked around him. The whole Cube was lined with various great glass windows, far larger than he had ever seen before. They were dark now, and lonely little heaps of rubbish lay behind them, he could not guess their purpose.

Cautiously he made his way toward the beautiful white building. There was rubbish on the stone floor of the great Cube. Over it he picked his way with the aid of the little light-tube and went up the broad, foot-worn steps of the library. This library was very old, even

he knew that. He knew more than most children of that thirty-second century civilization would have known. He could read the inscription above the door, even though it meant little to him, "INTERPLANETARY LIBRARY FOUNDATION." Foundation he understood. His father had taught him to read, for Jon Lawry, being a mechanic, had to be able to read meters, and other things, as had his predecessors, and so the art of reading had been handed down among the mechanics. Bruce knew foundation only as a heavy base one put machines on. He looked around for the machine, and wondered what kind of thing it could have been that had been set on this beautiful structure.

I NTERPLANETARY meant nothing to him. He did not know what a planet was. Library meant as little, for the Plehbs had forgotten libraries and printed literature almost entirely, and the little they knew was the simple technical material they needed. Actually Bruce's mother, Marta, had taught him reading more than his father had done, though his father had begun his instruction, for Marta was a worker in the chemical plants. She had nearly half a dozen books, books on thin metal plates, worn and broken now, for they were some four hundred and fifty years old. These were the only books Bruce knew. Libraries were unheard of among the Plehbs.

Bruce stared at the great bronze doors. Cautiously he pulled at one. It did not open. The grill of the gate was far too fine-meshed for him to slip through, and there were no windows in the building. Inside he could see the smooth layer of grey dust on the white stone, and long racks, a series of great tables, and here and there a low desk. It was very dark, save where his light

touched it. He wanted very much to get in.

Suddenly he turned his attention to the lock. It was steel, bright, rustless steel, far too well made to be opened by his efforts. Perhaps somewhere there still existed a key for that lock, but no man on all earth could have said where it might be. But Bruce was a mechanic, his mind was sharp, and trained to mechanical and electrical thoughts. Confidently he examined the door. Then he turned, and made his way back through the trash and litter of the Cube. Hunting, he finally found what he wanted, a bent piece of metal some six inches long. Fearfully he made his way to the door, stripped off his single garment, and wrapped his hand and the light-tube in it. Then with the other hand he removed the tiny glowing gas-tube from the device, and carefully inserted the bent metal, carefully protected with some mouldering cloth. In a moment he had located the thinnest of the metal bars of the grill.

A sudden groaning hum came from his light-tube as he made the contact, a popping and crackle of sparks, and a shower of incandescent metal fell on his cloth-wrapped hand. Some burned his bare body—but the grill-bar parted. Again he applied his light-tube, another bar gave way. Three more bars he fused. Then he stopped, and replaced the gas-tube. It didn't fit well now, for even the resistant light-tube was somewhat burned, and it didn't glow very brightly any longer, for the charge was nearly used. He knew though that it would burn satisfactorily for another four hours, and then he would have the emergency cell left for half an hour more.

TUGGING, straining with all his power, he pulled the broken bars aside. He crept inside, and looked

about him. Now he could see the stacks, and with a soft intake of breath he realized they were books. Books in such quantities as he had never imagined! Rapidly he went to them, and read their titles.

"T-h-e D-e-v-e-l-o-p-m-e-n-t O-f I-n-t-e-r-p-l-a-n-e-t-a-r-y C-o-l-o-n-i-z-a-t-i-o-n." He spelled out. But he didn't know what it was. So he took down the book, and looked at it. Then he put it back, realizing he did not know anything about it at all, and looked at other shelves.

Three hours later his light was growing very dim, and he realized he must hurry back to the lighted ways soon. Regretfully he turned away, and started homeward. But he determined that this Library, the meaning of which he knew now, was to be his secret, shared only with Don Wade. They would come back here, and bring fresh light-tubes with them, and they would learn what was in all those thousands of books.

Why, they might learn even what made the Burners give off their silent, hot flame endlessly, and the great surging currents. Nobody knew that anymore, but Jon Lavery had said, "They have forgotten. Once men knew, but they have all forgotten now. And the books are lost. They must have told once upon a time. Once, men were wiser than now."

Maybe these books told even that!

CHAPTER II

DOT STEEL was the third person to enter the library after the seven centuries of desertion. Bruce brought Don back with him that next day. Children had their work to do too, soon enough in life. By the time he was twelve, Bruce was apprenticed to his father in the mechanics business. Time and again he amazed his

father with work Jon could not do. By then he had read some of the books in that library, and what had been a child's secret from the first day, became even more of a secret. And from them he had learned the secrets of the machines Jon repaired blindly by rule. They were to him, just as to Don Wade, an escape. In the books they left the grinding labor of 3340 and went back through time to the days when earth was great.

An even deeper secret it was as they advanced to adolescence. Then, as their apprenticeship approached an end, their maturing minds began to realize more and more fully the significance of this thing. They realized the true inheritance of mankind. Bruce had studied the technical books, both because they lay along the field of his work and because in them lay his interests. He knew how the Burners worked, splitting the atom, and releasing the protons and electrons in flying streams, to give off the tremendous currents that were the life-blood of their civilization.

Wade had studied the historical books, he had gathered more and more a true picture of what the human race had been. But one problem was left in his mind. What had happened? Why had men fallen so, and fallen so completely and abruptly? In 2695, dozens of books were placed on the shelves. In 2697, the last book had been placed there. The library records ended in 2703. What had brought about this tremendous and abrupt fall, from a vast civilization that spread to every planet of the system, to a tiny shrunken thing that could not maintain itself at its high level for even one brief decade? Had men been afflicted with some titanic system-wide plague? Why was there absolutely no record of this tremendous, world-shaking change?

Don, more than Bruce, was absorbed in this problem. Don was the student,

the sociologist. Bruce was the scientist. To Bruce came the sheer, thrilling exultation of intellectual brilliance as he read of the scientific achievements of the Old Days. When men had come face to face with an absolutely impassable boundary—why they had simply dodged under it or over it or crept around it. Nothing had stopped man then, it seemed. In the greatness of earth, Man had sought, and found the secret of the energy of exploding atoms. One of the things that had given Bruce the keenest joy was the infinite subtlety with which men had attacked the problem of X-rays. No substance could be ruled with lines so close together as to produce a diffraction grating such as was used in light study. So—man had used the natural, regularly spaced crystal-molecules in substances as his diffraction grating. X-rays could not be reflected by a mirror, or concentrated by a lens to form an image. Yet man had used crystals to focus X-rays to make pictures of things too minute to be caught by light.

Bruce did not wonder at it, it seemed perfectly natural to him, but he was able to understand and follow with ease the deepest thoughts of those greatest thinkers of the Old Days. Why shouldn't he, he would have thought? They were men, he was a man—so why not?

THE Planets had done better by earth, in leaving her, than they had guessed. Wheat, strong and healthy, planted in fertile ground, produces lavishly. But ALL the wheat grows, weak with the good, and gradually the yield falls to that of ordinary wheat in ordinary ground. Weak, poor wheat, in poor, lean ground, will grow very poorly. The crop will be nearly nothing. But with a few generations, it rises to a more normal level. Now if that wheat be transplanted to good land, the yield will be enormous, because that harsh, poor

land has killed out the weaklings, the unresistant, and only strong, vigorous stock could survive.

The planets had concentrated all the weakness of the race on earth. All the weakness of the race had killed itself by its very weakness. Now, in the thirty-fifth century, a tiny population of scarcely two hundred million remained of earth's three billions. But those two hundred million were far above the average of the twentieth century, before the great dividing began.

Bruce and Don had studied, each finding a vast interest and release in these books. More and more they realized they must keep it secret, lest the Polshins find it, and destroy them as possible revolutionists. No other humans knew of these finds.

And that was why Dot Steel was finally brought. Don met her when doing some special work for the Metals Department. They had worked together, talked together—and soon they loved together. Don, twenty-two now, was tall and wirey powerful, his keen, pleasant face framed in golden blond hair. He wore the Blue of a Class A plehb, and, for that matter, so did Dot Steel. There was no law that forced them to marry within their own Plehb-class, but the class A Plehbs, being in similar lines of work, tended to come more together, they lived in the same parts of the city, and there was a natural tendency to intermarry.

Dot Steel was twenty when they met, five feet two in height, slim, as soft and graceful as a cat. Her hair was black as the Deserted Corridors and shiny as laquer. Her lips were full and red, and her black eyes seemed to challenge Don to love her.

He did, he loved her whole-heartedly. He'd have gone to the Mating Office with her within a week of the day he met her, but that he was still only a

first-grade apprentice. In six months he was to get his Class C Masters' papers, and with them in hand he could petition the local Polshin for a separate apartment, and on mating he would be granted, with his wife, a two-week holiday. So they had not gone at once to the Mating Office.

Dot Steel wanted to. She cared only for the moment, and she wanted Don, wanted him as only a Plehb, who had little in life to long for, could want anything. She wanted to be with him, and feel him near her. Not Some Time, but Now.

AND Don, with the keener, more powerful mind, realized it would be far better if they started *their own home*, instead of bringing a wife to live with his own parents. Further, now, as a Class One apprentice, he and his wife were entitled to but one week of vacation.

Dot began to doubt him, she grew suspicious of his love. And further, she knew when his hours of rest came, she knew he had twelve full hours off every day, yet never did he spend more than three with her, and then only once a week. The other days, he limited himself to one hour—and vanished. Try as she would, coax as she would, she could not learn where he spent the other time.

So one day when Don Wade called, expecting three hours with his own girl—she was cold and angry, she accused him of spending nearly all his time with another girl.

"I know—I know. You say you don't—but where *do* you go? Have you ever told me? Have you ever denied even that you were free those hours? One hour—then you are gone. You do not love—and you do not even play fair with the other girl, the one you must love better, for you spend most of your time with her."

"Oh, Dot, darling. I don't, I love you, and only you. I—"

"Then why don't you stay with me? Why do you always leave? You go off with Bruce—and stay away. You have lovers together."

"Sweetheart, in this town you know that couldn't be true," Don smiled, "you'd have heard the 'Truth' from the neighbors."

"I have," snapped the girl. "They all know you leave me. That's why it's so unbearable. If you love me, and not some other girl, prove it. Take me where you have been going."

That was final. Either Dot went where Don spent all his time—or Don could spend ALL his time there so far as she was concerned.

In despair, Don turned to the telephone system. Bruce, now a Master Mechanician, was necessarily available by phone.

"We must show her, Bruce. It is your discovery—shall we take her?"

"Of course, Don, if it means your happiness you need not have asked me. Shall I come along?"

"Will you? I'm afraid," he laughed ruefully, "she would not believe my word in her present mood."

THEY started in an hour, Bruce leading the way in his blue Masters' garb with its gold star. Down half-lighted back passages, then through a series of apartments long deserted that stood right on the border line between the deserted and the populated regions, missing the Polish guards as always. Then down the familiar passages to the Great Cube. It was Laurie Cube as Bruce knew now. As they came to it, the great gas-tubes lighted suddenly. A little scream of surprise came from Dot. Those miles of black, mysterious corridors, deserted for centuries, had been

all she could stand. Only her determination to see where Don was leading her drove her on. As they came on, she became convinced that Don was taking her here that he might scare her, make her afraid to go through with it. Then always he could say when he left her that he was going to the place he would have taken her had she not been afraid.

As the lights blazed up suddenly, mysteriously, at their approach, her nerves almost gave way altogether.

"It's all right honey—just an automatic photo-cell device Bruce arranged to light it at our approach."

"Oh," she gasped, then "oh—how beautiful!"

In the full light of the light-tubes, the little Greek temple of white silica stone shone like a great jewel, in a dark setting. About it the dark granite absorbed the light, it alone reflected it and seemed to glow of its own light.

Warm yellowish light shone from the doorway of the library now. Inside was the clean white light of the reading lights, but here the warmth of the yellowish light seemed to welcome them.

Rapidly they advanced, and Dot Steel entered the library, the third human to enter it since this region had been deserted six centuries before.

"In-ter-plan-et-ary Li-brar-y Foun-da-tion. What's that mean? What is this place?"

"A library is a place where books are kept, darling. Bruce found this place when he was a small boy, and ever since we have been coming here, studying, reading the books of the Old Days. Darling, we know more about this city here than the Polishins. We know more about the machines than any other man living. These books have kept forever the knowledge that men have forgotten. We have learned it again."

"Books?" the girl cried, "just books?"

She looked into the library now, looked about at the shelves of books, racked in thousands and thousands. The tables were strewn here and there with sheets of paper, pencils, calculating machines.

"JUST books," smiled Bruce, his deep voice smiling with him. "But you shouldn't say 'just' books. Books are something you have not learned to understand. Man practically lost books for seven centuries. Why, I don't know. And because he lost Books, he lost everything. He lost freedom, and wisdom and judgment. He lost ease and happiness.

"The books can teach him to win them back."

"I tried to read a book once," said Dot, her suspicions returning. "It was very uninteresting. It was so uninteresting I went to sleep, and was nearly late to work. I don't believe you come here. No one could be so interested in books as you pretend."

"But we are, Dot. That is how we have gotten our advancement so quickly. Don't you remember Bruce got his Master's Papers because he fixed a broken burner that no other Mechanician could fix. He could fix it because he knew how those machines worked. He alone of all men knows why they do what they do. I have gotten my papers rapidly, because I have taken from these books knowledge that has been lost for centuries, and put it to use."

"But that doesn't make me believe you are so interested you come here day after day and read—read books," she said the last words with scorn.

"Sweetheart, you have never read books. You don't know the romance and the mystery that surrounds them, and the things they say. What were the Old Days like—and why did they end? Who are the Polshins? Who are the

Plehbs? Do you know that 'Polshin' comes from a corruption of the old word 'Politician,' a man who sought to gain some public office. Oh—but you don't know what a public office is.

"There are mysteries and wonders in those books."

"I read one," insisted Dot. "It was very uninteresting."

"Dot," said Bruce, "there are one hundred and fourteen thousand books in this library. There are one hundred and three thousand different books—no two alike. You read one. You know how you hate Jak Studds. Would you say because Jak Studds was hateful, that all Plehbs are hateful? Be fair. Because one book is uninteresting to one very small, and very pretty little girl, that does not mean that one hundred and three thousand books are all very uninteresting to a man."

"Well—maybe.

"But then why is Don so unwilling to go to the Mating Office with me?" she launched her attack suddenly along different lines.

"Dot, Dot—you know I'm not unwilling to go there with you," Don cried, wrapping her suddenly in his arms, and turning her face up to his. "There's nothing I want more—except perhaps your happiness. And that, I think, I can best assure by waiting a little longer."

"OOO—you can't—you can't," she suddenly sobbed, and hugged him harder, burying her face suddenly on his chest. "I—I want you Don—I want you *now!*"

Don lifted her face again. "If you want me so much now, as much as I want you maybe, why—I guess we can get to the Mating Office in half an hour."

But Dot didn't stop crying. She cried harder, and hugged him harder, and began to dance. Let's go—let's go—.

CHAPTER III

THERE were three couples ahead of them when they reached the Mating Office. All of them were trying to look bored and indifferent. All of them were being very stiff and wooden. The couple in the Blue were being Recorded first. A mixed couple, a man in Blue and a girl of the Greens was next, then a Green pair, and finally a pair of big, powerful-bodied Greys.

Each couple was accompanied by a Master of his class to act as witness and identifier. The Blues' witness was evidently the girl's father, and he was quite as flustered as the pair themselves. The Plehb clerk behind the bench looked at him with a bit of annoyance, but not too much, for he was a second-class blue, while the Master was, of course a first-class. Finally the pair moved away, to the accompaniment of chuckles and snickers of half-suppressed laughter from the Polshin Guards standing at the door.

One of the Polshins left his post long enough to press his seal-ring on the wax, and returned, his soft scarlet cloak flapping about his legs.

This guard-duty was the one task the Polshin men performed in all their lives. For two years they were forced to do the strenuous job of standing or sitting about in the Plehb sections and guarding the Polshin's interests. Usually they went in pairs, for company. Each was armed with a shock-rod, but it meant nothing, for they were seldom needed. Their duty in this office was merely to put a Polshin stamp of approval on the Mating Record—and collect their fees. Two, lest the duty be too boring.

The mixed couple, accompanied by a Blue Master, was up now. The Master in this case was evidently the young man's Apprentice-master. The records were entered speedily, and the three de-

parted. The green couple followed, as another couple came behind Dot and Don. Then—Omallyn came in. Omallyn's entrance at that precise moment was as mighty a force in the course of human history, as Montgomery's speech on the "Independence of Mars," or that later speech of the later Montgomery on the "Isolation of Earth." Omallyn was the local Polshin leader, N'Yak's Polshin Chief. He was round, and short and fat, his face was red and fat, his hair faded, and missing on top altogether, so his pink, shiny skull showed. His fifty-three years of utter unrestraint showed in the bleary, pig-eyes, in the flabby, fat face and the flabby, fat belly. He waddled when he walked, and his voice was high-pitched and unpleasant. But he was followed by a retinue of lesser Polshins, bowing morally, intellectually, and physically to this scarlet-cloaked monstrosity. His once sharp hawk's nose was half buried in the soft fat of his face, and the sharp chin whose evolution marked the evolution of man was lost in rolling, quivering fat.

Omallyn entered, and the Polshin guards sprang to the straightest of attention. The Plehb clerk bowed low, and the other Plehbs in the room inclined their heads.

Omallyn nodded grandly. The Polshin Guards relaxed, the Plehbs straightened again. "Plehb, how many matings this month?" demanded the Polshin Leader.

"Six thousand four hundred and thirty-nine, Polshin Sir," replied the clerk.

"The rate is rising?"

"Yes, Polshin Sir."

"HMMMM — maybe, Karrody, I will admit your request to open some of the Deserted Passages to Coun-

eil. Hmmm—"Omallyn looked around him.

Dot Steel had, with the other Plehbs, sunk back to the less lighted portion of the soom, but the softer light merely enhanced and softened her beauty. Omallyn's wandering eyes suddenly focussed. A slow smile came across the fat face.

"By Gah—a beauty. Plehb, come here."

Dot Steel's richly colored face went white as the clerk's papers. Her body was suddenly trembling, her eyes opened, dilated slowly. But she did not move.

The Polshin Guard nearest the girl stepped over abruptly. "Plehb, move when you're ordered," he snapped. A touch of the shock-rod and the girl jumped violently. With a little whimper she turned, and started for the door on flying feet. The Polshin guard caught her, just as Bruce Lawry, his cold grey eyes blazing caught Don Wade. "Fool," he whispered, "you cannot help by fighting. It will only be death."

The Polshin guard brought Dot Steel toward Omallyn. Omallyn's fat hand reached up, caught the fastener of the girl's suit, a swift crinkle of sound and the single garment fell away, leaving her white body under the lights.

Omallyn's eyes seemed to lose their blariness for a moment.

"Ahh—" he said softly. "Send her to Infirmary Five for the treatment then to my place—she is very nice."

The girl collapsed slowly, gently to the floor, and lay quiet as Omallyn walked out of the room. The Plehbs in the room were tensely quiet as the grinning Polshin Guards picked up the girl. Passing his hands over her, one turned to his companion with a broader grin. "Old Omallyn—"

White-faced, frozen Don exploded into life so suddenly that Bruce did not even feel the warning tensing of his

muscles. One blow of his fist, backed by the work-hardened muscles of a strong man, sent the Polshin Guard flying half across the room.

One touch of the other's shock-rod jerked Wade into abrupt unconsciousness. His lax body fell across Dot Steel. Raging, holding his near-broken jaw, the first Polshin started across the room, his shock-rod glowing now with the blue fire that meant death at its touch.

"Wait, Mark. The poor fool was crazy. He's a Blue, and worth something. Losing his woman made him kind of crazy, don't kill him."

"Out of the way, that Plehb-spawned maggot *struck* me! No Plehb can—"

"Let him live, Mark, let him live. He was crazy. Don't worry. He's paying for it."

* * * * *

IT was hours later when Don Wade woke. Bruce was leaning over him, his eyes cold and clear. There was a hypodermic needle in his hand.

"Dot," groaned Wade. Abruptly he sat up. He stared about him. He was in the Library now, lying on one of the tables.

"Lie back, Don. You almost died anyway. Believe it or not, the interference of a Polshin saved your life."

"Where's Dot?"

"She's gone, Don," replied Bruce steadily. "You know that."

Don's eyes began to smolder with a colder, saner hate now. "I'm going to get her back. Those maps—the old maps! They will show where Infirmary is, and I'll bring her back!"

"No, Don. You won't. Listen to me, Don. You aren't prepared to bring her back. You couldn't get to her in the first place. In the second, you would not be able to bring her away now. She has been operated on by now. She will

be unable to move for days. If you did reach her, and escape with her, where could you go? I have thought of all this. While I was getting that stuff to revive you from the old Interplanetary Hospital, I thought that out.

"Don, you will have to lose Dot. I know more of medicine now than do those doctors of Infirmary Five. They are trained only by what is remembered from the Old Days. I know all that is known of the Old Days—more than they do. Listen, I will tell you what will happen. Dot is not like most of the Plehb girls taken. She is not the first but she will be almost the last. Dot will become conscious when the anesthetic wears off about two days from now. Then she will know what has happened. She will be treated. And she will die because she does not want to live. Nothing they knew even in the Old Days would have been able to make her whole again, so even if you could reach her, it would avail you nothing, because Dot would not want to live, and she would die. When a human not only does not fight for life, but seeks death, that human will die, even though they be in sound health. With a wound, death is inevitable. Dot is lost, Don."

For a long minute Don sat in silent, blank-faced thought. Slowly he sank back. "Yes. She is, I guess. I have read that too. And I know Dot." He smiled faintly at Bruce. "What will work for her, will work for me, Bruce. I do not want to live."

Bruce's eyes just hardened. "I thought of that, too. I would not have saved you if I had not known you would want very much to live. Don, you want to live because you know more than any other living human. You know the secrets of the old days, and we can learn more. With them—*We will not only destroy Omallin, but we will destroy*

the whole Polshin order: we will bring back the Old Days!"

SLOWLY Don's eyes lit up again, and again he sat up. "Use these secrets of the Old Days—to end Omallin and the Polshins. Yes, Bruce. I want very much to live."

His voice was so coldly, precisely deadly, Bruce looked at him sharply. Don spoke again. "It will take years, won't it, Bruce? We cannot do it alone, for then it would not stay done. The other Plehb girls would be seen by other Omallins, and want to not-live. No, it will take years, and we must be very careful. We must make all the Plehbs in N'Yak help us first. Then—I wonder if the old cities still exist, like this one. Shkaga and Washton, San Franco and London. Somehow, Bruce, we must learn, and start in all those cities, so that *all* the Polshins everywhere are destroyed.

"And first we must learn *all* the secrets of the Old Days, and more too, if possible. I think perhaps we can. We will open the old Interplanetary Laboratories. Somehow we must build an atomic cruiser, for I know that while we have seen only the pleasure cruisers of the Polshins, they must have, somewhere, the old atomic cruisers. We will need powerful weapons if we are to regain the surface for the Plehbs."

"I thought you would agree with me, Don. Yes, it will take years. And all those years you must keep out of the sight of the Polshin Guards, for one of those two in the Office there will look for you. The one you hit. The other saved your life."

"For that, perhaps I should thank him. If he did not, I would not have had this opportunity." Don's cold, precise voice seemed with him permanently now.

CHAPTER IV

DON WADE began the study of mass psychology, and the psychology of the individual that day, while Bruce began the study of the maps with more care. The power they were using to light the library and the Laurie Cube outside, they had simply stolen from the old power-lines that had never been torn out. But now, Bruce realized, he would want vastly more power, power to light and operate the buildings. For they had decided that some small part of this deserted section was going to be restored to the beauty it must have had before the Great Catastrophe, as they had come to call that period of sudden fall from earth's greatness, the sudden change from the Old Days.

Bob Steel, Dot's brother, was their first recruit, and Jon Lawry their second. Bob Steel was a Master of Direction, and a class A Blue. And he hated the Polshins with as deadly a hate as did Don Wade. With Wade he began to read the old books, and to learn what had been before. He quickly appreciated the mystery and romance of them. And—their possibilities for revenge, and for reinstatement of the Old Days. Old Jon read the books, and with ecstatic joy learned again the secrets forgotten by men for more than six centuries. He reveled in knowing. With difficulty he restrained himself from showing his knowledge at every job he was called on, and from calling on Bruce's far greater knowledge. Bruce had trained himself through years to study to a point that equalled the learning of any physicist of the Old Days. To him the atomic engines were clear, and straightforward in their action.

The Polshins had had, years and centuries ago, a spy system. That had been thrown over now, long since. When first

the semi-Plehbs, the small property owners and near-genius trade intellects had been suppressed almost immediately after Interplanetary's complete withdrawal, there had been violent, crafty rebellion, led by these intelligent ones. Soon, though, they had been killed off, had died out, or by intermarriage with the weaklings, both in mind and spirit, the last revolutionary tendencies had been stamped out. The far-reaching spy system of those days had died out with it. Gradually the televiso-system fell into decay, and failed utterly. The telephone system was simpler, needed less intelligence for its operation, and was maintained because the Polshins needed rapid communication at times of emergencies. The Masters were connected by telephone system, but that had, at first been watched with the greatest care, lest it be used for plotting. Finally even this had stopped.

Now, in 3350, there was no check on the Plehbs, because there seemed to be no need for it. The Plehbs had no unification whatever, no common leaders save the Polshins.

But, unnoted by the Polshins, intelligence had risen again. The dampness of stupidity had dried out of the powder—and Bruce was the fulminate cap that would set it off. Omallin had pounded the cap. Already the trains of fire were streaking out through the loose mass of highly intelligent and explosive men. All they needed was to be shown what *could* be—and they would demand it.

In a month, Bruce and Jon, and a dozen other master mechanics had restored the great power station in the Mahtan section of the city, the long deserted part, that part furthest from the inhabited portion. There were lights there now, the great atomic burners supplying plentiful power. And—the elevators had been restored to operation, the moving walks moved again. There were goods in

the show-windows, goods manufactured in the hidden plants in that deserted section by the skilled Plehbs who had been converted to the movement.

THE Mahtan section lived and breathed with a surface semblance of the old life. The televiso system was in full operation here, and century-old reels of televiso-plays, stored in the magnetism of thin steel ribbons, were again in action, the theatres were lighted and showing scenes of the Old Days.

These educated the people to the old life far more quickly than the finest of orators could have educated them. Educational reels showed the whole Solar System, how it was made up, and how it worked. News Reels showed the mighty jungles of Venus, the blazing, smoking rocks of Mercury, the yellow-red deserts of Mars, and their gleaming cities. They saw the ultra-powerful, squat men of Jupiter, and the lean, tall, tanned men of Mars. The mighty glaciers of Athena's frozen airs, and her broad rivers of liquid helium flowed again across Terrestrial screens.

They rode again in the early rockets, then in the mightiest of the great space-liners of seven centuries before.

And Don Wade spoke. Don had trained himself with the aid of the old books, and with the patient, deadly precision of a man who's life is directed to one end, the destruction of a hated system. Normally when he spoke now, his voice held only that cold deadliness. But when he spoke to his audiences, it was rich, and strong. It told the men what they could be. Blues and Greens were admitted, but as yet no Greys, for Don Wade had one important message to give, and no Grey would have been intelligent enough to obey.

"Do not let any Polshin, for whatever reason, even gain suspicion that in the

slightest degree, your ideas have been changed."

There was everything to win. Those Plehbs, seeing the city alive, the walks moving freely once more, the televiso news working, admitted freely now to the half-dozen libraries that had been found, did change. But they were chosen Plehbs, too. Not over a thousand at any time were allowed to enter the Deserted Passages. There must be no sudden decrease in the population of the inhabited section.

And other, side-separated routes were found for entering the deserted section. There were a score or more Plehbs who had permanently left the old section, and lived now as guards and watchmen at the entrances to the new. Televiso systems kept them connected with Bruce's headquarters.

Bruce had established himself. He was one of those who no longer lived in the old section, but on one of the lowest levels of the Mahtan section. Deep down here, two levels below the power plant, was the Interplanetary Research Laboratory. When Interplanetary had maintained its offices on earth, these laboratories had been the finest research organizations on the planet. They had been used for research in physics, in chemistry and biology, and for human research, for testing applicants for emigration. When Interplanetary had left, that laboratory had been simply closed down. The Polshins had not been interested in research—and they could have found no adequate scientists to populate it, had they been so inclined.

BRUCE found it. And Bruce repopulated it. From the Master Kem class, he drew chemists, from the Master Meks, he drew mechanics and electricians. From the Master Bios, he drew his biologists. Then he set them all, nearly fifty of the most intelligent

Plehbs, the most intelligent Terrestrials, working on the books and records he found here; the more advanced books in Physics he read himself, the last records, the reports and scientific publications that had been printed on Mars and Jupiter.

"For there is one problem that will, when solved, give us the things we need—real power.

"Remember this. The old revolutions were always stamped out by two methods: shutting off the air flow, and pumping in heat till the Plehbs nearly suffocated. They had to stop. All those controls are still in the hands of the Polshins at the surface. They still know how to use them, I'll bet. Then they turned off all the power, so that darkness and utter lack of energy forced submission and the deliverance of the leaders to them.

"Our first necessity is independent power. We can't possibly build new atomic burners. Remember the 'infuse' lining of the burners, and of the stop plates is a substance we cannot make here. We must have the Jovian elements. We must seek a new answer to the old problem of power. Chemical fuels simply won't do. Accumulators, marvelous as they are, aren't enough.

"Besides, we must have a greater power than the Polshins. And they have the atomic cruisers. Don, the atom contains the secret. That was the one problem that was not fully solved in the Old Days. I think I have a chance, where they failed, because I have learned not at the time, but centuries later, and I have gotten a perspective that they did not have. I have learned across all the centuries. Toward the end of the Old Days they were treating the atom more and more as a particle, but several centuries before that, they had considered it more as a series of waves."

"The treatment of the atom as a particle, however, brought them the energy of the atom, while the treatment as a wave brought them nothing whatever.

"The treatment as a particle brought them a particle of the energy. Think of it this way: A thousand tons of water is a mile above you. You can extract the potential energy of that water as it falls, by treating it as a mass. But if you treat it as an enormous number of atoms and take out its atomic energy, you get infinitely more energy.

"The break-up of an atom in the Burners yields electrical energy as charges. The Burners simply break up the atom the way a man might take apart the plates of an accumulator, and discharge each plate separately. In the burner the atom is exploded, in a tremendous magnetic field. The protons and electrons which composed the atom are hurled apart and scattered like the fragments of a bursting shell. Before that energy can become available as electricity, the particles must be separated into two types, the positive protons going one place and the negative electrons another. The magnetic field does this, it directs the protons one way, because they are moving positive charges, and the electrons the other, because they are moving negative charges. The two streams move in opposite directions around the center of the magnetic field, and strike the 'infuse' collector plates. They build up a charge on these plates, that tends to repel the incoming particles. The charge reaches about a million volts, and then stays there, for at that voltage the repulsion is so great that the incoming protons or electrons are almost stopped before striking. If we draw off power, the voltage falls to just such an extent as will allow such a number of protons and electrons to strike as will maintain the charge.

"**B**UT—the protons and electrons can't be stopped in practice, but actually strike with about twenty thousand volts velocity. That means that the kinetic impact will heat the 'infuse' plates. That's why the 'infuse' plates are made hollow, and the mercury is circulated through them. The mercury cools them, and helps stop the protons and electrons.

"Here on earth, of course, we use water-cooling, and just waste the heat-energy. It's so cheap anyway, we don't have to worry about that. But in a space ship, that heat has to be taken care of. Heat is very hard to get rid of, and while the process is 80% efficient, twenty per cent of one hundred million horsepower is twenty million. A space ship, one of the big liners, may easily use two hundred million horsepower in pulling free of Jupiter. That means a constant heat energy of forty million horse. Therefore, on space ships, to cool them, they carry mercury cooling, use the mercury vapour so created to run turbines, and cool and recondense the mercury vapor in water turbine boilers.

"That system of atomic-electricity—mercury turbines—water turbines will take care of the normal, constant production of heat energy. By converting it to electrical energy they can use and thus get rid of it. For the short period of two hundred million horsepower used in leaving a planet, they used heat-reservoirs, tanks of liquid hydrogen, the substance which holds the most heat, weight for weight, then they could get rid of the heat slowly. As it was, however, even the atomic cruisers had to stop at the Jovian satellites to cool off between jumps. In space, only radiation will carry away the heat you see, and radiation at any normal temperature isn't very rapid.

"Now the atomic cruisers for battle,

were normally in a pretty bad way if the thing went on very long, because they'd overheat. Atomic power engines would permit of about two billion horsepower in a moderate sized battle cruiser—but if they ever tried to use that, they'd have four hundred million horsepower of heat to get rid of.

"That doesn't satisfy me at all. In the first place, you are just using the potential energy of the water falling down hill. I want to find a way to use *all* the energy of the atom. Destroy even the remnants, so that I don't have even a hydrogen gas exhaust as the atomic engines do. I think I can see some way toward doing it. That's the goal I am heading toward now."

"What progress?" asked Don.

"Whoa—not so fast. I haven't even set up the apparatus yet. Lora Wayne is helping with it. She's a bright girl.

"You go back to your work—and I to mine. Remember, even when we have this whole city ready, we will still have to wait till we can convert the others around us."

CHAPTER V

BRUCE smiled up in triumph to Lora. "That proves it, I think, doesn't it?"

"It certainly looks to me like the answer Bruce," she replied, her eyes glowing with excitement. "Can you try it out somehow practically? What will it do—can you limit its action?"

"I'm sure I can. Those old mathematicians were right, when they made their calculations, but wrong when they passed on unheeding. I think this is infinitely more important than anything else we have done. The Old Days had anti-gravity, and we have it again." He nodded toward a large metal ball, floating unsupported in the air, a small string holding it down, and against its tend-

ency to be thrown because of earth's centrifugal force. "Now we have anti-reaction, you might say."

"Those waves of force though must act against something," objected Lora. "When I made the apparatus for you, I didn't see what that was going to react against."

"They don't react against something, they react against everything. They are of such incomprehensible fineness that they slip through what we call matter, and space, and react against the stuff out of which our curved space is cut. They pull on all space. They push the earth, and the Sun, on Jupiter, Mars and the Magellanic Clouds equally.

"Practically—they mean a ship without the tell-tale streams of atomic fire pushing it along. Atomic rockets are visible. These momentum waves aren't."

"It seems strange that the wave theory of atoms should lead to a means of generating momentum directly in space."

"Any correct theory of the atom must delve far deeper than surface manifestation of force we know as matter. It must take into account the real nature of space. Atoms aren't things—they're symptoms of space. We detect magnetic fields by their action on steel, or on an electric particle. We detect space by the existence of atoms—but atoms are merely symptoms of space as the movement of the compass needle is a symptom. The wave theory asserts, remember, that every electron, every proton, every tiniest particle is actually a series of complex waves spread through all infinite space. Over all space, these waves cancel out, the trough of one wave-system coming on the crest of another wave-set of that same electron, except in only that tiny bit of space where we can detect its effects, where the waves are not visible, and we say the electron or proton is.

"That involves space. If it described

the property of space known as 'atoms' correctly, then it should describe that property of space known as 'momentum' and 'kinetic energy' correctly. Through perfectly logical derivation on the mathematics of the wave-atom, you can derive this formula of momentum, and this kinetic energy.

"THEY seemed to me the simplest means of proving or disproving the theory. Though worked out nearly fourteen hundred years ago, way back in the twentieth century, they were never tested. If a theory is good, it will predict, and its predictions come true. Here is a prediction that has come true. By these momentum waves we can drive a ship silently, invisibly and almost undetectably. We are one step toward the defeat of the Polshins."

"Are you going to make a ship now?" asked Lora eagerly.

"Not yet. We have not enough men in our movement yet. Remember, we must have workers enough to operate the deserted machines here to make the vast number of things we will need. Only one hundred of us are living here permanently, and nearly a third of that number must spend the major portion of its time in services, making food on the machines, and clothing and other necessities. Another portion must spend some time on the generators, and other apparatus. Scarcely a score of us is engaged in advance work.

"Besides—I have another thing I want to work out. It may be even more important!"

"What Bruce?"

Bruce turned to his laboratory assistant with a smile. These members of the new movement were not clad in blue, or green. They wore costumes of pure white, trimmed with whatever color they fancied—save only scarlet. That was Don's idea. The Scarlet would merely

have broken the law. It would not have been a choice.

Lora was dressed in the white costume, trimmed with gold, as was Bruce. Her jet-black hair and dark eyes made a striking contrast to it. A contrast she hoped that some day Bruce would notice.

But Bruce turned to his laboratory assistant with a smile. "The solution to another problem the men of the Old Days never solved. Television without a sending device."

"But didn't they say in the Old Days that that was impossible?"

"They did, but they also said, before it had been done, that making a machine that would fly was impossible, and that making a ship to cross space was impossible and finally that overcoming gravity was impossible. But they didn't after it had been done.

"The trouble is that you have to pick up some form of energy coming from the scene in question before you can view it. Light won't do, because bodies in between will stop it. No wave will do that is short enough to be effective in delineating the object. Radio waves will penetrate, but they are so long that they will also penetrate the body to be viewed."

"Then haven't you yourself said it was impossible?"

"WATCH. I have been working on this while you were making up that apparatus for me. It isn't fully completed. I will need a better tie-in, than I have now, between the two focusing devices."

Bruce walked over to a piece of apparatus he had set up on one of the insulated benches. There were two devices, about ten feet apart, and directly between them a third. This third was flat-topped, some two feet square and six inches thick. One by one Bruce turned them on. Tubes began to glow,

and the recording meters mounted as the heaters began to throw out their electrons.

"She's hot. Now watch." Slowly he began turning a control dial on one of his machines. Abruptly something snapped softly into existence on the top of the little, flat, cubical box. Carefully Bruce focussed it. A loud speaker began to chatter meaninglessly. As abruptly as the cloudiness had appeared, it solidified, and the speaker began to talk intelligibly.

Three men bent over their work. They were clad in the white of the Freedom Party. The delicate apparatus they were working on was taking shape. The scene was scarcely twelve inches high, but the coloring, the detail, the weave of the cloth even, was in such absolute perfection that Lora gasped. Ten-inch-tall men working on inch-long apparatus, their tiny hands functioning with perfect precision.

"What will it be when we get through, Jon? This looks to me like the old radio-receiving set circuit? Do you suppose he's going to start a radio-broadcast station again?"

"I doubt it. The Polshins might pick it up. That would be bad. It is probably something quite different. Remember that radio-frequency currents were used for thousands of purposes, from sterilizing foods under super-sonic waves, to aiding medical healing and causing artificial fevers."

"Oh, Bruce! It's Jon, and Mark and Ted! They're six blocks away through granite walls!"

"Not all of them, Lora, not all of them. Touch one of those images there."

Timidly Lora advanced her hand and, half-frightened, touched the image of Jon's head. Her finger passed easily through it—but there was a slight resistance, just the barest feeling of pressure. "Why—they're sort of solid!"

"They are. They are real images, they are part-formed electrons and protons. This device here, perfected, will mean more than anything we have ever dreamed of. It will surpass a million-fold the televiso system of the Old Days.

"Every proton and every electron exists through all space. Part of the protons and electrons that compose Jon exist in this space where we are—and where the machine is. That machine cancels out part of the electron-wave, so that the rest, no longer mutually canceling, become real in our space. Those images are one one-hundred-thousandth real. I have condensed them for greater solidity. The microphone I have just turned off, picks up the tiny voices of those images, and amplifies them so that we can actually hear them.

"So far as I know—the device has no distance limits!"

"Bruce—you mean we could pick up even the planets!"

"We can. When we've built the big apparatus, and at that it is to be our first step. Because—I can reverse the process, and make myself appear. But there I am limited. I cannot appear further than one thousand miles away with any practical apparatus, and at that distance I must make myself a ghostly image fifty feet tall."

UNDER Bruce's direction, the apparatus was begun within a week. They, who made it, did not know why he installed all the elaborate timing devices, the careful clock-work. And Bruce appeared only occasionally, because most of the time he left the work to Lora.

Week after week passed. The apparatus neared completion, the Freedom movement spread through all N'yak, till more than half the Plehbs were enrolled in it, and had seen the City of the Old

Days that had been gradually built up in the old Mahtan district. Still the Polshins, fat and comfortable in their assurance of power, not imagining such a movement after centuries of peace, did not feel the growing tension.

The Plehbs swung more briskly through Center Cube now, but still the Polshin guards loitered aimlessly, laughing, grinning—and occasionally still a Plehb girl disappeared as she attracted the attention of one of those guards.

Then Bruce and Don and the leaders of the movement would have their hands full, suppressing the tendency for an untimely explosion. With a realization that this was *NOT* just the normal course of events, came a new feeling of rebellion. Before it had seemed as inevitable as death. Now it was not.

Silently, the Freedom scientists were working. Bruce was not alone now; he was the director of a competent and growing force of scientists. One man was studying the problem of insulation against the shock-rods of the Polshins, another that of the problem of hand-weapons for the Plehbs. Others were aiding Bruce in his studies of the atom. More and more Bruce was realizing that he studied not the atom, but the properties of space. The gravity-field was one of his greatest aids, the magnetic field second, yet both of these had to be handled cautiously—for their effects reached out to infinity, and powerfully to the Surface, where some Polshin might wonder at them.

Three months were needed to construct the timing devices of the great projector. Two months more saw the two focusing machines set up. A full eight months passed all together before the apparatus was ready for its first trial. All the staff that had worked on it, and many of the elected leaders of the Freedom Party were present. Based

now on the Planetary Socialistic Government, elected leaders ruled the party. These elected delegates gathered with the scientists and Bruce and Don arrived.

Briefly, to the leaders, Don Wade described the intended functions of the machine. With it, they hoped first of all to see the other cities of earth. To see whether there, too, the same system of Polish and Plesh existed. Then, they hoped to turn their giant eye out to Mars and Venus, to see what had happened to the civilization of the Planets.

"Does it require so huge a machine for shorter ranges, such as looking at earth-scenes?" asked one of the delegates.

"NO," Bruce replied. "I can, and will, make much smaller replicas of the important parts of this machine for that purpose. But this machine is intended for viewing the planets. To make that possible, I had to mount an enormously complex clock-work device to follow the planetary motions. For instance, to view a city such as Thanton on Callisto, I have first to neutralize earth's daily rotational movement, then to neutralize the effects to Callisto's daily rotation, her orbital rotation around Jupiter, and Jupiter's orbital motion around the Sun. All of this requires an exceedingly complex apparatus. And already now, sets similar to the primary view-apparatus are in machine-production. We had to cut dies for that, and that is what took so long. That, and the development work. But the technicians are now working on a similar device which will have an illimitable theoretical range, and a practical range that would permit glimpses of life on Athens. However, this device will be but two feet square, and three inches thick. For viewing scenes on earth, it

will be fully capable of anything we need.

"The big apparatus is ready. That stage there is ten by ten, and I will put on it life-size human images, with one ten thousandth real solidity. The subjects which are viewed will feel a slight electrical tensity, but absolutely nothing that will disturb them in the least.

"I have adjusted the controls to view the old city of Shkaga. This should be the Center Loop Cube, at the ground level."

Bruce walked to the main controls, and started them. This was, actually and really, the first time the machine as a whole had been tested. The tubes warmed, a low humming echoed momentarily from the speakers. Then—abruptly, solidification was complete. On the stage there was a portion of a building, fading off into misty unreality at the edges of the focus. Dark rubbish lay at its base, and on the pavement. There were no people on the stage; all was dark, apparently.

Bruce rapidly condensed the image. The building shrank, and the whole of the great Cube was visible, dark, and rubbish-heaped. "There are no men in this section. It is dark here, evidently. The image is lighted by our lights here. In reality, it is utterly dark. I will shift the focus." The setting blurred, seemed to shimmer and change, flashes of solid rock obscured everything, then suddenly for an instant a flashing human figure appeared and was gone. Instantly Bruce changed the setting back.

It was a passage, lighted evidently. Half a dozen human figures in grey garb slunk disconsolately down the rocky corridor; at its end was a Polish guard, in the deep orange the Poleshins of Shkaga wore. Bruce raced down the corridor with his settings, branched to a larger one, down that, and finally reached a small Cube. There were more people

here, Plehbs in grey, and dark red and dark blue. The Red here was evidently highest, but the men recognized again the Plehb and the Polshin.

IN swift succession, Bruce brought in scenes from San Franco, Washton, and a dozen other cities.

Then, in London, he found again the Polshin and the Plehb in Berlin and in Paris. In Tokyo and Peiping. In every major city. Only three cities he tried showed no human life, deserted and utterly dead. Barcelona, Munich and Lyons.

"Show us what the Polshins are doing above us!" called a delegate.

Bruce smiled grimly. Don Steel had prepared for this request. Not for nothing had he studied mass psychology, and he had searched for many minutes on Bruce's original model of the machine before finding the scene he knew would most quickly and effectively rouse the people. Suddenly the stage was a garden, a magnificent garden of flowers and shrubs. It was night, but soft lights made a dim illumination. In the garden were scarcely a dozen figures. Two young Polshin men, an older Polshin, and three Plehb girls in a group. The older Polshin was bleeding freely from five long gashes across his fat cheek. One of the Plehb girls was bound to a pair of young, stout trees. The Polshin had a heavy whip, and was beating at her body with all his fat strength. Her whole raiment was colored by criss-cross streaks of blood, she hung loose in her bounds, petking feebly to each stroke of the whip. Low moans came from the speaker, and soft cries from the two other Plehb girls, held by the two younger men, watching the scene.

Abruptly Bruce cut the dials sharply across. A rumbling roar sounded from the speaker as there were flashed on the stage masses of tumbled, jagged rock,

green trees and solid mountains. An angry cry mounting up from the audience drowned out the sound, as the scene was established at last in a swaying forest of pines. A ruined bridge flung its broken members across a quiet stream.

"I think that will be enough of that," Bruce decided harshly. "I did not pick up the Polshins at first, because I feared some such scene. We did not have to see in order to know. We have heard all this. I think it would be best if we used now the more complex features, and viewed Mars. That is the great problem really. Have the planets suffered a like fate? Has their civilization fallen so far as has ours? Remember, we never did have anything but a straight democratic government, with no proper controls. Mars started differently. Perhaps they have not fallen quite so low."

Carefully he was setting his apparatus now, with the aid of two other trained mathematicians, one in training now to be an astronomer.

The clockwork began to hum softly, then was silenced to a barely audible purr as it got into action.

"I think we are ready. We should be within five thousand miles of the planet. You see—we do not know the exact time, we are not absolutely certain, even, that we know the exact day. The old calendar was known to have defects, and we may be wrong. However—"

The lights had been turned off in the main part of the room now, and only some very carefully designed reflectors lighted the scene. Abruptly—on the stage appeared a floating ball, some five feet in diameter. Just within the limits of the machine's observation, was another ball, a tiny ball scarcely larger than a golf ball, jagged and ruggedly shadowed in the light of the spotlight flooding it. The larger ball was edged with

a thin, shining belt of light, bright in the powerful spotlight.

"MARS," said Bruce, "and even in the 'Old Days' they had nothing to equal that! We will win out, I am sure."

The planet expanded swiftly, the tiny satellite became hazy, ghostly, and vanished at the edge of the scene. Tiny spots appeared on the very slowly turning globe, spots of black and glowing light. "Those are lights on Mars," Bruce said, his voice tense. "Lights shine as lights, even in this device." The surface came nearer, toward one of those shining clumps of light. It grew, and, as it grew, the rotation of Mars became evident. The scene was turning past them. Bruce centered it again, and engaged another piece of clockwork. The scene steadied—and expanded abruptly.

They were hanging, it seemed, some ten thousand feet above the city. It was a great city of black and gold and silver and colors. The buildings towered slim and graceful, ships flew through the air around them, and into them. Only here there was no perspective. Bruce altered the setting, and the whole city, in miniature, was on the stage. Now the ships flew across the stage, and tiny, crawling dots moved in streams below.

Abruptly there appeared a section perhaps two blocks square. Only half the buildings were visible, the upper halves soaring off into the upper air. People, thousands of gaily dressed people it seemed, flowed along on the moving ways. They were smiling, laughing, happy. A scene such as no Plehb had ever seen. Brisk, clear sounds came through the speaker, the sounds of voices mingled faintly, the hum and rush of vast business.

"Civilization didn't fall there!" gasped Don. "They have all the civilization

they ever had! They must have ships, space ships—"

Bruce twisted the settings, until the scene on the stage shrank, and grew tiny, the buildings reappeared, diminished, the city became small and the curve of the planet showed itself again. The ships sailing about the city seemed concentrated near a great open square. Bruce re-expanded the scene, entering on this view. The square was huge, so great that the great ships even seemed small. It was fully three miles on a side, the city, actually, built around it. And as they watched, they saw something dart into being on the screen, a huge something that settled on the field, and occupied a space half a mile long. A titanic space freighter.

"A space ship!" Bruce exclaimed. "Why do they never come here if they have them? Let's look at Callisto—Venus—"

The stage grew blank with the night of space. In seconds, the giant of the Solar System appeared, mighty Jupiter, a six-foot ball, with smaller balls moving slowly about him, planetary in size themselves. Callisto—it separated, centered on the stage, then abruptly clicked into immobility as the clockwork was thrown in. In moments Bruce had located Thanor.

Thanor was a mass of moving, happy people. Small transplanetary ships moved about. Slightly larger inter-moon ships and gigantic interplanetary ships circled and moved freely.

VENUS—more ships, moving freely. Space seemed full of them. Only on the Moon and earth were there no great space ships.

"Why?" asked every man of himself. "Why is earth alone deserted thus? Why was earth left to a savage, feudal system in an ultra-machine age?"

Muttering, stupefied men left the hall.

Back to their jobs, and to the men who had sent them. Back to tell of other earth-cities under the crushing rule of the Polshins. Back to tell of Plehb girls bound and beaten to death by heavy whips in gardens of beautiful flowers and tinkling fountains. Of hundreds of millions of bappy people on the other planets. Happy people from Mercury to far out Athena. And misery, and terror and hate only on earth. No brutal Polshins, taking Plehbs as mere animals living solely for their amusement, save on earth.

AND in the hall, furious work was going forward. Nearly twenty of the electron-wave visors were set up within three days, the stamped parts coming out in a steady stream now. The force of permanent dwellers in Mahtan increased now to nearly two hundred and fifty, even the Polshins beginning to notice a slight difference in the city, were working at furious speed. Smaller, simpler clock-drives worked nine of these wave-visors. Nine of these machines were in constant operation observing on the nine planets, and the great machine was examining the satellite worlds which it alone could follow. Recording cameras took down everything seen.

The other machines, operated con-

stantly day and night, were observing things on earth. Five of them observed in N'Yak, the other six were trained on Shkaga, San Franco, Washton, Felfya, St. Loui.

Swiftly now the campaign with the city was gaining. And now new dies were being cut, dies to make the projection apparatus Bruce had mentioned. In every city men were being chosen, without their even being aware of the examinations, for the local leaders.

Bosn, Felfya, Shkaga, and Washton would be the cities where the first starts would be made. These cities were within the possible range of Bruce's projector, here he would be able to reach out and speak to the men, the personnel, which directors chose.

And Bruce worked constantly at his other problems. Still he had merely begun. They had communication—but not material communication. Time and time again he had tried to make the apparatus transmit the entire piece of matter it viewed. Time and time again—on the tiniest particles—he had failed. When he reached the half-transmitted point, instantaneously some terrific force seemed to wrench all space with unutterable violence. Terrific flaming arcs played momentarily over his apparatus—and it fused in ruins.

So Bruce worked on something else.

END OF PART I.

The World Aflame

By ISAAC R. NATHANSON

In this story I. R. Nathanson delves into the world of the atom in which such marvelous potentialities are locked up, which we may hope for man to eventually set free and utilize. It gives a strange picture of natural forces exceeding man's control and making one almost afraid of the future.

CHAPTER I

DEEP silence reigned in the Lecture Hall. The listeners sat with wrapt attention drinking in every word that fell from the speaker's lips. Professor Samuel Mendoza, admired and revered by the entire student body, was an inspired lecturer.

"... Indeed," the Professor was saying in his concluding remarks, "it is almost impossible for the human mind to conceive of the vast energies residing within that microcosm we call the atom. From what other source come the prodigal radiations of sun and stars? Think of it: Within one pound of ordinary prosaic matter if annihilated, there is enough energy to raise 100,000,000 tons of water from freezing to boiling temperature!

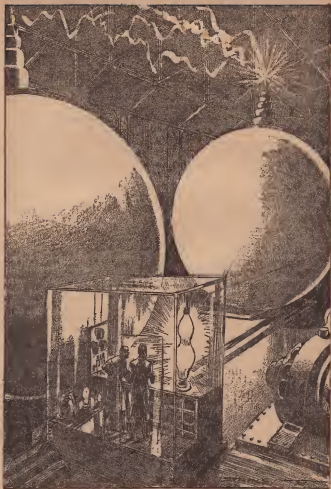
"When the day comes that we can hitch on to the mighty energies locked away within the body of the atom, a truly new age of man will be ushered in. All the past achievements of the human race will be as nothing, the fire of Prometheus a mere plaything in comparison. Even flight to other worlds in space—greatest miracle perhaps of all—may then follow as the inevitable development. What this alone would mean in revolutionizing life, no one in our generation can even begin to visualize."

Here the Professor lapsed into a dramatic pause, his dark eyes aglow with the fire of the prophet; his tousled iron-gray hair, brushed back from a massive forehead, accentuated the spiritual expression of a face which was more that of a poet or musician than of a hard-thinking, mathematically exact scientist. His gaze shifted from one to the other of his listeners, rested on the lean, handsome, almost ascetic face of young James Tomlinson.

"And the conquest of the internal energy of the atom," the Professor then continued, "is not as far off as many think. Of this, as you have seen, it has been my happy privilege to present some measure of proof.

"But"—pointing a long finger as his listeners, as if sounding an ominous warning—"with the coming of this all-powerful jinni of science, comes also unequalled responsibility; responsibility most solemn and tremendous upon those charged with the proper use of this illimitable force entrusted to man's care. These intra-atomic energies are too vast and fundamental to be ill used or trifled with. With such power in his hands, a time may well come, perhaps not so very far off, when the very life of the race—the stability of the planet itself—may depend on how mankind chooses to make use of such a priceless gift.

"In all earnestness I close with these



An indescribable electric tension filled the air; a sputtering, crackling roar assailed their ears, tingled every nerve and cell of their bodies.

solemn words uttered from the bottom of my heart: Man will either rise to the heights of the gods, or, if he does not take care, he may just as easily destroy himself!"

THE lecturer had finished. The post-graduate students filed slowly out of the room, strangely silent, as if still under the speaker's spell. He always had that uncanny effect upon all who listened to him. He breathed life and drama even into the most abstract and technical of subjects.

James Tomlinson, brilliant pupil and great favorite with Professor Mendoza, as well as his tireless assistant, waited patiently while the Professor, evidently still under the momentum of his lecture, slowly and absent-mindedly collected his papers.

"Ah, yes, Jim. Have you finished with those equations?"

"Last night, sir. They're in my room. Checked them over most carefully."

"Better go get them and meet me in the laboratory in half an hour."

Jim left the building, crossed the spacious, grass-covered campus, sweet-smelling after a recent rain, and hurried toward his quarters. All the way, his thoughts, eager and aflame, were full of the prodigious experiments on which the Professor was embarked. He could scarcely believe that he, Jim Tomlinson, obscure and unknown, should have been so signally honored as to have been chosen by the great Mendoza to assist him in his profound researches.

The substance of the lecture he had just heard kept running over and over in his mind, particularly the concluding remarks, uttered with such solemn and passionate earnestness. Was there a hidden meaning, more than his mere words had indicated, which had passed over the listeners' heads? Surely there could be no serious physical threat in their

latest experiments which they were pushing through with such fanatical zeal. The "Chief" himself didn't think there was—"with proper precautions;" but, as he often remarked, "When you step out into the cold realm of the unknown, strange things are possible." No, Professor Mendoza must have referred to the improper, nay inhumanitarian, destructive, even senseless uses to which the greatest of scientific discoveries are often put by the world at large. Perhaps in many ways it might prove only too true that, in the not far distant future, the very life of the race would depend upon how it chose to make use of the new forces released by science. Could it be true that man was toying with the lightning that would destroy him in the end!

CHAPTER II

WHEN Jim entered the great laboratory, the "Chief" was already hard at work. Despite his sixty-seven years, the scientist was remarkably youthful in appearance, and might have been taken easily for no more than fifty. The fire in his eyes, the energy of his hand and brain, seemed to have lost none of the vigor of youth. Though Jim himself was a glutton for work, he often marveled at the older man's tireless energy.

The Professor nodded to Jim without looking up. The younger man immediately donned his laboratory smock and was soon also absorbed in the elaborate experiments, on which they had been working the last two years. Daily, often far into the late hours of the night, they had thus driven ahead, figuring, testing, experimenting, studying. More than once they had seemed close on the trail of their quarry, yet somehow it always eluded them. With the characteristic patience of true scientists, they were not

the least bit discouraged. Rather, important results only drove them on all the harder.

The hours on that particular afternoon came and went. In their zeal, both forgot their evening meal. The long summer's day turned to twilight, became dark outside. Still they worked on with intense concentration, exchanging only the necessary words.

Though both knew that the special experiment on which they were just then engaged was far advanced toward possible success, neither of them dreamed that, during the later hours of the same night, they would so suddenly and with such dramatic fierceness succeed in unshackling the chains of the awful fount of atomic energy. Still less could they dream of the ultimate consequence of that particular night's work to the whole earth, to everything that lived and ran and crawled or swam or grew on it or flew over it.

The laboratory itself was one of the best, certainly the most thoroughly equipped in the world. Its upkeep, especially the enormous expense incident to the elaborate and profound researches and experiments, was not infrequently objected to by some of those in control of the University funds, but was more or less grudgingly acquiesced in due to the quiet insistence of the master physicist and the influence of some of his able colleagues in and out of the University.

The main portion of the entire laboratory wing was set aside for the exclusive use of the great Mendoza. This was specially equipped, and very few had access to it without his special permission. There, surrounded by a maze of extraordinary apparatus, the scientist was to be found at almost all hours of the day or night. Most prominent, in the center of the huge laboratory, was the multiple battery of forty gargantuan

X-ray tubes, built at an enormous cost. These were arranged in a near circle. A large peculiarly designed mechanism of shining metal was spaced between every ten tubes, dividing the battery into four main divisions. The whole, linked together end to end, could be operated as one mighty unit—the wonder of the scientific world. All around was an imposing array of mechanical and electromagnetic apparatus, mostly of a kind and design altogether new to the eyes of an ordinary engineer or laboratory worker. Huge generators were humming their song of power. Another special feature immediately arresting the eye, were the two 30-foot spheres of highly polished metal, which served as the negative and positive terminals of an enormous electrical field. The highly charged apparatus gave to the air of the room a sharp tang of ozone. Now and then, would come a forked flash of dazzling intensity, followed by a loud, crackling explosion that shook the walls of the building.

"SO far, so good," Prof. Mendoza spoke in a slow, quiet voice. "Now we are ready to concentrate the entire force of our voltage on that piece of beryllium. I believe we have reached a point in our experiments where there should be no hit or miss when we step up that stream of speeding protons. We should score at least twenty per cent hits, enough to split the beryllium nucleuses wide open—but we'll have to be careful!"

"Shall I turn on the power?" Jim enquired in an equally calm tone, although his heart was pounding; it was to be the crucial test.

"Yes; increase slowly. When the beryllium atoms begin to kick out neutrons heavily, we'll turn on full force and see what happens."

"Isn't that"—the younger man moist-

tened his lips and hesitated—"rather risky; might burn out something without stronger insulating shields?"

"Perhaps. But this field has already speeded up before to near 500 million volts, with no bad results. Another hundred million or so should not get out of hand. Besides, we can't get any more money right now for a more powerful set of insulators. So guess we'll just have to take a little chance and go ahead. 'Nothing ventured, nothing gained,' you know. But stop quickly when I call out. Are you ready?"

Jim nodded and pushed the main switch part way, gradually increased the power.

The bombardment of the beryllium metal got under way with a powerful stream of protons produced from ionized hydrogen. The extreme power of the plant at their disposal was capable of 30 million volts. But that was only a beginning, for this mighty power could be gradually stepped up to an even vastly greater voltage by means of the tremendous circular electro-magnetic field, which could accelerate the shooting protons to hundreds of millions of volts—a power never before dreamed of in laboratory science. As the enormous voltage increased, speeding the bombarding particles at ever greater velocities, the electrostatic charges of the atomic nucleuses, which ordinarily repel the oncoming protons, began to break down completely, permitting an ever deeper penetration of the nuclear hearts, with more frequent collisions. Aiding mightily in the new process of atomic annihilation as devised by Professor Mendoza, was a piercing concentration of super-gamma rays of cosmic ray intensity. Further and further went the switch. . . . Ten million volts! The mighty X-ray tubes glowed fiercely with their surcharge of power. From the rest of the complicated apparatus came

a humming and vibrating and crackling.

"Now, lets try full power," the Professor commanded.

Jim shoved the main switch to the limit . . . twenty million volts . . . 30 million!

THEY held their breath. It was the first time they ever dared the full load. An indescribable electric tension filled the air; a spluttering, crackling roar assailed their ears, tingled every nerve and cell of their bodies. Under the concentrated bombardment of the terrifically speeding protons, magnetically controlled and guided to effect the maximum number of nuclear hits, combined with the intense flood of piercing super-gamma rays, the beryllium plate began to radiate with intense brilliancy. And as the process of accelerating the bombarding protons by means of the circular electro-magnetic field continued, the voltages climbed to fantastic heights . . . 800 million volts! The temperature at the focal point recorded the unimaginable intensity of 2,000,000 degrees centigrade, comparable only to that which obtains in the interior of the stars. No such artificial heat had ever been thought possible. As if in protest, the specially designed thermometer suddenly exploded in a cloud of gas.

Professor Mendoza slammed shut the anti-radiation screen of the insulated inclosure, from behind whose thick quartz windows they were taking observations. And well for them that he did so. For just then something let go with an awful, explosive roaring, like that of escaping steam under a tremendous head. The brilliantly incandescent beryllium suddenly turned to a strange bluish-white radiation of such dazzling intensity as to all but overpower the senses. So overwhelmingly fierce became the light rays which pierced every nook and

cranny of the laboratory, it was impossible to open the eyes for more than a moment, even when they turned their backs to the source. At the same time, despite the protecting screen, the searing rays became unbearable.

"Quick, turn off the power," the Professor yelled.

Almost at the same instant, young Tomlinson threw back the main power switch. To their fright as well as amazement, the overpowering rays and heat and the deafening roaring continued unabated. The power apparently would not turn off.

"Something's gone wrong; the switch won't work," the younger man gasped.

The older man turned swiftly to the control panel, shading his eyes with his hands to see. "It's in working order all right; quick let's disconnect the cable."

They worked frenziedly to disconnect the power. But that did no good either. A suffocating rush of gas and deadly heat rays penetrated their shelter. The two were forced to flee for their lives. In the corridor outside they halted momentarily, shaken and undecided what to do. They were sure the power had been turned off, but that would not put a halt to the thing which they had started. The laws of nature refused to work as expected. It was mystifying and it was at the same time terrifying.

The building shook and trembled so, that instinctively the two ran outside. Upon looking back at the huge wing which housed the laboratory, they were horrified to see a burst of white hot flames shooting from every window. In a thrice the whole wing was enveloped in fire and smoke. The flames spread rapidly to the rest of the immense building, forcing them to retreat to a safe distance.

While they were standing bewildered,

so suddenly had it all happened, somebody turned in an alarm. In no time came the loud siren of the speeding fire-fighters. A huge crowd gathered. People flocked from all directions, hampering the work of the fire department. As the fire grew rapidly worse, a general alarm brought almost every piece of apparatus in the city to the scene. The immense Physics Building was soon an inferno of flames, even threatening the other buildings. While high above the crackling flames, the falling walls, the shouts and other noises, the two scientists could hear the terrific roaring of the disintegrating beryllium, whose blinding and searing radiations made a near approach to the burning building very dangerous.

In a short time the building was in complete ruins. The fire-fighters bent all their efforts toward keeping the intense flames from spreading to the other buildings on the campus. Mighty streams of water from many lines of hose, thrown with great force from the high-pressure mains with which the city was provided, seemed of no avail. The water turned to steam almost as fast as it fell on the burning building. And from the costly laboratory continued the same terrific hissing and roaring, the same blinding and searing heat, undiminished and unquenchable.

Outside, among the milling and excited spectators, the two scientists, pale and temporarily unnerved, turned to exchange significant glances. They were almost like two frightened children who had been playing with fire and gotten badly burned.

"Jim," the older man spoke up, finally regaining his usual composure, "we have at last unchained our jinni of Atomic Energy."

"Well, that's what we have all along tried to do, isn't it?" the younger man answered with a wry smile.

CHAPTER III

ALL that night and throughout the next day, and the nights and days which followed, the roaring and flaming of the disintegrating element continued with no apparent diminution in its intensity. To those that came and beheld the spectacle, it was fascinating and was somehow frightening. It was a sort of intensified version of Moses' burning bush.

"Somebody oughter put a stop to those crazy scientists and their fool experiments," one overawed onlooker remarked to those standing near him. "Some day they'll blow up the damned town."

"I don't see the good of any more inventions," another all-knowing being delivered himself to a group of listeners. "Too much machinery and unemployment as it is. If it was up to me, I'd pass a law prohibiting any more newfangled inventions until everybody had a job. Mark you, men: if new things keep cropping up as fast as they've done, machinery will be doing all the work, and everybody'll be thrown out of a job."

"You can't put the blame on those fellows for that," countered a listener, "Under the right industrial system, the work of inventors and such will only create more wealth for everybody."

"Industrial system, hell! What's that got to do with furnishing those nutty professors with oodles of dough so they can putter around with expensive dew-dags while thousands are starving right now."

While this impromptu forum was gathering heat, one of "those nutty professors" was standing not far away, wringing his hands at the sight of his expensive "dew-dags", which had taken so many years to develop, undergoing irretrievable destruction. A woebegone expression was on his pale face. At his side, also sad and forlorn, stood his

worshipping assistant, now and then casting a side-long glance of mingled sympathy and anxiety at the older man.

"We'll have to do something and quick," came from Professor Mendoza almost in a groan. "I'm worried over the possibilities." His teeth were chattering as if with cold.

"You mean—?"

"Well, you know, the disintegration of that beryllium—might communicate itself to other elements, unless neutralized. Look," pointing to several small molten streams, brilliantly incandescent, that were flowing out of the ruined building. "Fortunately that piece of beryllium is small, and may perhaps radiate all its substance before anything happens to the intra-atomic structure of other matter."

"And if it does infect—?"

The Professor shrugged his shoulders. "Come, we've got to do something; no time to lose." He was now himself again.

At his urgent request, after voicing a possible danger, the University heads, in cooperation with the city and county authorities, aided the scientist in assembling the necessary powerful electromagnetic and other equipment which he called for. It took ten days of stubborn fighting on the part of Professor Mendoza and Jim Tomlinson, aided by a corps of technicians, before they succeeded, by means of a reverse process, in so retarding the fierce rate of atomic radiation which was annihilating the beryllium, as to finally bring it under control.

"WELL, that's that," the Professor sighed with huge relief. "The next thing is an effective means of controlling this jinni and of making it work for us, whether it comes from beryllium or any other element."

But the mighty jinni of atomic energy

were not so docile as to be conquered thus easily by man's genius. It is always easier to let loose or destroy than to synthesize and create.

The repercussions of his momentous discovery was not to end here. It was but the first of a chain of events of which Professor Mendoza was the innocent and nobly-intentioned initiator, that was destined to end in such an all-consuming catastrophe for the whole earth. The scientific genius which should and could be used for the glory and achievement of a greater humanity and a finer civilization, is often as not garbled and misused and misdirected by others for personal or selfish aims, to the detriment, nay tragedy of countless numbers.

On the morrow after Professor Mendoza had succeeded in subduing and finally nullifying the atomic outburst which had so amazingly kept up its fierce radiation long after the building itself had been reduced to a shapeless mass of steel and masonry, he was called into "conference" by the dignified president of the great university.

To understand more clearly the tortuous, psychological twistings which, operating within the narrow confines of some human skulls, have so often produced such mournful results, we must digress slightly on the character of the head of the university.

Dr. Quentin Lorman, the somewhat past middle-age president, had entered into his duties as the head of the great institution of learning about a year prior to the disastrous fire earlier described. If a signally imposing appearance, fine carriage and grace of manner is any indication of inner abilities, let alone character, then indeed the Board of Directors had made a fine choice. Unfortunately, however, exterior appearances do not always tell what lies inside a man's head, still less his heart,

As a University president, Dr. Lorman undoubtedly was a far better politician. That is, he had a far keener eye to politics behind adequate finance, and on which side the University's bread, not to mention his own, was buttered, than matters pertaining to mere learning. He was therefore extremely careful of anything in the way of deeds, or even mere unconventional utterances anywhere within the realm of the institution under his jurisdiction, whether by student or teacher, that might offend the delicate sensibilities and still more delicate pocketbooks of the influential donors and keepers of the school. Certain it is, there had been a rumor among those who professed to be in the know, that the dignified Dr. Lorman owed his high position, to an extent few appreciated, to his well-connected political association rather than to his profound educational or other abilities.

BE that as it may, the good Dr. Lorman was thoroughly dismayed and quite put out by the recent disastrous fire which had wrecked the newest and finest building on the campus, and came uncomfortably close to destroying some others. At the same time, to say the least, he was quite annoyed at the distinguished physicist who had been the careless, if unwitting and unhappy cause of the disaster. More than once before, since taking office, it had occurred to him, and now came to him with even greater certainty, that the physicist, granting his great distinction, had all along been allowed too much, altogether too much, of the lately restricted University funds for those never-ending and costly experiments of his. Could there be any doubt of it now? The school needed a new gymnasium, for one thing, much more. There was a crying need voiced by a large and vociferous majority for a new and larger stadium. After

all, he had his obligations to the student body, not to mention the alumni. Besides he doubted if the Professor, considering his age, could accomplish much more anyway. And even allowing for the utmost charitable view, what did the professional work of one man mean alongside the larger needs of the school as a whole? And since he had for a long time intended to cut down the professor's huge laboratory appropriations, right now was as good a time as any, without arousing too much antagonism on the part of those more scientifically minded.

Furthermore—and this was of prime importance, despite the man's renown—he did not like, to put it mildly, the Professor's entirely too open and critical views on such public matters as religion, politics, industry, and society in general; views radically at variance with his own. There was great danger of such open expressions contaminating the developing mind of many an innocent student, whose parents certainly had the right to expect protection of their offspring against such radical doctrines. If the learned Professor, personally such an admirable fellow, would only stick to his grubbing, scientific experiments, that in itself, aside from the expense, would not be so bad. But his utter indiscreetness—he would not term it fearlessness—when it came to his radical utterances! Anyway, the shoemaker should stick to his last. Again, regardless of the modern holly-balloo for science and still more science, Dr. Lorman could not restrain a secret belief that it was somewhat overdone; the scientist was getting altogether too much attention.

"My dear Professor; won't you have a seat?" the President began in his suave voice, his florid face wavering between a polite smile and a veiled frown. "It's been quite a disaster, quite a disaster."

"Yes, I know. For this I am truly

sorry. No doubt there was full insurance?"

"Well, hardly," and he gave the luckless scientist an icy stare. "You see, the insurance companies take the stand that in view of your highly dangerous experimentations, there can be no expectation of adequate insurance."

Professor Méndoza looked down on the floor, a sad, worried expression on his scholarly face, and shook his head in silent contrition.

"And even if there were, I'm sure the Board of Directors would be against any more such large scale experiments—at least for the present. I may add for your information that there has been considerable adverse criticism at the State Capitol. Already I fear legislative steps will be taken to cut down our total of appropriations for the University. It is being said, this is no time for expensive researches, especially of such a doubtfully practical nature, when there are many other crying needs."

He paused in momentary silence to let his words sink in deep; the tips of his fingers pressed together in a benign attitude.

"I regret very much, my dear Professor, but for the present at least you will have to confine yourself to lectures and other academic duties."

CHAPTER IV

STUNNED and grieved, Professor Méndoza went about his now restricted activities. Also grieved, although more chagrined and rebellious, was his brilliant assistant, Jim Tomlinson.

The Professor suffered in silence. Deprived of the expensive apparatus which had taken him so many years to build up, and now a melted and twisted heap of metal; with no visible funds to resume those profound researches which

had occupied him for so long—the amounts required were beyond anyone but a rich individual or institution—he felt himself utterly lost. Bitterly he reflected that here he had come to the verge of perfecting perhaps the greatest discovery of all time, and still the men in control of the necessary funds lacked the vision and imagination to allow him to continue.

"Well, Prof. Mendoza," Tomlinson spoke cheerfully, "I should say, if you will permit me, that there are other ponds in this wide world to swim in. With your reputation, it should not be hard to get going elsewhere."

Prof. Mendoza thought for a while, and smiled sadly.

"Other ponds to swim in?—yes. But our apparatus will have to be entirely rebuilt, and that will take a long time and lots of money. And with almost every institution retrenching again these days?"—he shrugged his shoulders in his characteristic way.

True genius, however, is not easily to be denied. It has a way of striving for its purposes despite all handicaps. Prevented from going ahead with his profound researches at the University where he had spent so many happy and fruitful years, Prof. Mendoza decided to go elsewhere.

But here, as he had feared, disappointment awaited him. For although the fame of the distinguished Professor was known throughout the world, and although many a university in America, Europe and elsewhere would have been gladly honored by his presence in their midst, there were few at that time who could or would take him under the conditions he stipulated—large financing for the purpose of concluding his experiments on the structure and control of the internal energy of the atom. In addition, he ran smack into another difficulty he never dreamed to exist to the

extent it did; a difficulty unspoken of and usually soft-pedaled in academic halls, but effective in its power of discipline—religious and political intolerance against anyone of radical views. Some that might have been willing and well able to take him under his conditions, had heard of his radical utterances in the realms of politics, economics, religion and what not. That always marks a man, regardless of his other attainments or qualifications. Many were willing to let him lecture on his favorite science, but that was all.

Undaunted, after wasting a precious year, his soul chafing under the restraints at the University, the Professor sought aid outside the confines of houses of learning. He was promptly snapped up by the laboratory division of a great industrial corporation. He was offered an enormous salary, which he declined, except what he needed for his modest living expenses, and was given full leeway to go ahead with his unfinished work.

Taking his valuable assistant and colleague with him, Tomlinson being now a full-fledged Ph. D., he lost no time in plunging into his interrupted work.

BUT try as they would, and though they spared themselves no hours nor respite from their grueling researches, they made no progress whatsoever in the all important goal which was their aim—a practical means of controlling the fierce atomic energies so they could be safely harnessed for useful purposes. As it was, all they had learned to develop, so far, was an improved method of releasing these basal energies of radiating matter, but they always were forced to follow immediately with a terrific struggle to halt the dangerous process in quick time. More than once they risked their very lives. For so fierce and terrific was the out-

pouring of energy, once begun—even when the process was operating at a partial rate—that they dared not allow it to reach its full amplitude, fearful of their inability to control it utterly, and apprehending the possibly dire results from a too prolonged contact of the disintegrating element with other substances. They worked with only a bare pinch of the elements under experimentation, finding that hard enough to control as it was. Once started, it was nip and tuck to stop it. The most refractory substances melted and volatilized almost immediately from near contact with the fiercely disintegrating element. Try as they would, no receptacle or form of container could confine the force of these radiations for a period sufficient to develop practical use without everything within a considerable radius disappearing in explosive clouds of incandescent gas and rivulets of molten matter.

This matter stood when, on account of thorough going retrenchments forced by the bad economic conditions which descended on general industry the world over, a halt was called on Professor Mendoza's expensive researches. In vain he pleaded with the high officials of the company to permit him to continue just a short while longer; that he was on the right trail and truly on the verge of a successful outcome to his long-sought quest. He was politely but firmly informed that the Electrical Products Corporation had for the time being gone along that line as far as it could.

Fearful lest, in the meantime, his great secrets pertaining to his discoveries should fall into irresponsible hands, should perhaps be put to dangerous uses, the Professor decided, after due consultation with Tomlinson, to entrust all his secret formulae, priceless data as well as the specially developed apparatus in his possession into the keeping of the Federal government, with the reserva-

tion, that he or his disciple could have access to their use at any and all times. This the responsible officials had at least the good sense to accept and carefully file away for possible future use.

Followed another fruitless year for Professor Mendoza as well as for Tomlinson. The master scientist languished from the let-up of his many years' intense researches into atomic physics. Nevertheless, he did not give up hope, even though for the time being he was obliged to confine his main activities to lecturing and minor researches. In and between he delved as much as he could into his favorite subject, and in this quest used up the very last of his private resources.

But deep discouragement as well as his advancing years began to tell, although the fire in his eye and the flame of his genius never faltered. A severe attack of pneumonia, following a short illness brought about by overwork and self-denial, proved too much for the aged scientist. He died a penniless and broken-hearted old man. His passing came rather suddenly; the only ones present when he breathed his last were his idolized daughter Esther, the only child by a former marriage, and the devoted and worshipful Jim Tomlinson. Outside of the scientific journals, where his great accomplishments were given their just recognition, the passing of this superlative physicist received scarcely more space in the daily press than the tawdry doings of many a minor athlete or thrill producer.

In passing, it is perhaps not too much to say that this, of all the strange quirks in the public psychology, is perhaps the most maddening and, to men of true genius, nothing so thoroughly heart-breaking as this indifference and off-recurring blind-spot in regards to so many of the truly great souls of the world until long after their death.

CHAPTER V

BUT though Professor Samuel Mendoza, great thinker and outstanding genius in the realm of science, passed on into the Great Beyond without realizing his greatest ambition, he left a great pupil full worthy of himself in the person of the tall, lean-faced and personable James Tomlinson, who had worshipped at the shrine of his great teacher.

With the persevering grit of true genius and a determination to carry to completion the unfinished work of his revered master, the younger man set about accomplishing that great object. In this he was perhaps not a little encouraged by the beautiful Esther Mendoza, beloved daughter of the late physicist. Throughout the years of Jim's association with her father, the limpid dark eyes and curving lips of the girl had a lure for the young scientist, the extent of which he hardly dared admit to himself. And her shy, yet compelling personality and oft reddening cheeks when in his presence, on more than one occasion—had he been less gifted with the divine spark of genius—might have proved disastrous to his scientific enthusiasm for the subject in which he and her father were so absorbed.

By dint of his great inherent abilities, as well as of the prestige derived from his former association with the renowned Mendoza, Jim, now known as Dr. Tomlinson, made rapid strides in the Federal Bureau of Scientific Research. His efforts finally reached a point where it seemed that before long the great aim to which he had sworn to devote himself, and which, since the death of the late Professor, had long been held in abeyance, seemed in a fair way to get going again.

But here once more a perverse fate stepped in to the detriment of all man-

kind. For just as Dr. Tomlinson's ceaseless efforts to persuade the proper authorities had met with success, in the form of a generous appropriation, but before he could launch into actual operations, a great, devastating war burst upon the world. His fond hopes were annihilated.

In the new alignment, on the side of the Associated Central and Southern Nations, the ACSN, was the greatly enlarged Japanese Empire. Conditions do make strange bed-fellows. The country of the Rising Sun had long since cut a wide swathe clear across Asia, and this was the moment she had long waited for—her complete hegemony over practically the entire vast continent of Asia. In this she had been held in check only by the fear of the Anglo-American-French Alliance.

Knowing the secret plans of the enemy, which was to strike first at France and England, overwhelm them at one blow and then proceed in full force against America, France, Britain and the other members of the Alliance, which included Poland, the traditional ally of France, the nations of the ACSN took the jump without waiting for the blow they knew was coming. They immediately declared war.

All the leading countries of the world were soon drawn into the conflict, with the exception of the Union of Soviet Socialist Republics. The latter decided to remain neutral and sat back to await the now long-overdue world Socialist State which they proclaimed was at last to come inevitably, as the outcome of this new world war.

In those last decades of the 20th century, no country, no matter how far removed, could long remain untouched by the horrors of war. The new aviation could span the widest ocean as easily and, by taking to the stratosphere, almost as swiftly as though it were a mere

jump. The rival air fleets of the fighting nations soon brought the war home to everybody. From then on things moved with appalling swiftness, and the results were horrible and terrifying to combatant and non-combatant alike. The rulers of the world, more or less hide-bound by tradition and far behind the advances of the latter-day science, should have foreseen the dreadful results of such a conflict, and long ago should have taken steps to forestall it.

But with the details and general conduct of this horrible war, the onus for which can this time be laid at the door of the group of misled nations whose lust for world power and mad ideas sought to achieve their object by forcible means—with all these we are not here concerned. Our aim rather is to trace the causes which so unhappily led to a far vaster catastrophe than any war in itself could possibly have inflicted on a whole planet. The war but reveals the unworthy, nay ghastly uses to which the greatest and noblest products of man's genius can be put by irresponsible and hate-maddened individuals and peoples.

CHAPTER VI

LATE one evening shortly after hostilities had commenced, Dr. James Tomlinson was in the private archives of the Research Bureau, where his secret plans and data on atomic energy were kept, and to which, according to the agreement, he had access at any time. With him was a colleague, Oliver Maywell.

While pouring over these plans, the two men were startled by the sudden unexpected entry of four intruders. A glance showed they were heavily armed. How they had gained entrance to the carefully guarded precincts, he did not know, but there they were. And Tomlinson was soon made painfully aware of

their mission. The foremost grated some harsh order in a foreign tongue and the intruders immediately pounced on the two unarmed men. The sharp struggle which followed was soon over; cruel blows on the head laid them out cold.

When Tomlinson came to, the intruders were gone. Despite the pain in his head, the red blurr in his eyes, he quickly discovered what they had come for—his priceless plans and equations were gone! Staggering outside, Tomlinson and Maywell reported the theft to the military authorities. They released several guards who had been overpowered also. But the foreign spies had succeeded in making a clean get-away. The only clue was a swift plane of enemy design headed eastward at an extreme altitude and sighted momentarily by a searchlight near the continental shores, just before it was swallowed up in the darkness over the brooding Atlantic.

AT the end of a year of frightful carnage, with the A. C. S. N.—Japanese side on the verge of losing the war, an ominous thing came to pass. The dreadful results of which no one dreamed of at the time.

In a carefully camouflaged underground retreat somewhere in Central Europe, buzzed strange activity. Hundreds of men were hurrying about like a swarm of ants in a burrow. In the labyrinth of huge underground chambers of bomb-proof steel and concrete, hummed and throbbled a titanic assemblage of complicated machinery of a kind strangely resembling those developed by the late Professor Mendoza and James Tomlinson, only vastly larger and more powerful. In still another cavern was a monstrous mechanism, resembling a cation of grotesque size. The frightfully gaping muzzle, the tip only of its

many hundred-foot length was all that showed above the surface of the ground.

The uncanny enemy mind had devised an engine of destruction as frightful as it was dangerously suicidal. The world was about to learn something new of the old spirit of frightfulness, which had lost none of its previous ruthlessness; but this time science had placed in their misguided hands a power that should never have been trifled with. Desperate and virtually beaten, instead of bowing to the victorious Western Allies, the crazed Central rulers permitted the launching of this final and senseless engine of frightfulness at their near-victorious enemies.

Toward the close of a hot day on the 10th of August, secret word went around among those actively engaged in manning the engines that promptly at the stroke of midnight would commence the first of that series of long range bombardments, which was to strike terror into the hearts of the Allies and force them to their knees.

The awful messengers of destruction about to be hurled at the allied homelands, weighed no one knows how many tons, and were ingeniously freighted with an immense charge of matter in a state of fierce atomic disintegration. Only minds crazed with hate and desperation could have deliberately embarked on such a dangerous course. The misguided brains, the technicians who understood and built the dread engine of destruction surely must have realized in large measure at least, the world-wide threat involved. But who can fathom the infernal depths to which fanatically-crazed minds can descend.

The giant projectiles of such unheard-of size were in reality a combination, rocket-type design. Their construction, as much as can be gleaned from the meager details obtainable, consisted of a series of thick shells one within

the other, marvelously insulated and of some amazingly refractory material previously unknown. In the center was the immense core of matter in the initial stages of atomic annihilation, whose awful radiations nothing could long resist.

After its terrific expulsion from the giant mouth of the howitzer-like engine took place, the combination rocket mechanism with which it was equipped kept the projectile going at a swiftly accelerating rate. By the time it reached its objective by way of the stratosphere, the last of the multiple outer shells would be almost reduced to a trail of incandescent gas by the internal heat of the core. The multiple shell construction served merely to convey the disintegrating charge before it struck home.

It was necessary that the projectile leave the muzzle of the firing engine at the very moment the state of true atomic annihilation commenced. The muzzle velocity was two miles a second, which was soon accelerated by the terrific exhaust of flaming gasses from the rocket-type construction to five miles a second, capable of taking it to the shores of America in about ten minutes. Everything required split-second precision to avoid a premature release of the atomic energies before the charge could be hurled on its way. During its brief flight, practically all the multiple outer shells, despite the marvelous system of insulation, rapidly melted and volatilized; the destroyers counting on results after the disintegrating mass of fiercely radiating matter had buried itself in the enemy lands.

Such in brief were the terrible engines that were to start on their way beginning that night.

FROM a young Central officer, named Mueller, lone survivor of the hundreds who comprised the personnel,

comes an eye-witness story of the shot which destroyed the earth.

"Thirty minutes before midnight," he tells in his vivid way, "everything was ready for the first shot, sharp at the stroke of twelve. The radio signals in secret code were coming in strong from our planes which were that minute approaching New York City to direct our range.

"Everyone was excited and nervous. It was the first time anything like that had ever been tried. Even the experts were not absolutely sure of the results, and an underground rumor to that effect had passed around among the men. One thing was stressed above all: the importance of coordinated precision in the timing."

He goes on to say. "The main objectives of these long range shots were first, New York, Boston, Philadelphia, Washington and other important eastern centers; then range further inland to include the Niagara Falls power plants, Buffalo, the important Pittsburgh area, Cleveland, Detroit, Chicago and finally westward to all the populous centers clear to the west coast. Buenos Aires, Rio De Janeiro and other South American centers were also on the list. A similar bombardment of the nearer cities of the Allies—including Paris, Marseilles, London, Liverpool, Warsaw—was to follow as soon as possible, in order to grip the entire Alliance in one great fear. One or two hits for each center was considered enough.

"Outside, above the ground," as the young officer told it, "the virtually deserted country-side, where the great works lay hidden, was dark and deserted. Not a solitary light was allowed to draw the suspicions of a possible enemy. The moonless sky was clear and thick with stars. Not a sound outside of those made by the night insects. No one passing by would have dreamed of

what was going on far below the surface."

As the interviewer long afterwards retold the story, Mueller here paused, and a sad look came over his handsome face, the while he closed his eyes momentarily as if to efface some horrible memory. Then the young fellow continued:

"But you should have seen the beehive of activity far down below the surface in the deep caverns which housed the works. Officials were buzzing and running around giving last minute orders. The mammoth engines were primed and ready; the enormous power tubes, the electromagnetic and other works were beginning the process of inducing the state of atomic disintegration of the great core within the huge rocket-projectile. The long muzzle of the gun was pointed and corrected according to the latest signals.

"I took my appointed station far forward and off to one side, to observe the initial course of the shot; and to that I owe my life." An unhappy sigh escaped his lips. "My position was in a specially built observation station just below the surface. I looked at my watch; the seconds ticked off interminably, seemed to pound in unison with my heart. Came the warning last signal: fifty seconds more and the atomic charge would be ready, the moment for the first shot would come simultaneously. I knew the timing had to be perfect.

"I had my eyes glued to my instrument, when there came an awful detonation, followed by a sickening rumbling and earth-shaking. I was almost laid flat. The darkness of the night went suddenly brilliant as with sunlight. The change was blinding. I had but a fleeting glimpse of the flaming projectile as it streaked westward across the sky; the incandescent gasses which streamed from its wake left an enormous comet-

like tail that was visible for a long time afterwards."

Here ends the officer's account of the epochal tragedy-filled exploit, worthy of a better and more humanitarian cause.

THE gigantic messenger of destruction, already incandescent the moment it left the muzzle of the huge firing engine, grew ever more brilliant as it streaked westward toward the American Continent. Observers who happened below the path of its trajectory, noted the daylight brilliance with which the darkness of night was dispelled, the length of its fiery, comet-like tail. Its immense trajectory took the projectile some hundreds of miles beyond the earth's atmosphere, and in exactly 13 minutes and 20 seconds bridged the two continents.

However, the best laid plans often "go awry." Despite the vast amount of care which went into the first shot, it failed to strike its objective—New York City—by a wide margin. Partly it seems that an atomically disintegrating projectile is hard to manage; partly, the enemy pilots, who had risked their lives high over New York to direct the shot, had been spotted almost at the last moment. Caught in a maze of searchlights they became the center of a hurricane of fire from above and below, and their final signals, just before they were brought down, were too hurried. The net result was that the flaming projectile, roaring with the noise of a thousand express trains, passed New York far to the north and fell with a terrific detonation in an uninhabited section in the heart of the Catskill Mountains, burying itself deep in the ground.

This was the first and the last shot of its kind that was ever fired. The attempted firing of the second shot, which took place some time later that very night, proved disastrous to themselves.

The lone survivor relates that something must have gone wrong as the second projectile was about to be discharged. Nothing remained of the elaborate hide-out but an immense crater two thousand feet in diameter. The exploded and melted equipment together with the personnel were scattered by the winds. Scarcely a trace was ever found.

But the harm was done beyond recall.

CHAPTER VII

THE morning news reported the unprecedented long-range attempt at bombardment and its apparent fiasco. Most of the space was devoted to the well deserved, self-destruction of the would-be "baby assassins," as one radio announcer put it. "Fitting punishment for the apostles of frightfulness," a leading French paper commented.

But very little or nothing was said at the time about the flaming and roaring and earth-shaking volcano-like outburst in the heart of the peaceful Catskills, where the dazzling brilliant projectile had fallen. For no one happened within miles of the deserted spot where it fell during the dead hour of the night.

Expert geologists who arrived on the spot, sent thither by the County and State Authorities, declared it was not a true eruption, although it exhibited many of the usual phenomena that go with volcanoes. Certainly the usual volcanic cone was absent. That the flaming projectile was at the bottom of this, most experts who journeyed thither had no doubt.

However, in so far as the center of the fierce consummation was in a deserted mountain spot devoid of inhabitants, and since, after the surrounding vegetation was consumed, there seemed no serious threat of further danger, outside of some poisonous gasses

and falling hot cinders, no one got excited over it. The papers and the radio occasionally commented on it, and a few views came over the television. The war, now in its concluding phases, tended to drive all else from the public mind, so that few gave the small but fiercely belching artificial volcano much attention. In time, it was assumed, it would burn itself out.

BY an unfortunate streak of fate, the one man in the whole world who would have realized at once the dire danger inherent in the spectacular but local and apparently harmless eruption, was just then confined in a hospital ward in the city of Washington, suffering from shock and wound as a result of an enemy aerial raid in force, which had occurred on the Capitol, the very hour the projectile fell. For four days Tomlinson lay in a delirium of sickness and fever, ignorant of what was transpiring in the heart of the Catskills.

On the fifth day the fever left him; and although still suffering from the pain of his wound, which was not serious, he was more himself again. Esther, the late Mendoza's daughter, now his devoted wife, was at his bedside. The first thing he asked for, was news of the war.

"Do be quiet, Jim," she pleaded. "Nothing of importance has occurred."

"Read me the headlines, Esther—please?"

After reading the main features to him, she turned the page and read: "Catskills Still Erupting."

"Erupting?"—he eyed Esther questioningly.

"Oh, I forgot. The enemy fired a long range shot and it fell into the Catskills. It's been burning ever since. They tried to fire a second shot, but the report is that something went wrong and the whole works blew to smithereens—serves them

right. You know, from the description, I think it must be an atomic bomb of some sort which they shot over; probably got the idea from those stolen plans—what's the matter, dear?" She broke off and looked anxiously at the wounded man.

Tomlinson who had been listening to Esther with eyes and mouth wide open, suddenly sat up.

"My God!" burst from his tremulous lips. "My God!" he repeated in an agonized tone as he attempted to get out of bed.

Frightened almost out of her wits, Esther signalled for help, and with difficulty persuaded the wounded man to lie back in his bed.

"Please, Jim, for my sake, do calm yourself," she pleaded. "What has gone wrong suddenly?" Anxiously she peered into the frightened eyes of the man she adored.

"I must get up, Esther. Don't you understand?—that atomic bomb . . . ! Haven't you been long enough around your father and me to realize what that might mean? Quick, I must do something. There is not a minute to lose. Over four days it's been burning, you say? Good Heavens! It may be too late already. . . ."

It was now her turn to stare at Jim with frightened eyes, for well she knew that her scientist husband, great disciple of her great father, never spoke idly.

"But what can you do now?" she pleaded, the woman's fear for her beloved outweighing everything else. "You are too weak. The doctor says you are not to get up for several days."

"No time to lose, I tell you." He fell back on his pillow with a groan, and closed his eyes from weakness. After a few moments: "Esther, dearest; you must get me in touch immediately with Dr. Grey at the Bureau. Tell him it's

absolutely urgent that he come here.

An hour later, Dr. Mortimer Grey, head of the Federal Bureau of Scientific Research, sauntered in leisurely and sat down at Jim's bedside. He eyed the wounded man sympathetically after exchanging greetings.

Without wasting any words, Jim began

"I have called you with regard to the atomic bomb disintegrating in the Catskills." He paused a moment to moisten his dry lips before continuing.

"Oh, that," there was just a trace of annoyance in Grey's voice, as if he resented being thus urgently called upon for something so trifling—when he had so much else to do that was important. "Nothing worth while bothering about that, my dear man, is there? Doing no serious harm, from all reports. Will burn itself out no doubt, with time."

DR. GREY looked up at the house doctor, who just then stepped in; glanced with mild suspicion at the drawn face of the sufferer. "Gone to his head, poor fellow," the thought flashed through him. The trace of annoyance vanished and gave way to sympathy.

"Well, I must be going," he spoke, rising, impatient to be off. "Glad to see you getting along so——"

"Don't go, Dr. Grey." The sick man sat bolt upright and began to speak in a cool, collected tone, as if he were discoursing an academic subject. "That eruption up there in the Catskills is not an ordinary eruption. The bomb which is causing it is not an ordinary bomb. Do you remember the plans and equations those spies stole over a year ago? Well . . . the enemy has evidently succeeded in producing a state of atomic disintegration on a vastly larger and more complete scale than either Professor Mendoza or I ever dared to try. Furthermore, they have somehow managed

to confine it sufficiently long to be able to shoot it over to our shores,

"Now, a tiny charge, such as we experimented with, and the release of a large mass containing perhaps tons of fiercely disintegrating matter liberating blind energy at a rate more than enough to run all the industries of the world, is a totally different thing altogether!"

Tomlinson paused and held his listener's eye.

"The annihilation of atoms on such a huge scale may communicate itself to other elements. Once allowed to gain a sufficient start . . . may set the earth aflame . . . perhaps detonate the whole planet. . . . Does that mean anything to you?"

Dr. Grey leaned back in his seat, a half-startled, a half-dubious look on his usually serene face. Was he listening to the gibbering of a madman, or——. He shook his head as if warding off an unpleasant thought.

"But, my dear man," he began soothingly, "aren't you perhaps the least bit over-alarmed? I grant that you of all living men are perhaps best qualified to judge of the possible effects of such a thing; but——" He stopped when he noticed the rising tide of impatience in the wounded man's face, the fire of anger and scorn in his eyes.

"Dr. Grey," his voice became imperious, "there is not a second to lose. On you at this moment rests the awful responsibility of averting a major catastrophe of unthinkable proportions. Go to the State or Federal authorities at once, and tell them what I told you. Have some of them come here to me if they wish. Regardless—there is no time to lose in assembling the necessary equipment. I have the complete plans and specifications for just such an emergency. And pray God that it may not prove too late."

As the head of the Research Bureau

stood hesitant, a mixture of infected anxiety and incredulity, he added: "Dr. Grey, you are my superior, and it is not meet that I should speak to you in such a tone; but, if you refuse to carry my message to the proper authorities . . . and disaster comes . . . I shall point my finger at you!"

CHAPTER VIII

WHEN the good Dr. Mortimer Grey left the hospital after having promised to do whatever he could, he no longer doubted the youthful scientist was perfectly sane and in his right mind; and what was more, was deadly serious about the great danger which he believed threatened. But truth to tell, though he himself was by now quite perturbed and in a measure infected with the grave misgivings imparted to him, and though he had much respect for the young Dr. Tomlinson, especially in view of the latter's recent collaboration with the great Mendoza—more than he cared to acknowledge to a subordinate—somehow, the more he thought about it, the less it excited him; and the further he got away from the burning eyes of the wounded man, the more ready he became to take it all with a generous pinch of salt. After all, it was hard to believe that such a thing could come to pass. But, then again, the new physics . . .? Remotely possible—hardly probable. And he shrugged his shoulders and breathed deeply of the good air, took in the pleasant sunshine and felt the gradual return of his former cheery outlook on life and the good universe in general.

Still, he had promised; and whatever else, Dr. Mortimer Grey was a man of his word. His conscience at least should be clear; the burden would have to be taken up by others.

Without wasting any time, for he was

anxious to get it over with, so he could be about his usual pressing duties, Dr. Grey immediately arranged for a conference in Albany. He followed Tomlinson's advice not to waste any time with the county authorities, as the matter was something of too great a magnitude for them to tackle. As head of an important national bureau, he found no trouble in obtaining a respectful hearing almost at once.

Among those present were the chairman of the New York State Conservation Board, the Lieutenant Governor, Major General Wilkinson, ranking military defence official of the entire eastern seaboard, the congressman of the district, and several other highly placed Federal, State and Military Officials.

Dr. Grey did his best to convey Tomlinson's fears. But as his own fears kept dying away, he took pains to make it clear that the views he expressed were not his own, that he himself was loath to subscribe to them if pinned right down to it.

"This young scientist, I make bold to say," he went on in his quiet, monotone way of speaking, "is unquestionably highly capable and I feel sure knows a great deal about certain problems relating to the internal structure and radiant energy of matter, but that is all that I would care or dare to say in recommendation. Most certainly I do not wish to arouse any baseless fears in your minds, gentlemen; for I know you have enough worries without it. I have merely done my duty. You will have to decide for yourselves," he concluded.

The important officials listened blandly and with a measure of curiosity—these scientists always did come up with something new and startling. But when Dr. Grey had finished presenting the case, including the possible dire results as pictured by Tomlinson, it was plain to see

that, much to the speaker's embarrassment, the majority of those present looked askance, some partly amused, the rest almost resentful at being called in for a conference on a matter which had been given them to believe was of such paramount importance, but which, to their way of thinking, was not. Somebody was evidently trying to be ridiculously sensational.

"It can hardly be so bad as all that," one of them thoughtfully remarked in an all-knowing way, voicing everyone's sentiment. "Tell this man Tomlinson, whoever he may be, that I for one expect the seasons to roll around and the grass to grow just as green, long after all of us are gone."

The rest laughed good-humoredly. And someone clinched the decision by remarking that, "Surely he can't expect anyone to get insanely excited over a mountain woods fire far from the nearest town."

Dr. Grey, whose fears, whatever they may have been before, were now quite dissipated by the confident self-assurance of the others, stood up to leave with the uncomfortable feeling that perhaps he had made a mistake and risked ridicule for even remotely espousing such a far-fetched idea before these important men.

The meeting closed with some good-natured banter about making their wills "before the world comes to an end," and degenerated into a discussion of the closing phases of the war and other subjects which to them were important and interesting.

Grey, busied with other matters, waited a few days before going to the hospital to report the result of the conference to Tomlinson. He went with a feeling that he had done his duty, even though he shouldn't have allowed the young man to infect him the way he did.

Upon hearing Grey's light-hearted re-

port of the almost indifferent reception of what to him was a matter of perhaps world-life or world-death, Tomlinson let out a loud, "Those damned idiots!" much to the shocked ears of his dignified superior. The latter with a "Well, I've done all I could," refused to commit himself in any further way, and took himself off, quite eager to escape the scornful remarks and the burning eyes of the scientist.

TWO weeks later, Tomlinson, still weak and somewhat wobbly from his confinement, left the hospital. Pale of face but soul on fire, after hearing and reading about the long-continued "eruption" in the Catskill Mountains, he boarded a plane and soon was in the vicinity of the fierce conflagration to see for himself.

Approaching as near as he could, what of the terrific heat, the dangerous rays and the gases, let alone the constant pelting of hot ash, Tomlinson soon saw that his fears were far from being groundless. The explosive roaring which he knew so well, the intense light and heat, which even at a considerable distance was unbearable and unapproachable, all these to his trained mind were but harbingers of the dreadful aftermath which might follow—unless something, and at once, was done about it.

Careful inquiry of those who had been observing the eruption from its beginnings, elicited the information that instead of abating, it had grown worse, especially the last few days. This only confirmed his horrible apprehensions. A pall of scarlet-hued clouds of poisonous gases made a closer inspection, even with the aid of gas masks, impossible. But he saw and heard enough . . . was quite sure of one thing—the intra-atomic activation, through its inconceivable power of disintegration, was communicating its state to other matter; was

slowly, even if very slowly, spreading!

Fired with dread apprehension, not only for himself and his loved ones but for the whole world—the very existence of the earth itself and all it contained—James Tomlin hurried back to Washington. Once more he sought the chief of his Bureau. But the latter this time turned a deaf ear to his pleas, and refused under any circumstances to take an active part.

"I'm afraid you'll only end up in making yourself ridiculous," was his parting advice.

Undaunted and with the fire of conviction burning within him, Jim sought out, one by one, and not without considerable difficulty, the officials whom Grey had formerly convened. As before, they refused to become alarmed. And it was not until two more hectic weeks had elapsed, that after much wire-pulling, he managed to obtain a short interview with no less a personage than Grover T. Hammond, the Assistant Secretary of War, to whom he was referred, and who was said to have enormous influence with the Secretary of War, and even with the President himself.

The right hand man of the Secretary of War listened to the serious scientist with full respect for a few minutes. But just as soon as he caught the drift of Tomlinson's remarks, he arose with great politeness from his comfortable chair and stood up.

"My dear sir: I'm not a scientist. But you know, we are in the midst of a war. My business is to do what little I can toward conducting this war to a successful conclusion."

"But *this* is infinitely more important than even the war—which is about won anyway."

The Assistant Secretary looked at the speaker with calm compassion. Pacifists were no new thing to him; but that anyone should consider a scientific curiosity

going on somewhere in a little known corner of a deserted mountain side from the nearest village, as more important than a gigantic war in which all the important nations of the earth were engaged—well, the human mind certainly had strange off-shoots.

"Better see the New York State authorities. That's something for them to worry about."

"I have already done so, Mr. Hammond."

"Then why come here?"

"I was referred to you. They claim to have done all they could, and, anyhow, won't take it seriously."

"Do you expect me to?"

"You would, if I could make you understand it."

Hammond chuckled with amusement and lit a cigar, politely offering one to Tomlinson. "Better see Miss Harkness, Secretary of the Interior. I've got too much to look after. That should fall within her jurisdiction anyway." With that he dismissed his caller, refusing even to consider Tomlinson's request for arranging an interview direct with the Secretary of War himself, "over such a petty thing," as he termed it, with a shade of ironical exasperation in his voice.

"Those impractical scientists," he muttered to himself as Tomlinson closed the door. "Next thing I suppose he'll ask of the Great General Staff to side-track the war for a little while to put out that fire in the Catskills. More important than the war, ha! ha!" he chuckled to himself, and then burst out laughing aloud, much to the amusement of the comely young lady who just entered with a stack of mail.

MISS HARKNESS, Secretary of the Interior in the President's Cabinet, a thoughtful woman of near middle age, who had attained her high

position due to her great abilities, listened with interest to what the scientist had to say. She had an intelligent layman's curiosity in things scientific without understanding a thing about them. Her fine gray eyes, set in a not unattractive face, took in the handsome features of the scholarly scientist with secret admiration. Her long experience in the hard-boiled world of men told her that here was one of an altogether different kind.

"Off hand, I dare say that, although I'm not a scientist, it seems to me you are needlessly frightening yourself. Surely that fire which is arousing so much curiosity should burn itself out shortly, just because of its very intensity."

Tomlinson smiled grimly. "But that is not a fire, as you call it. In that mountain side lies buried an enormous charge of matter weighing at least several tons, in a state of swift atomic disintegration, comparable only to the process no doubt going on in our sun and the stars. Do you realize the amount of atomic energy locked up in the tip of the pencil you hold in your hand? Well, right now, in that Catskill Mountain, more concentrated, energy is being released and at a faster rate than all the power engines of the world could generate. If this process of disintegration should communicate itself to other substances—and I fear that this has already happened to a partial extent—if allowed to go too far, then indeed is the world doomed!"

"Grant that such is the case. Still, as I understand it, you and the late Professor Mendoza have started and stopped the process many times during your experiments without burning up the world," and she gave a soft, musical laugh. "Surely, therefore, it ought not to be any trouble now if it comes to a point where it is desirable to take it under control."

"In the case of the enormous charge now activating in the Catskills, the amount and power of the equipment that would be required to neutralize it even right from the start, is enormous. And in view of its long start and undoubted spreading since it began to activate over a month ago, I fear it quite probable that from now on it may accelerate faster than we can construct and assemble the equipment necessary to fight it. Now do you see?" Tomlinson gazed expectantly at the Secretary.

"I see, I think I understand. But still——" She looked away, and her delicate fingers toyed with the platinum pencil in her hand. "Just how much, would you say, would it cost to take the necessary measures, granting I could be influential in getting them approved and under way?"

"I can't say offhand, but no doubt it would run into millions."

"Millions!" Secretary Harkness straightened up as if from an electric shock. "Oh, I'm afraid that would be quite impossible—right now at any rate. If it were only a matter of some thousands, or even a few hundred thousand, that would be different. But when you talk of millions, why, I would not even have the audacity to sponsor such a thing. My dear man: don't you realize the country is all but bankrupt right now, as a result of the war!"

"The present center of atomic disintegration does not recognize the troubles of war, finance, labor or capital. It is mightier than either or all. If necessary, capital and labor and material may have to be conscripted. Miss Harkness," and he leaned forward in his seat, his pale face stern as the face of a prophet. "Miss Harkness, if something is not done about it and at once without any further quibbling or delay, regardless of the cost to each and all—our sun will all too soon become a binary,

with a small flaming companion to accompany him in his galactic course!"

CHAPTER IX

A MOMENTARY wave of alarm spread over the Secretary's face, a startled look in her handsome gray eyes. But this almost at once gave way to her usual unruffled calmness.

"Aren't you a bit sensational in this, Dr. Tomlinson? Consider what you are saying. Do you expect the masses, even the more intelligent and better posted, to believe such a thing?"

"The masses never initiate: they follow."

"But the legislators? Remember: if this is a national threat, Congress would have to pass on any such large appropriations as you mention."

"They, too, are only sheep that follow. The majority of these earnest gentlemen and ladies only echo the votes back home. There must be an honest fearless leadership that will take them in tow. In that lies humanity's salvation."

A long silence followed, the man and woman studying each other, as serious minded people often will.

"Well, I shall see what I can do. I cannot promise anything. Right now everybody is taken up with the forthcoming armistice, which all are praying for. But I shall confer with the ranking members of Congress; perhaps sound the Governor of New York. I may even mention it to the President and get his reaction."

"This woman has more brains than half a dozen of the men I have talked to put together," Tomlinson remarked to himself as he left the office.

The famous Secretary of the Interior, under the pressure of her manifold duties, delayed taking any action on the matter until nearly a week had passed by. Her first move, viso-telephone con-

versations with responsible New York State officials met with the assuring reply that the State Forestry Department had done all it could in safeguarding the areas adjoining the "eruption." She was told that the few settlers in the danger zone had been removed and well cared for, that aside from the still raging center, the "fire" was purely local and of "no consequence and should soon burn itself out."

Thus valuable weeks slipped into months, and nothing was done about it. Secretary Harkness, with womanly sensitiveness, fearing that, if she laid too much stress on the subject, she might lay herself open to ridicule for senseless fears, especially on account of her sex—something she felt her high position could not afford—decided to drop the matter altogether. Besides, after all, she was not perfectly sold on the idea. At any rate, she reasoned, if the disturbance did take a serious turn for the worse—a thing which nearly all she spoke to seemed to scoff at—there should be time enough then to act without incurring the danger of ridicule, especially the sharp darts of those who still were old-fashioned enough to believe that women had no place in high politics.

This decision she finally communicated to the more than ever concerned Tomlinson, who was a frequent visitor to her office. When she quoted some of the remarks made by responsible officials who refused to be moved, he replied grimly:

"In not so long to come, they will all be falling over each other to vote not millions but billions 'to finance a flight to Mars', but it will then be too late."

IN his unflagging determination to awaken those responsible for public opinion and safety, Tomlinson went so far as to seek an audience with the

President himself. In this he was unsuccessful; the war-torn President, kindly, haggard and overworked, referred the matter to others, who referred it to still others, who pigeon-holed it and let it die a natural death through indifference and neglect.

Despairing of his efforts to arouse the world to the danger which threatened, he addressed himself to leading scientists, scientific and other organizations in America as well as abroad, including even the late enemy countries. He sent a number of articles to leading publications, whose staid editors refused to publish them on account of, as it seemed to them, their extreme sensationalism. In truth his was "a voice crying in the wilderness."

Some of the articles were, however, published in a certain section of the press and some of the lesser magazines, whose editors considered it good for their sensation-hungry readers, although they themselves took no stock in it. Some articles on the subject by others did appear a little later on in a few of the technical journals, whose content in the main recognized the scientific possibilities of Tomlinson's warning, if not the probabilities. And still later, a few scientists and technical experts of note even went so far as to espouse his ideas and lent their voice to his. But by far the larger majority of scientific opinion held aloof, refusing to be drawn into a controversy which, if they proved themselves wrong, might be injurious to their hard-won reputation. A theory was not a theory until proven.

As time went on, however, and the strange phenomenon showed no signs of abating, but on the contrary was distinctly if not almost perceptibly on the increase, scientists from all over the world became more and more attracted to the spot. Most of them came away shaking their heads. Some, including not

a few of note, were of the opinion that the danger as pictured by Tomlinson was too far fetched. True, the activating mass, buried deep underground, with its vast store of internal energy, might well continue radiating for years, had, in a measure, already communicated and would perhaps continue to communicate its fierce state of atomic disintegration to other matter previously unaffected; still, they did not think, in the light of accepted knowledge of the day, that the process could continue indefinitely, but must gradually thin out and eventually die out.

As to those scientists of Central Europe, even if a few did have definite opinions, these were strictly gagged and muzzled by their policy back home, which had put a tight lid on all freedom of thought.

Dr. James Tomlinson ground his teeth. It was not the first time that something new to the wisdom of mankind had to fight for its life before it was accepted.

Thus the world came and went, each engrossed in his daily round—the ant heap that saw not the poised foot.

CHAPTER X

TWELVE months whizzed by. In a deserted section of the Catskill Mountains off the beaten path, a fearful eruption, small in area as compared to a natural volcano but incomparably fiercer and more terrifying in the intensity of its ceaseless roaring and flaming, was shaking the mountains. The eruption which, starting with the fall of the gigantic projectile over a year ago and continuing unabated, had grown slowly but steadily in extent and ferocity; for the last few weeks especially it had taken on a truly ominous turn. As if it had waxed subter-

raneously as well as on the surface, its gathering strength had all at once burst out in a mighty upheaval which blew the entire top off a whole mountain and sent thousands of tons of rock and gravel far and wide. The tremor of the shock which accompanied the explosion were felt over most of the States of New York, Connecticut, Massachusetts, New Jersey and the eastern half of Pennsylvania. The roaring and hissing and electric-like crackling could be heard for miles and miles, and the lurid skies at night lent a garish light clear to Albany on the north, and visible as far as New York City to the south.

The menace which up to that time had been receiving slight although gradually increasing attention, by its sudden outburst brought itself violently to the public eye.

And well it might. The heat which it generated made anything like a near approach impossible. Trees and vegetation within an increased range of twenty miles scorched and died almost at once. Residents and vacationists, who thought themselves within a safe distance fled for their lives. Considerable streams of molten lava flowed down the mountain sides. Thick falls of ash and hot cinders buried everything within the danger zone; were carried far afield by the winds. Enveloping all was a thick pall of bright coppery-red smoke capped by flaming incandescent gases several miles high, through which lightning-like flashes played and thundered. At times, during a sudden rift in the gaseous clouds, the blinding intensity at the core of the disturbance dazzled and overwhelmed the eye, its blueish-white rivaling the sun in intensity. And more immediate, the winds which blew from the affected region carried a poisonous breath to distances that spelled deadly danger.

A conference of well known scientists and practical engineers was called im-

mediately at the behest of the New York Governor to consider ways and means of fighting the menace. Curiously enough the one man who, despite his comparative youth, understood best the intricate science of atomic physics, and knew most about what could or might be done, was not called upon. In the field of science youth sometimes has its disadvantages, for it usually takes many years to gain a solid reputation. Indeed, one or two of the high State Officials who remembered somewhat vaguely their being warned the year before of the coming danger, could not even recall Tomlinson's name and, inexcusably enough, did not even think it worth while to ascertain his identity in view of the many eminent experts who were already sitting in.

Another priceless month was thus wasted in fruitless surveys and baseless plans, all of which came to naught.

A number of European and other foreign experts, including some from the former enemy, were called in. They came, saw, made their surveys, handed in their expensive bills for their services and departed for their homes, openly admitting there was nothing they could do. Some held the optimistic view that "Natural forces might of themselves step in to right the unbalanced danger zone."

To all of which Jim Tomlinson in his study at home would smile grimly and continue with his own constant studies toward a solution of the problem.

AT a Congressional session a committee was appointed with full power to investigate the situation and bring back recommendations as to the steps that should be taken. After delegating this work to a committee and voting a generous appropriation to care for a thoroughgoing survey and workable plans—as if squelching the eruption

was a routine matter that could be taken care of by legislation—Congress, ironically enough, turned its attention to other matters before it. Which only proves that even great bodies of serious men and women convened for serious purposes can, if they lack vision and proper knowledge, be easily shifted from the all important to the insignificant and the inconsequential.

Again a number of leading scientists and others were convened by the important Congressional Catskills Committee. This time Dr. James Tomlinson, at the urgent request of Secretary Harkness and several other officials whom he had formerly approached, was also called to the meeting.

As none of the eminent men present could offer definite and practical working plans, Harvey C. Bradner, the Chairman of the Committee, prompted by Miss Harkness who was also present, called upon Tomlinson to state his plans.

"Dr. Tomlinson," the chairman addressed himself to him, "As I have been given to understand, you have quite definite ideas on the problem before us. We should therefore like very much to hear from you."

"Mr. Chairman, Members of the Committee, Friends: Yes, I have very definite ideas on the problem before us—very definite. And what is even more important, practical plans, without which ideas alone won't count." Without stooping to point out that certain responsible leaders, whom he had approached long ago, had failed to measure up to the gravity of the impending danger, he went on to explain the type and manner of the gigantic works that would now be required if there was to be any hope of successfully combating the menace before coping with it grew absolutely hopeless. Then he went on to say:

"But unfortunately the cure has been

delayed unreasonably long, much longer than good judgment would warrant, and I for one cannot guarantee an efficacious cure at this late date. However, it is imperative that something be tried and regardless of the cost. The consequences of failure are too horrible for me to dwell on."

"How much do you estimate the cost to be?" one of the committee inquired, in the manner of one deciding on a business venture, and clearly showing he had not the slightest grasp nor believed the danger was as pictured.

"Well, I cannot say exactly, but off-hand I should estimate in the neighborhood of five or six hundred million dollars—possibly a great deal more," Tomlinson answered laconically.

The entire committee and others present jumped as if bitten by a scorpion.

"How much did you say?" the Chairman queried, incredulous. "Please state it again."

"Five or six hundred million, most likely more."

"Phew," several let out a concerted whistle.

"Only five or six hundred million—a mere trifle," Walters, another Committeeman ejaculated. "At that rate guess it'll pay to let it burn. The whole Catskill area is hardly worth half of that."

Tomlinson rose to his feet, a bitter, mocking expression on his fine face, scorn in his voice.

"My dear sir:" addressing himself bluntly to the Congressman who had thus delivered himself, "With all due respect for your position on this important Committee, it is plain to see you don't know what you are talking about. *This* is not a question of money or effort, but to save the whole world from going up in flames. Is that worth a half or even a whole billion to you?"

"Man, alive, do you realize what such a sum is?" The Congressman looked at Tomlinson pityingly. Those unbusiness-like scientists! Talk of billions as if they were marbles, he felt like saying.

"Yes. And I have no illusions that any of you here will recommend, much less vote any such sum until it is too late to do any good," he answered scornfully.

CHAPTER XI

AND then one day it happened. The area of atomic disintegration which up to now had on the surface kept within certain bounds but had evidently eaten its way deep into the bowels of the earth, suddenly blew several more square miles of mountain to smithereens. Huge blocks of rock and pulverized material, some of it dangerously incandescent and radioactive, rained down over a wide territory. There came such a terrific flare-up and earthquaking as to strike terror into millions of hearts. To add to the ferociousness of it all, immense quantities of molten matter and asphyxiating gases poured forth in true volcanic form out of the interior of the earth.

From then on the situation became truly appalling. Tomlinson, who had felt the shock clear down in Washington, hurried at once to the scene, but was unable to approach within more than twenty miles of the fiery edge of the disturbance. From what he could gather, the heart of the raging inferno had now grown to at least a half mile in diameter. Between slight rifts in the enveloping clouds of incandescent gas and ashes, there shot forth the stabbing radiations which were too brilliant to look at. The heat even at a distance of more than twenty miles was unbearable.

Sadly and with fear in his heart, his worst apprehensions now on the road to

realization, he returned to his Washington home.

Esther met him as he came to the door. One look into his eyes told her the story.

"Too late, too late," was all he said.

She clung fearfully to her husband. "Jim, must we and our kiddies—everybody . . .? Cannot something . . . is there no way out?" Hopefully and with a woman's confidence in a capable husband, she looked up at him.

He shook his head. "Beyond anything man can do."

She was brave, but the thought of the horrible fate in store for herself and all she loved was too much for her. She buried her head against Jim's shoulder and cried softly, the while he gently kissed away her tears.

"But isn't there some way out?" she wailed.

"Perhaps, but not on this earth," he answered quietly.

She lifted her head and looked up at him with a mixture of startled hope and fear. "What do you mean?"

"This planet is doomed. The only salvation for mankind is to trek to another."

"But Jim, you're not serious?" and a trace of a smile came to her tear-stained face.

"Never more serious in my life."

"But, how, where?"

"That is the problem that will have to be solved. There is no other way out!"

THEY were startled by a sickening tremor under their feet. Pictures shifted on the walls, windows rattled; from the dining room came an unnerving crash as several pieces of china fell to the floor.

"Look," Jim cried, pointing a finger outside. A fine gray ash was falling like snow, covering Washington with a

ghostly mantle. He had noticed it when he had first disembarked at the airport, but it was getting much worse. Another tumbler, more severe followed. Frightened people, some with a shocked, unbelieving expression on their faces, as if doubting their own senses, were scurrying about; others stood in uncertainty, in excited, milling groups.

The visophone rang. An official's face appeared on the screen as Esther came to the receiver.

"Dr. James Tomlinson, please."

Tomlinson stepped over to the visophone.

"Dr. Tomlinson, your presence is requested at the White House at 10 A. M. to-morrow. The President has called an important meeting of his Cabinet and others. Please bring all the plans and important data you may have relative to the Catskill eruptions. Thank you."

When Tomlinson arrived at the White House at the appointed time, the session was almost ready to begin. He was directed to the "new wing" which had been added a few years before, and immediately ushered into the spacious "Presidential Hall."

As he entered, he was surprised to note the large number present besides the regular members of the Cabinet. Everyone's eyes turned with ill-concealed curiosity in his direction, rendering the usually reticent scientist extremely self-conscious. Miss Harkness shook hands with him very warmly and introduced him to some of the notables.

A few minutes later the President himself came in and the session commenced in earnest. It was the most historical, and in many respects perhaps the most dramatically strange meeting of the kind ever held.

Tomlinson listened silently to the preliminaries. He knew he was signally honored to be called to such a notable gathering. And yet, he could scarcely repress

a feeling of frustration, of bitterness. The thought came to him. Why do so many people wait until the devil himself is upon them before they will listen to reason? There came over him a longing for his departed great teacher. Had Professor Mendoza been alive, he felt sure, the threat would have received the proper attention long ago, and the dreadful emergency might never have come to pass.

At the end of an hour's discussion pro and con, Tomlinson was called upon to speak. When he stood up, all trace of nervousness and bitterness was gone. A dramatic silence fell upon the room. It was plain, he was the master.

"MR. PRESIDENT, members of the Cabinet, Friends: "I am indeed glad to have the honor of addressing so distinguished a gathering, to partake in deliberations so vital to the life of our nation. At the same time I feel constrained to say that I speak with a heavy heart. For nothing that I can say or do, nothing that we can all of us say or do, will avail to alter the fatal course of circumstances." Then he went on to state the case as it stood from the very beginning to the fatal stage to which it had been allowed to go. Continuing:

"The neglect can be laid at the door not only of the public leaders but of the rank and file of those high in office, who, no matter what their other qualifications, have proved themselves woefully short of imagination, ignorant of important facts of science, lacking even in true intelligence." Governor Simons of New York coughed and scraped his feet. A crimson spot appeared on Hammond's cheek. Others looked down on the floor.

"The bogey of money has proved our undoing. A few millions right at the start could have supplied the necessary means to put the atomic bomb under

control. Later on a few hundred millions, more or less, might have perhaps turned the trick." (Bradner and Walters of the former Catskills Committee squirmed in their seat.) "But now," he concluded, "we must face the bitter truth: It is too late at any price."

He sat down amidst a deadly silence.

"Surely," the President found voice to say in his quiet, forceful way—"surely, it cannot be that our latter-day science and engineering should acknowledge itself incapable of subduing this terror which the thoughtlessly cruel and malicious act of our former enemies has inflicted on our fair land. A way must be found!" His powerful and commanding personality, idol of the nation, breathed an infectious confidence that seldom failed. "I am prepared to go before Congress at once and demand unlimited funds to combat this great evil which has overtaken us. I believe the might and resources of this great nation should be equal to the task."

Tomlinson shook his head sadly. "Mr. President, I cannot express my grief in saying this, but no power on earth can stop this thing now. The doctor has been called too late. All the money in America will not suffice to undo what has been done. If all the capital and labor of the entire world were conscripted, even if all mankind worked as one without stint or let-up, it still would not avail. It is dreadful to admit, but the reasons are simple: We could never build the necessary equipment fast enough and powerful enough. Right now, this very second, there is pouring out of that center of disintegration in the Catskills more energy, many times more, than all the energy and power we could muster against it with all the science and engineering resources known to man. Long before we could even finish the gigantic works that would be required, granting it could be

done, which it cannot, the area now in a state of atomic disintegration will have increased many times faster than anything we could hope to muster to equalize it. My equations which can be checked by any competent scientist prove this beyond a peradventure of a doubt."

"But the effort must be made—shall be made!" And the President's iron jaw closed hard.

"SOME things are beyond man, whether he wills it or not. Mr. President, Members of the Cabinet and Friends: Resign yourselves to meet your Maker. My estimate is that in twenty-five to thirty years at the most, life on earth will have become insupportable. In one hundred to two hundred years from to-day, or sooner, long after the last germ of life has perished off the face of the earth, a small new star, companion to the sun, will have announced itself to the rest of the universe, its fiery face lit by man itself. There will then be no man or beast on the lifeless, incandescent earth as it careens around its parent sun in its yearly pilgrimage."

Dr. Tomlinson paused. The distinguished gathering remained like paralyzed, a mingled look of terror and incredulity on everyone's face. After a long painful silence, he continued:

"But—there is perhaps one ray of hope, and the only hope. No, not for our globe; that is doomed, finished, make no mistake about that. I mean for humanity." A momentary expression of relief on the part of his listeners gave way to bewilderment. "The only hope is"—his words came slow and almost a whisper—"a mass migration to another planet."

There was a slight lifting of the tension, a scraping of feet, a faint murmur. Everyone present stared hard at the speaker, as if undecided whether to doubt his sanity or the accuracy of their

hearing. A few smiled. It must have struck his listeners as more than odd, almost as if the speaker had allowed himself an ill-timed jest in the midst of solemnity.

The President found his voice, his face still solemn, but there was a quizzical look in his eyes.

"Are you serious, Dr. Tomlinson?"

"Utterly."

"How, pray, may such a feat be accomplished?"

"Interplanetary navigation."

"But the idea is—er—fantastic, to say the least."

"Not at all. On the contrary, quite possible—if we set ourself to the task. Given the will and ample funds, a mere trifle as compared to other items in the usual government's budget, I believe a way can be found. Already the necessary power in the form of atomic energy is here. A little more experimentation and study and it can be brought to a point of control where its terrific power instead of destroying us may be utilized for our salvation, for practicable purposes. The interplanetary vehicle will have to be worked out, most likely in some rocket form. Much work has already been done in that direction all over the world, more than is realized by the average layman. And with the government's active interest, rapid progress in that line can be accomplished.

"But where would you go?"

"Mars . . . Venus . . . Any solar planet that is found fit for human life."

The room became a beehive of voices.

CHAPTER XII

THREE more years dragged by. Dread omens—worry and sleepless nights for responsible heads of government; for all those who at last understood. Loss of life and property to thousands within a large radius. Name-

less uneasiness and wondering to the masses of the North American Continent, particularly those living east of the entire Appalachian Range. Notes of warning by prominent scientists had appeared in European and other foreign centers; but these were promptly suppressed by their governments out of fear of creating an uncontrollable panic among their population.

For there was now no longer any possible shadow of a doubt in the minds of those who knew that the prophetic warnings of Dr. Tomlinson, and later of others, which should have received more intelligent heed long before it was too late, were only too dreadfully true. The ferociously radioactive release of incalculable amounts of energy brought about by the atomic annihilation of thousands of tons of matter, the intense rays and terrific heat, of an order totally different from any that mankind had ever experienced before mere chemical, electrical or other forms of energy, these continued to induce a like state in hitherto uneffected matter, embraced an even larger and larger territory.

So far, the historical Council at the White House three years before, from which so much was expected, had proved a fiasco. Little good had come from it, outside of panicky and futile efforts toward controlling the danger. Several great councils of leading scientists and practical engineers were convened by the government. These met frequently and long. Tomlinson's figures were checked and rechecked. There could be no doubt about it. His contentions were sustained; there was not enough counter power available in all the world's coal and oil and what not—the practically unlimited amounts of the necessary electro-magnetic and other equipment with which to fight the accelerating terror could not possibly be built in effective time.

And yet, deep down, despite the raging calamity drawing ever nearer, and strange as it may seem to-day, the government authorities could not get over a secret feeling that everything would come out all right in the end, after all. The world was too big, it had lasted too many billions of years (if the scientists were to be believed) to suffer such a fate as pictured. It could not be that God Almighty would permit such an unthinkable thing. It was the old story of the intense wish being father to the thought.

ABOUT the only good that came from it all was that Dr. Tomlinson was granted unlimited means to conduct the most thorough-going researches into the problems of atomic energy control. In this, Tomlinson, working day and night with a corps of able colleagues, made tremendous progress, and was well on the way to devising a practical engine, whose motive power was to come from the controlled annihilation of tiny quantities of matter. But when it came to taking any stock in his advice that all efforts should be concentrated toward developing a practical means of leaving the planet—that the main authorities considered as altogether fantastic and absurd, and anyway impossible. Such a thing was too much for their training and powers of imagination.

However, later on, he was allowed means to take up seriously the problems of interplanetary flight; but not till the pressure and active financial support of influential private citizens and organizations had taken a hand.

Then came another of those savage spurts in the otherwise slow but steady advance of the violent disintegration, which blew the entire eastern half of the Catskills out of existence. The results were frightful. The entire mountain area and beyond became a flaming

furnace of incandescent gas. Large pieces of radioactive matter thrown to great distances started new centers of infection. The steady desertion of New York, Albany, New Haven, Philadelphia and other cities which had been going on for over a year, now gave way to a mad stampede north and south, via land and air and sea, which quickly depopulated a wide swath of the eastern states for hundreds of miles up and down. Only a providential downpour of rain, unusual in amount and duration, cooling the overheated atmosphere, prevented a holocaust right then and there. Then, too, be it said for the authorities, some such outburst was not unexpected and they were in large part prepared for it. Many, who could, fled oceanward toward European and other shores.

Up to now, the government through its various channels of control, had minimized the extent of the danger, in a mistaken desire to allay the fears of the populace at large. A tight lid was clamped on to keep as much as possible the full news of what was transpiring from reaching the general American public. They feared the nameless reaction of an unreasoning mob-psychology, the disorganization that comes from an uprooted population, the loosening of social ties. Much irretrievable time was thus frittered away by such tactics. Instead of their belated and wasted efforts to avert a calamity whose hopelessness was borne in more and more upon those competent to see, the authorities should have directed themselves long ago toward a planned and systematic removal of the entire population of the crowded eastern seaboard to regions west of the Appalachians, and not to have waited until driven out by the inexorable march of the fiery terror.

When the truth of the inevitable which faced the American people could no longer be suppressed or minimized,

the public explosion which followed was almost frightening. Government heads, high and low, fell right and left, a few not gently at the hands of enraged mobs. The Governor and the entire State Legislature of New York were the most unhappy butt of the public storm. The President himself, his Cabinet, the House of Representatives and Senate, all came in for an unmerciful lashing from the press, the radio and the pulpit. Indeed, it was fortunate that the public was given a quick opportunity to let off steam, but two weeks later when the general elections came, the national government and practically all State incumbents everywhere were turned out, bag and baggage, cleaner than a whistle.

THE new President immediately convened Congress in a special session extraordinary. With characteristic energy and the true spirit of a true leader of men, he demanded the immediate passage of the "Save America Act." A state of extreme emergency was passed unanimously empowering the President to take any measure he saw fit.

"Perhaps now," Tomlinson remarked bitterly to Esther, "something will be done besides methods that were like squirting toy water-pistols at a forest conflagration."

With the fire of energy and decision which characterized him, our great President Spencer at once formed a "Save America Council" composed of the ablest men in all walks of life, with himself in supreme command. He appointed Dr. James Tomlinson as Director in Chief of the Council, which had unlimited power to take whatever steps were necessary. It was announced that capital and labor should immediately prepare themselves for conscription as needed. There was to be no dilly-dallying, evasion or chiseling of any kind. The situation could brook nothing like

that, and a firing squad would attend to obstructionist tactics.

This had an immense calming effect on the entire public.

The Council set itself to the twin tasks: First, the completion of a practical mechanism that could control and utilize the awful Jinni of atomic energy, at once the death-threat and the possible saviour of mankind. It alone could furnish the tremendous energy in small bulk that was needed to take large masses from the gravitation of the earth. Second, a practical means or space-ship to take a party of intrepid explorers on voyages of inter-planetary discovery, to find if possible a new home for humanity. Tomlinson's estimate was that only about twenty-five years perhaps still remained in which to accomplish this almost superhuman task before the earth became unfit for life.

As to the former, that is, an effective atomic-energy engine, except for certain important refinements, which would come as a practical certainty with a little more time, Tomlinson had by now virtually solved the great problem. Of the latter, that is, an effective vessel for taking a party into interplanetary space, that had to be almost completely worked out.

In the meantime, the immediate plans as adopted by the Council under Tomlinson's able leadership, called for a series of high and mighty walls two to three miles in height and spaced some two hundred miles apart to be erected west of the Appalachians. These were only partly for the purpose of temporarily stemming the rivers of molten matter. What was of supreme importance, these would serve to deflect the hot, poisonous breath of the terror and confine as much as possible the fearful clouds of incandescent gas, the overwhelming quantities of pulverized matter, the cinders and the ashes that were

carried to great distances inland with every shift of the winds.

As the atomic conflagration bit ever westward, north and south, inevitably overwhelming these walls, others to be constructed far in advance would take up the burden of holding back if only for a time the devastating breath of death.

Gas-proof suits and gas-masks were also distributed to the entire population, with training in their proper use, together with sufficient fire-proof places to house everyone in case of a sudden shift in the hot gases. Immense reserves of food and other necessities were stored west of the Rockies. The uprooted population of the east were settled and cared for most admirably and with astonishing order. The entire industrial machine had to be almost reorganized. The fortitude and the orderly manner with which the uprooted millions adjusted themselves to the unprecedented calamity was the wonder of the world.

CHAPTER XIII

THUS matters stood at the end of the fifth year. The fiery cancer, which was slowly consuming the earth's substance, continued its march in an ever widening circle. For some unexplained cause, it moved seaward more rapidly than in other directions. It marched to the edge of the Hudson, obliterated the mighty river in clouds of dense steam, filled its bed with white hot lava and overflowed eastward. The entire seaboard from Massachusetts to Virginia was covered by the molten flow. The Capital of the nation fled to Chicago. Hissing rivers of lava emptied into the Atlantic. Steaming clouds blew eastward.

So far, South America, Europe and the other continents remained untouched. Distance lent a sense of security. The

ruling authorities across the seas, true to their ancient conception of what was best, kept their peoples in as much ignorance of the deadly menace raging on the American Continent as possible. Editors were prohibited under pain of arrest and confiscation from printing the full news of what was going on. In France and free England, Switzerland and the Scandinavian countries, where the glorious spirit of freedom kept its head and saving sense—there the public followed with interest and apprehension and sympathy the news from their stricken sister democracy across the seas.

Russia and Asia, Africa and Australia felt themselves too far removed to become immediately concerned. And somehow, in the minds of almost everybody abroad, there was a strong belief that the mighty Atlantic and Pacific would prove effectual barriers and confine the fiery cancer to the Western Continent. Keen observers and students of science, with great misgiving, kept a close eye on what would happen when the real edge of the atomic vortex first reached the shielding waters of the Atlantic.

To jolt the peoples of other lands out of their false sense of security, Dr. Tomlinson and the Save America Council, by special and open appeals, through whatever channels the authorities over there allowed, pleaded with those who would listen, to make haste and follow the American efforts toward finding a way of escape from the earth's confines.

"Only about twenty-five years more at the most remain before the earth's atmosphere will have become unfit to breathe, even if the atomic disintegration does not attack every continent in that time," Tomlinson pleaded. "My fellow men, make haste while there is yet time."

To this plea, the British Isles, and France responded immediately by embarking on the construction of mighty steel and concrete walls on the wester-

most shores, two miles or more in height, similar in design to those erected in America, to deflect the poisonous breath which was coming. Similar bulwarks was begun on the north-north-east shores of South America.

BUT never was a false sense of security more rudely shocked than was that indulged in by most of the inhabitants of other countries, particularly those masses whose guiding authorities had kept them mostly in the dark, well-meaning or otherwise.

Long before the atomic fires finally reached the edge of the Atlantic, the terrific heat of the rays, still miles away, caused the shore waters to boil and steam furiously. The raising of huge clouds of white steam prevented ocean-going, air or water vessels, from touching any but far northern or southern portions of the United States' eastern shores. And when the real activating edge of the disintegration, which had eaten its way many miles deep into the earth's vitals, began to bite underneath the ocean floor, there came such an eruption as to strike terror even greater than what had gone before. The shock was felt clear around the globe. Hundreds of square miles of ocean bottom blew up and became a seething, incandescent inferno that roared upward to the stratosphere. Under the disintegrating forces the oxygen and hydrogen of the ocean's waters disassociated and united again and again in tremendous and continuous explosions.

The long felt security of the Europeans and others was shattered all at once. An appalling tidal wave which resulted from the last upheaval struck the European Continent, followed by dense clouds of water vapor mingled with volcanic dust and poisonous gases. The unprepared multitudes, especially of countries bordering the sea, paid dearly.

In their rage, and feeling themselves duped, the populace of Central and Southern Europe, Spain and Portugal turned upon their rulers in that raging fashion, in which people unaccustomed to the liberal methods of true democracies, often turn upon their dictatorial rulers and ruling classes. The timely action of the British and French, however, in building the great sheltering walls, finished not a day too soon, fortunately broke the full fury of the tidal waves which struck their shores, deflected the sulphurous winds, and thus saved their countries from preventable losses. Torrents of warm rain fell and fell, and from then on continued to fall often and heavily.

As for the teeming millions of China, India and other parts of the world far removed, if they thought of it at all, they must have thought of the calamities which had befallen their western brothers in much the same way in which the westerns had always viewed the recurring famines, floods and other disasters which had afflicted the Oriental Peoples for generations back. Too bad, but nothing they could do about it. Who is the person who gets excited, aside from mild sympathy, over the afflictions of people unrelated to him in blood and culture whom he never met? As for the backward natives in the hinterlands of South America, Africa and other far places, these went on in blissful ignorance of the coming fate; or if they heard something about what was transpiring, they shrugged their shoulders as if it were no business of theirs.

THE first active breath of the fiery terror which reached Continental Europe, which should have immediately prompted them to unite in a common brotherly defense against whatever threatened, caused instead stupefaction, selfish bickerings and wide-spread dis-

cord. All the evils of centuries of intolerance, animosity and prejudice and unreasoning hatreds rose to the surface. Instead of helping each other, the general tendency in many quarters at first seemed to be to let the devil take the hindmost. Those that could, fled to the safer reaches of more easterly lands. Much valuable time was lost improperly caring for those who through frequent and disastrous hurricanes and tidal waves were made homeless. And still more valuable time was lost irrevocably before everybody at last woke up to the necessity of organizing for the great inevitable, and of erecting a series of high protecting walls, and the preparing of the general populace against the gaseous winds which began to blow. The subject of finances, that specter of the civilization of those times, caused much delay, red tape and inexcusable blundering, as well as selfish and shortsighted seeking of private gain in the face of calamity.

As Tomlinson remarked to Esther one day during the few hours he allowed himself for rest, "Those people remind me of a man who has a weapon aimed straight at his heart, but still refused to surrender his pocket-book. What deprivation and suffering many people will stand for before parting with money!"

How much longer the delays and bickerings of those in control of the deluded countries would have gone on, no one can say. But the deadly progress of the earth's cancer did not hesitate to wake them up none too gently. The fiery consummation progressing in all three dimensions, not merely on the surface, affected the ages-old stability of the rocky layers of the earth in many widely scattered sectors. Unexpectedly and like a bolt from the blue, a number of belching volcanoes burst out all over Central Europe in places that had never known

such things before. At the same time, practically every known volcano on earth, including some long since extinct, beside many new ones, burst into furious activity.

At last the whole world woke up. The thing was at their door.

CHAPTER XIV

IT was the tenth year. In every civilized land, earnest, able men labored to shield themselves as best they could from the fiery consummation. The greatest brains worked incessantly on the problems of successful interplanetary flight. The free interchange of thought and new discovery all went toward the conquest of the imperative world problem.

Laboring mightily with all the force of his great genius, James Tomlinson, having finally conquered the problem of an atomic energy power plant, then concentrated all his energies on the vehicular method best suited for reaching another planet. With unlimited power available in the compact form of controlled atomic energy, the most obvious vehicle was the rocket principle, long recognized but never fully developed. Coordinating the many refinements and improvements and endless experiments of many master minds, Dr. Tomlinson at last succeeded in constructing the first rocket-type engine capable of a flight through the void.

It was a great day for the harassed and thoroughly frightened people of the world when he announced the first trial flight. This took Tomlinson and his aides several thousand miles from the earth and was entirely successful.

In a great speech over the visoradio, at the conclusion of the flight, he urged that, "Now not a moment should be lost in constructing as many vessels as needed to transport the world's popula-

tion, including the necessary supplies and other things desirable. The time is short; and universal unselfish devotion to the cause is imperative if salvation is to come. Everyone must not give their mite, but their all, lest we each and all perish."

But the defeatist spirit, residing within a large number of individuals, would not altogether down. Why add to our present miseries, voiced many a critic, by undertaking such a vast amount of construction before a suitable planet is found? Perhaps the idea of other worlds is a myth, and all our efforts will be in vain. What then? Admittedly the solar planets are our only hope, for even if other planets existed in far-off stellar systems, there can be no hope of bridging the vast distances in ample time. But what if, after the solar planets were reached, which still remains to be achieved, and these are found uninhabitable? Why plunge the world into a frenzy of construction, only perhaps to be followed by disillusionment and the dreadful reaction that will come from futility?

To this Tomlinson and his supporters replied: Even if the quest for a habitable world should prove unsuccessful, there was nothing to lose by the immediate construction of vast fleets of space vessels. Improvement would thus follow improvement. At any rate, if a habitable new world should be found, as there was every reason to hope, then the immediate construction of sufficient vessels to remove the earth's population was imperative and might not otherwise be completed in time.

It is remarkable to what depths of stubborn foolishness some men will be carried by ignorance, demoralization and the defeatist feeling. And indeed there were large numbers throughout the world who could make no sense of such a fantastic idea as the bodily transporta-

tion of all humanity to some far-off twinkling star. To such people a star, call it planet or otherwise, had always been a star, just a blinking point of light, for star-gazers to rave over and poets to laud. But as an abode of life, a possible homeland for humanity—? In fact, many people declared they did not believe such a thing as "getting up there" possible. There was a large school, the religious fanatics, who were more or less openly against any such "tinkering to thwart the will of God." Others, of whom there were not a few, doubted to the very last if the total destruction of such a large body as our earth would ever come to pass. These predicted that Tomlinson and all the "wise ones," as they were dubbed in some quarters, would be confounded, when in the end "God did not forget His children." Opposite were those who saw in this disaster the coming of the "true end of the wicked world;" and many a pulpit thundered against a sinful humanity and the deserved coming of this last and final and greatest Sodom and Gomorah.

"Esther," spoke up her husband one day, "did you ever see a burning stable filled with frightened animals refusing to be taken out?"

"No; but I've heard of it."

Fortunately, however, by far the vast majority of the more clear-headed and the practical were in the saddle, and the work was driven through without further stint of effort.

ABOVE the haunting fear and dread, sounded a clear, clarion note of hope. Great excitement prevailed. But it was a different kind of excitement, that for the time almost drowned out the inexpressible terror that clutched at every heart. The lilting tones of a possible deliverance somehow communicated itself to the mass-soul of all the

people throughout the entire world.

The first of the great atom-driven rocket-ships that was to span the illimitable spaces in search of a new home for despairing mankind, was at last finished. The news ran like the proverbial wild-fire. The entire world was electrified. Ah, something definite, tangible at last!

First to complete the hitherto thought-of-as-impossible mechanism that could turn the trick, was Dr. Tomlinson and his capable colleagues. To America, the first and so far the greatest sufferer, went the glory and the honor of a new and greater kind of leadership.

From the great, roofless take-off platform in the outskirts of Chicago, the mighty spaceship was ready to be launched into space. A public holiday of thanksgiving was proclaimed. The people by the hundreds of thousands came to see the new miracle which man had wrought.

With Dr. Tomlinson himself in command, despite the protests of those who claimed his life was too valuable to humanity to risk, the most vitally important expedition in all history was awaiting the moment of take-off. The personnel, besides a trained crew, included a company of the most prominent scientists and specialists in many fields.

The goal decided upon was the planet Mars, the ancient planet of war, but now a welcome sight in the heavens. Mars was chosen as the objective of the first expedition because of its then being nearest in its orbit and because of its apparent similarity except in size to its sister planet the earth. Just then at opposition near perihelion, which occurs every fifteen to seventeen years, the ruddy planet was shining with extraordinary brilliance and only about 35,000,000 miles distant. A long journey indeed! But at the speed of which the ves-

sel was capable this was a distance that could be covered in a few weeks or less.

AT a wave of Tomlinson's hand, the great ship took off, smoothly and swiftly, the propulsion coming from flaming exhausts of incandescent gas generated by the atomic engines. The initial rate of speed was easily regulated due to the enormous power available. The take-off, therefore, though swift, was comparatively slow, thus avoiding the danger and discomfort which a too sudden release would bring. Those who were present at the epochal event will never forget the dramatic scene. In a few minutes the huge space-ship became an invisible speck to be seen only through a powerful glass.

Soon to follow, under the command of Oliver Maywell, one of Tomlinson's chief assistants, was another vessel, a twin sister ship which was rapidly nearing completion. Its goal was Venus when she approached inferior conjunction. Other expeditions were being rushed to take the place of the first two in case something went wrong.

Across the seas the British, the French and the Italians were working might and main, not to be outdone in the race for carving out their share of a new world. Utilizing the successful principles first devised by Tomlinson, to which they added ideas of their own, they were not far behind their American rivals. Their expeditions, not long afterwards followed in the depths of space.

Spanish efforts were severely hampered by their belated erection of protective barriers, and the terrific tidal waves which struck far inland, one after the other, with disastrous force. The great technical genius of Germany was unfortunately lost to the world during those trying times, on account of the violent volcanoes which burst out in that land in overwhelming numbers,

driving practically the entire population eastward.

The U. S. S. R. with their high geared industrial machine, their country so far the least touched of any nation in Europe, set themselves the task, in addition to two separate expeditions to Mars and Venus, of discovering what the favorable conditions were for settling on the Jovian or Saturnian satellites, particularly Saturn's Titan, almost half the size of Mars. To cover such stupendous distances as the outlying solar system presented, within reasonably short time, they coursed on the special high velocities to which they claimed their ships could accelerate.

Japan, though as yet untouched by the direct force of the atomic terror, was suffering almost as severely indirectly by one continuous horror of earthquakes, flaming volcanoes and mountainous tidal waves. The terrific pressure of the force that was eating its way deep into the earth, was causing vast dislocations in many parts far removed from the immediate center of disturbance. The Japanese, too, in spite of all handicaps, were but little behind in the race for interplanetary conquest. One of their objectives, on the way to the solar planets, was a stop-over on our moon. The practical Japs were not going to overlook any bet so close to home if a way could be found to colonize the supposedly airless satellite.

India was also hard at work preparing an expedition to Mars or Venus. Nor was China neglecting her share in the general race for salvation.

Altogether, there was an intense but friendly rivalry to get there first. But under the surface, although not openly admitted, the various governments had a keen eye toward carving out the choice portions of whatever planet or planets, if and when they got there, that was worth carving out for their teeming mil-

lions. The great stakes, aside from the dire necessity for escape, were worth racing for and lightened the burdens of despair. Even in his moments of greatest peril, the economic instincts of the acquisitive human animal could not be altogether downed. Perhaps so much the better.

CHAPTER XV

A PRAYERFUL humanity filled with new hope settled down to await the return of the various expeditions, as one after another departed from their respective homelands.

Anxious days, uncertainty, suspense was America's lot after Tomlinson's expedition departed, particularly as their country embraced the center of the fiery cancer. Five millions of miles out, their velocity having accelerated to over ten miles per second, their powerful radio transmission system could not make itself felt on earth. From then on the silence of infinite space swallowed them up.

The American sister vessel which followed two months later, bound for the planet Venus, which was drawing near to the earth, took off the very same day as the first British expedition, with Venus the latter's goal also. Some days later they were followed by a French rocket-ship, much larger and said to be better equipped than any of the others. And the month following the Union of Soviet Socialist Republics dispatched two separate expeditions into the great void, with Japan and India close on their heels. From then on, from various of the civilized nations of the burning globe, one expedition followed the other, bound for the various likely planets or their satellites. With each, regardless under what flag, went the hopes and the prayers of all humanity. An anxious world awaited the return of these first Argonauts of space.

Six months later, despair was eating at every heart. So far not one of the expeditions had returned. Not a word, not a signal of any kind. Every instrument, every telescope was trained heavenward. To all intents and purposes they were as completely swallowed up in the immensities of space as if they had never existed. Other expeditions that bravely set out to find what had become of their lost brothers were as completely swallowed up.

Tomlinson was now many months overdue. It gave the entire world a sickening feeling, a sense of frustration. The spirits of humanity fell to the lowest possible level. Was the conquest of space to prove an impossible feat after all—a chimera of the tortured soul of man? The reaction was on the point of taking a fatal turn.

THEN suddenly, just when all the expeditions were given up for lost, and the mourning was universal, the world was electrified by the safe return of Tomlinson's expedition. Of all those who had departed with such high hopes, his was the only one ever to return. All the others, with the later on exception of the Japanese, were never more heard from. Several, as was learned long afterwards, had crashed fatally in the act of landing; others had evidently been unable to take off again for the return journey to earth. Still others must have lost control and continued on endlessly into the depths of space, or perhaps met with some unknown collision or other accident. The Japanese expedition had partially crashed on the moon and had been unable to take off again. They were later found and rescued by a Belgian party that was exploring the satellite, just as the Japs were about to perish from lack of air and water.

These first disasters of interplanetary travel were the unavoidable price which

all pioneering adventurers have always had to pay. Much of it was due to the lack of astronomical experience. Accurate charting of the abysmal depths of space is a new science, highly complicated. The swift movements of the heavenly bodies made it quite easy for the tyro to miss his mark by many millions of miles, perhaps forcing a long chase after the retreating globe which is apt to prove disastrous. It is also very important to learn how to avoid the innumerable small and large bodies which circle about the sun or the various planets. A collision with any of these, moving at cosmic velocities, spells finish instantly.

Another most important factor that counted heavily against the unfortunate first expeditions, were certain serious defects in the construction of these earliest space ships. A similar fate had come within an ace of snatching Tomlinson's expedition also. Although his vessel had succeeded in landing safely on Mars, it was not without a severe crash, due to trouble which had unexpectedly developed with the control system. Fortunately, and partly due to Tomlinson's supreme genius, their equipment and preparations were such that they were able at last to effect the necessary repairs in time; although not until after several months of agonizing uncertainty.

With the safe return of his expedition, however, it was now possible to iron out most of the serious unlooked for defects in the new science and art of space ship construction, as well as the better to avoid the errors incident to astral navigation.

TOMLINSON reported that Mars was habitable, although far from being an ideal planet for the needs of a transplanted mankind. For one thing, too large a proportion of its available

surface was a hopeless desert; the colonizable areas entirely too limited for the full life of the teeming terrestrial millions. Second, the water supply, though ample, was badly distributed, most of it confined to the frozen polar caps, and would require an immense amount of engineering before it could be made available on the needed scale. Rainfall was very scanty and practically non-existent over large portions of the planet. The air was very thin and dry and much like that on the highest mountains on earth. Then there were the terrifically cold winters, about twice as long as the terrestrial (the Martian period of revolution at a mean distance of $141\frac{1}{2}$ million miles from the sun is 687 days, although the daily rotation, in 24 hours and 37 minutes, and the axial inclination is practically the same as the earth's.

There were of course the peculiar drawbacks due to its small size, only 4,216 miles in diameter, and the still more peculiar conditions incident to its small mass, which is only about one-ninth that of earth. But Tomlinson was overjoyed to find there was life on the ruddy planet, although it proved to be of a very low order and of vegetable type, confined chiefly to certain narrow tracts traversed by the summer-time streams fed from the polar caps. All in all the planet was not a very inviting world.

But it was something. And under the stern lash of necessity it is surprising what can be done. If nothing better turned up, the red planet could be made to do. For the atmosphere, even if rarefied, was fairly invigorating and fortunately adaptable to man's nature. Of water, an ample supply could be achieved with the aid of art and science, despite the severe conditions imposed by most of the available supply being impounded in the polar caps. Much gen-

eral preparatory work, of course, would be required.

NOT content, however, Tomlinson immediately announced his plans for another and greater expedition to Venus. The cloud-enshrouded planet would shortly again approach inferior conjunction and be at its nearest.

His plans for this new expedition were on a much more ambitious scale. It comprised six of the largest and newest type atomic-power driven rocket-ships, which incorporated all the best ideas gained from his previous voyage, without the defects which had proved so disastrous to all the others and which was well nigh fatal to his own. Altogether, over eight hundred men departed on this great expedition.

And successful it proved to be. This time, Venus, the Evening Star, at nearest inferior conjunction—only about 24,500,000 miles away—proved an easy conquest. Five of the expedition's fleet of six vessels spanned the distance in only fifteen days, landing safely in perfect condition. The sixth unfortunately was lost in a meteoric storm, something that with experience could in the future be avoided.

Venus, as explored by Tomlinson, revealed itself to be a raw, young world, lifeless and uninhabited. This was at first sight very disappointing. But after closer study the planet was found to have tremendous possibilities in its favor as a future homeland. For, outside of life itself, which had never developed there, the planet contained within itself practically all the essentials for life as required by terrestrial creatures.

Almost the same size as its sister planet the earth, or to be exact 7,575 miles in diameter, with a somewhat larger proportion of ocean covered surface and large copious watered continents, it offered, according to Tomlinson

and his colleagues, a fit world for colonization; far preferable to the small and arid Martian planet. To be sure, the atmosphere was heavy and quite below the oxygen content to which human beings were accustomed, but far from deficient. With time and the agencies of transplanted vegetation and human artifice this could be brought up to the desired content. Adaptation, too, if need be, could be relied on. The temperature, of course, due to its nearness of 67,200,000 miles from the sun, was hot and humid, but this was considerably compensated for by the thick envelope of moisture laden clouds which prevented a great deal of the killing heat from reaching the surface. An important drawback was the excessive amount of carbonic acid gas, but not dangerously so, it could in fact be turned to advantage as conducive to a rapid and luxuriant growth of transplanted vegetation. A number of years of intensive preparation and pioneering work would be required before a general trans-migration of the human masses could begin.

Altogether, however, and in spite of other drawbacks, such as the long days and nights and the unequal seasons and temperatures which prevailed, the planet should prove a fit place for an uprooted humanity. Anyhow it was the best there was to offer, and there was every reason for a dispossessed mankind to be grateful for this gift of the heavens.

Toenlinson further reported that before leaving Venus, he had staked out in the name of the United States of America a continental mass in keeping with the power and needs of his country. The other countries of earth were free to stake theirs, first come first served.

Subsequent expeditions which shortly afterwards explored not only Venus but practically all the other solar bodies, agreed that Venus was incomparably the

best bet, although Mars, too, could be colonized after a fashion, especially by the highland races accustomed to a dry and rarefied atmosphere.

Then began a feverish race to build rocketships and still more rocketships. Time was short. The fatal days when life on earth would no longer be supportable was drawing shockingly near—fifteen to twenty years at the most.

AND there was in very truth a whole world of things to be done, a most stupendous and to many a seemingly hopeless task, what of the few brief years remaining, made still harder by the handicaps presented by the already dislocated conditions on earth.

First of all there was the necessity of outfitting vast pioneer organizations for the arduous and tremendous preparatory work on the new homeland, before the first of earth's teeming millions could even begin to be moved; to break the raw ground for the masses that would follow as fast as with safety and with reason, under the lash of necessity, they could be transported and settled.

Powerful electrolytic plants were the first thing to be set up in various parts of the New World, to release vast amounts of free oxygen from the abundant ocean waters. The disassociated hydrogen would have to be expelled into space to avoid dangerous explosions. The lifeless soil had to be prepared and fertilized. This in itself would have been an almost insurmountable task in the short time remaining were it not for the inconceivably great power now available through the controlled use of atomic energy. The vegetable kingdom, without which human or other life could not exist, had to be rooted in the new world; billions of seedlings planted; a comprehensive system of forestation; domestic and useful animals and birds moved to their new habitat; rivers and lakes and

oceans stocked with edible and useful fish and other of the multitudinous marine forms necessary for a full and happy life. Even the useful but invisible bacteria and other necessary micro-organisms, which did not exist on Venus, had to be transferred to it. In this the greatest care had to be taken not to include the destructive forms which had inflicted mankind on earth. Also desirable wild life, animal and vegetable, those that flew or ran or crawled; fruits and flowers—in short, everything necessary for the complete life-cycle as it went on on earth.

The task was overwhelming in its immensity. But the cruel lash of necessity drove a frenzied humanity on and on, and the toil such an undertaking required, which ordinarily would have taken centuries to complete, was crowded through in a few years. Nothing now mattered but brains and brawn and skill and the ability to stand the utmost number of grueling hours of work and hardship. The entire populations were called upon, from the little children who could contribute their tiny mite, to the doddering oldsters. Work and still more work was demanded. Finance and ownership and hours and what not, so dear a part of the pre-catastrophic age, were thrown overboard as so much useless baggage. Fortunately, too, Venus was as rich as the earth in all the minerals and metals and other necessary elements.

Nor was artificial spur necessary to drive everybody. The writing was on the wall, so plain a child could read it . . . the poisonous winds, requiring frequent use of gas masks . . . the mild, summer-like temperatures over large areas where winter should have been; the unbearably hot summer seasons; the oft steam-laden air; the devastating tidal waves; the torrential rains and almost everpresent heavy drifting clouds, even where rain was formerly unknown. . . .

The fine volcanic dust that encircled the earth to great heights, coloring the skies with flaming colors at once beautiful and ominous; the frequent showers of ash carried to long distances by the hot winds . . . The fantastic numbers of active volcanoes everywhere, even where none had been before; the sickening earth tremors, the rumblings, the violent 'quakes. No need to be told what was coming. All these drove the slaving populations forward with super-human frenzy; the greatest danger feared that at any moment the fiery center, now over half a thousand miles in diameter, should not in one devastating outburst detonate the whole globe and blow it to bits before the work of transmigration could be finished.

The advancing wall of death was unapproachable anywhere within hundreds of miles above or around. Its sun-like brilliancy dispelled the darkness of night over millions of square miles. The general rise in temperature even began melting the polar caps.

In America, the population sought temporary safety behind the ramparts of the Rockies, carrying their industries with them. The surplus population ranged clear into northern Canada and Alaska, and south to Mexico and the South American Continent. National barriers were forgotten.

In Europe, the tremendous disturbances forced the western populations ever eastward, where they reorganized and continued their work. There, too, the force of circumstance obliterated all national boundaries. Closer association brought better understanding and mutual sympathy. Sorrow makes brothers of us all.

In Asia, Africa, South America and even as far as the Antipodes, the shiftings of populations also took place on a vast scale, even though these lands had not as yet been directly touched by the

searing terror, but rather indirectly, on account of the fantastic number of volcanic and other dislocations touched off by the main center of annihilation.

CHAPTER XVI

THE time was near. With the vast engineering and preparatory work on the New World still far from complete, although more and larger armies of frenzied workers were transported and thrown into the work; with the flaming disintegration approaching a planetary crisis; it became imperative for the wholesale transportation of the earth's masses to begin. That could not be put off another day. As fast as ships were rushed to completion, humanity and necessary supplies streaked Venusward, and the ships returned for more. There was no time for niceties. The main thing was speed and more speed with safety as the imperative goal.

And as rapidly as the first masses, fortunate to escape from the earth, were settled and organized on the new homeland by their respective governments, they, too, continued at the herculean task of planetary preparation, of home-building, of fabricating and manning the endless number of rocket ships needed to remove their terror-stricken fellow men who awaited their turn to be taken. The populations still remaining on earth, more or less disorganized and demoralized were less and less able to help themselves. Unspoken was the fear that the work of escape for all those millions who still remained might at any moment become impossible.

Came the critical months. The end was not far off. The work of rescue and removal became ever more difficult. Millions still remained to be moved, especially the more backward peoples who lived in countries less advanced in the arts of civilization and were therefore

almost incapable of effecting an escape through their own efforts. Many of these unfortunates, it was feared, were doomed and about to pay the supreme penalty for their low state of development in the arts and sciences.

The air became increasingly bad, necessitating the constant wearing of gas masks, and protective suits. The heat was torturesome, scarcely relieved by the now incessant downpour of hot rain. None of those still remaining could longer aid in the work, or even help themselves. The work of rescue from now on had to be altogether directed and carried out from the new homeland.

IN the midst of these last frenzied efforts, with the vast work of removal almost complete, there came a terrific explosion that rocked the earth from pole to pole. The ferocious disintegration which by now had worked almost half way across the floor of the Atlantic, suddenly lifted thousands of square miles of sea bottom in one vast upheaval that sent flaming elements hundreds of miles into space, showering the entire remaining surface of the earth.

It was the beginning of the end. An appalling hurricane of dust and gaseous moisture soon enveloped the entire planet, blotting out the sun completely. The tortured surface heaved and rolled; tidal waves truly mountainous in height swept everything that was not at a higher altitude.

To the very last moment the heroic work of succor went on. Into the thick of it, directing, guiding, planning was James Tomlinson, without rest or sleep. As supreme head of the International Great Council, he had given orders that the work should continue until the very last man and beast shall have been removed, as long as there was any possible chance. Happily, with the exception of some unfortunate primitive inhabi-

tants of mountain, jungle and desert, who could not be reached, the great work was done. The fiery hurricane then forced the last of the rescuers to leave.

* * * * *

HIGH above the thick, fiercely crimson clouds which enshrouded the eastern hemisphere of the burning earth, James Tomlinson in his great rocket-flyer hovered. His heart was heavy and sad. It was sure death to venture more unto the surface.

With a sigh, he signalled the vast rescue fleets, some laden with man and beast of earth, some unhappily empty. There was nothing more to do. They streaked away toward their new home.

Arriving high above the cloud-covered surface of Venus, and about to brake in a long spiral preparatory to landing, Tomlinson, now a man with greying hair, looked back at the distant globe which for so many countless aeons had been the sheltered home of terrestrial life. He could scarcely be-

lieve that all this had actually happened. It seemed more like the substance of a realistic dream. He gazed long and ardently at the tragic yet brilliant spectacle presented by Terra aflame. The great dazzling spot formed by the main center of the atomic vortex, stood out almost sun-like in its brilliancy.

Through his mind flashed the closing words of his long departed great teacher before that class so many years ago . . . that warning prophecy. . . .

Stricken Terra, great giver of life, mother of man. Victim of thy own creature, that being with the mind as of a god, yet with a heart that is not. From now on thy sister planet will take up the work which thou hast finished.

Then a feeling of happiness surged through him, a feeling of work well done. Eagerly he dipped the prow of his rocketship below the friendly mantle of white clouds which draped the new homeland. All that he held most dear was now safely housed on its rich surface.

THE END

What do you know?

1. What is the test of the validity of a theory? (See page 37.)
2. What is a symptom of space? (See page 37.)
3. What does one of the wave theories suggest? (See page 37.)
4. Can the atom be regarded as a source of energy? (See page 44.)
5. Is the idea of possible danger to mankind to be found in intra-atomic energy? (See page 44.)
6. What is the planetary satellite nearly half the size of the earth? (See page 81.)
7. What is the mean distance of Mars from the sun? (See page 83.)
8. What is the length of its year? (See page 83.)
9. How long is its day? (See page 83.)
10. What is its diameter and its mass compared to that of the earth? (See page 83.)
11. What is Venus' nearest approach to the earth? (See page 83.)
12. What is the diameter of Venus? (See page 83.)
13. What is the mean distance of Venus from the sun? (See page 84.)
14. How would the power of jumping, when on Mercury, be affected by its gravitation? (See page 106.)
15. Is the principal mass of an atom in its protons or electrons? (See page 114.)
16. What is the relative weight of the two constituents of atoms? (See page 114.)
17. What are some of the characteristics of calcium and sodium? (See page 116.)
18. How does a fish breathe? (See page 117.)
19. Is moist air heavier than dry air? (See page 119.)
20. What remarkable decomposition can plants effect at ordinary temperatures? (See page 127.)

Land of Twilight

By ROBERT PAGE PRESTON

We are now concluding this serial and it is enough to say in these few lines that the end justifies the means. It departs a little bit from the spirit of the proverb because the means have been extremely good and we know the readers will enjoy the interesting climax of this story, so skillfully brought about by the author.

Conclusion

TI-SAN and his brother Mukan had put over the idea of domesticating the troad and hundreds of the beasts were being trained in agriculture and for use in war. The soil was now turned by steel-tipped plows, instead of being scratched with a stick as heretofore. When these beasts are captured young they assimilate their training easily, but the adult beasts either break free and return to the forests or else sulk. Eventually I expected that they would play an important part in the defense of the nation.

The drilling of the army occupied a certain period of each day. At some time or other we expected to make Energy Guns for all, at the present time they depended mostly upon the bow and arrow. Archery had been developed to a surprising degree of efficiency. Our army was built around a small corps of gunners, using the weapons that we had brought from earth, supplemented by aerial attack with the ship. In addition we had a force of nearly a thousand cavalymen, mounted on troads. The rest of the army was composed of archers with an assortment of types of bows, from the huge cross-bows with a range of over a thousand yards down to the less

powerful but far faster long bow. All the men were equipped with a short spear and sword. It had been a long time since any of the Sen Lev had been sighted near the settlement, but I felt sure, that, with a man such as Ig for their leader, we would hear from them at some time. Nor was I wrong.

The women of the nation took a greater share of the task of teaching. I found time to make occasional visits to these classes and we spent many hours in writing down for them as much as we could of the sciences that we knew. All work was done on a substance similar to slate, which became as important in the lives of these children as their notebooks to the scholars of earth. In the course of time the King and his leaders expected to find some substance that would play the part of paper, but at present they were concerned with getting as much knowledge as possible in a short time. In a few short months they had obtained a knowledge of the most important steps in the ladder of progress. They had a knowledge of architecture, the use of the metals, the domestication of animals, weapons and a knowledge of military tactics and, most important of all, an alphabet and the power to put thought into



Wave upon wave of the men from the inner lands charged against the barrier—only a few lived to return again to the main body.

form fully elaborated and indestructible.

For centuries our ancestors on earth had struggled with these problems before they had mastered them, then to be retarded for countless years, when our world had been lost in a maze of superstitions and unnecessary wars. In this region of Mercury there is no definite night or day, which is perhaps the reason why superstition plays no important part in the lives of these people, for night is the time of mystery, when the mind of man conjures pictures of evil spirits and evil deeds. I have often thought that this is the reason that there is no counterpart of the evil spirit in the religion of these men, nor anything that is similar to Hades. We have never tried to alter these beliefs.

During these months I had insisted upon a patrol far beyond the limits of the valley. The King had laughed but consented, even Hughes was inclined to believe that I was overcautious, but I had persisted and obtained this guard, that in the last few weeks had become much more efficient, mounted on the tireless troads. For the same reason I had insisted upon the speeding up of the completion of the high voltage barrier that surrounded the domain. They seemed to believe, that, bested in a small skirmish with only a few of their available men in action, the men of the land of darkness would leave us alone. I did not believe this. I had seen their chief, Ig, and knew that he had far more intelligence and ambition than the average Dar, also I had seen the look of enduring hate that he had bestowed upon Bill and me, when he had parted from us on that night so long ago.

As was my custom, I had emerged from the terminals of the city one day and climbed to the mountain top to watch the signals of the guards upon the range to the eastward. I never tired of studying the sharp contours of the

land, accentuated by the shortened horizon, the colors of the leafless trees and the surface vegetation mystified by the hazy light. It was perpetual twilight.

Through my glasses I picked up the flash of signal-pistols. "Sen-Lev," the lights flashed, "many, many of them!"

"Ti-Dan" I shouted to the captain of the guard, "A fleet runner to the King and the white giant. Bring the warriors here with all equipment. Hordes of the barbarians are attacking, so make haste."

One of the fastest messengers departed for the city below. I turned my glasses again eastward. Over the plain came a warrior mounted on one of the steeds. I marveled at the speed of the beast and the natural skill of the rider. Fast as a swift horse would travel they came, unhindered by the rough ground and the bad light. He was carrying a special message, I surmised.

"Call the scouts in, Ti-Dan. We do not wait, but will attack as an army; first, however, we must learn how many we face and where we shall meet them."

The Vereans were assembling now. Among the first to arrive were Sen Eo, Bill and Dianna. She was commander of the reserve forces, an army in itself, composed entirely of Verean maidens, who demand equal rights in battle as in the other walks of life. To men unfamiliar with their customs, as Bill and I were, this might seem wrong; to the people of Sen Ver it was but natural. They have done so since the beginning and do not draw the lines of sex very finely. While not as strong as the male, the women are oftentimes more alert and they stand the hardships of a campaign to an amazing degree. Possibly the action of battle instills in their hearts a true hatred of bloodshed, which is passed on to the young, for all of them detest slaughter. A strange paradox, desiring peace above all things,

yet their very existence depends upon their ability to fight. I hoped that soon the time would come when they would not find it necessary to be always ready to do battle, when they could pursue the occupations of normal men as they wished to do.

The crew had gone to their posts in the ship, which was always ready to take off. I lingered to speak with Hughes and the King. "I will scout their position from the air, they must still be a great distance away. I will report to you in the passes of the first range of mountains, since it is agreed that we shall await the Sen Lev there and attack from that point."

"Happy landings, partner," said Bill.

I turned to board the ship, to find Dianna waiting for me there. A brave and handsome picture she made as she stood beside the outer port. She was clad in the conventional garment of the Vereans, with a purple band around her flaxen hair, from which arose a plume of three purple feathers, insignia of all higher officers. For a weapon, she had a short officer's sword in a golden scabbard. Smiling she extended a slim hand.

"I wish you happy landings, too, David."

On the spur of the moment, forgetting that this was a princess, unmindful of the fact that I was an outsider, without a thought of anything except that I loved her more than any one I had ever known, I drew her to me and crushed the rose-petal lips to mine. Had she resisted me it would have done her no good. I was not sure that she did. Realizing finally that I could not stand this way forever, I tore myself away and entered the ship. As we rose swiftly into the air I could see my loved one below, sword raised in salute. Swiftly we sped across the valley and over the mountains beyond.

CHAPTER XV

The Electric Soldier

OVER the plain beyond the range of mountains we came upon the enemy. They could not see or hear us at the altitude at which we were flying. My worst fears were realized. This was no mob of beasts but an army of men with some semblance of order. They were encamped below us and huge fires were blazing away. As I studied them through the glasses I could see that nearly all of them were armed with long bows and many with swords. The sight brought home the fact that men are the ultimate artists in mimicry. A few short weeks Hughes had been amongst them, still they had learned from him to make fire. On one occasion only had they seen bow, arrow and sword in action. An agile brain among the masses had registered the value of these and put them to use. Against this was the fact that for ages untold they had lived and died and no being amongst them was able to think of his own accord of any of these advancements.

I called to Mu, who, with glasses, was estimating the numbers below us. "How many of the enemy do we face?"

"There must be about seventy-five thousand of the savages," he said when he had completed his survey, "that is three times the number of troops that the Sen Ver have mustered, even with the regiments of maidens."

"We shall go back to meet our forces and call a council," I said, "and as the council votes so shall it be; if we shall make an attack or retreat behind the barrier which we have set up."

In a very short time we had returned to our forces, made camp and the council had met and I reported conditions as we had seen them.

"Men and women of Sen Ver, we face a very grave danger," I advised, "not

only do the wild men outnumber us by three to one, but they are quite well armed and seem to have been trained to a fair degree of efficiency. Think well before we attack. We can return behind our barrier, no doubt such action would save many lives."

Much to my surprise it was Dianna, as leader of the women who voiced the first objection.

"No," she cried, "there is no reason why we must always run from these beasts! We have superior weapons, we have a force of mounted men and when it becomes necessary to retreat we can always do so at a faster pace than the savages are able to maintain!" A long and heated discussion followed, Hughes and I both being in favor of returning at once, but we were over-ruled by Dianna and her following. I suppose that either they had not much faith in the wires that we had strung around over the landscape, or else, as some of them had intimated, they were tired of being chased around by the enemy.

"If we are to give battle," I said, when finally I saw that it was of no use to argue further, "the supreme command should be placed in the hands of a man who has had military training. Otherwise in your ambition you will lose more lives than there will be any necessity of losing and may become encircled by the enemy. Hughes is such a man." Bill was a West Point man, had been an officer in the army. This sort of warfare was new to him, of course, since on earth, for many years, all wars have been won, or lost, for the most part, in the air. However he was well versed, as an army officer must be, in the methods of ground warfare, the distribution of supplies, care of the wounded and all the many details of a campaign. This was to be guerrilla warfare, fighting from behind trees and rocks. Our plan of action was to meet the enemy at the

base of the range. The mounted men, armed with most of our supply of energy pistols in addition to their regular equipment, would attack all along the line of battle. My crew, using the big guns of the ship would cover the attack. Any of the opposition that broke through would meet the main body of archers.

In the valley below, the enemy was spread out in an encampment about twelve Yurgs in length. Far up on the side of the mountain our line was made the same length as that on the plain below. The first action would begin at the edge of the wooded slopes.

Our thousand of cavalry advanced first to meet them and from the air I gave the signal to attack. Simultaneously we opened fire with the big guns aboard the ship. The mounted troops, using Indian tactics were strung out in a long line, always moving along the enemy front. The fire from the ship was supposed to clear a path for them, the arrows of the archers to take care of any that they missed. I knew that, if the first burst of firing did not demoralize the forces of Sen Lev we were in for a long hard battle, the outcome of which was really doubtful, as we did not have enough ammunition for the energy rifles to carry on a sustained attack. The supply that we had brought from earth was nearly exhausted and we had not as yet found time to make more. The leaders of the nation had expected some attack by their enemy, but had not thought that it would come so soon nor by such a large force.

The enemy had been well trained. As soon as men began to fall and they knew that our attack was on, they made use of their natural ability for camouflage. Amid the small growth they could not be seen, either from the air or by our ground forces, their mottled skins blending with the colors about them.

"I can not see anything at which to shoot," the gunners reported.

"Then hold your fire," I replied, "since our stock of ammunition is low." I had not been able to see any of the enemy for some time, except those that were at a distance, by the aid of glasses.

Our attack on the ground was also failing, the riders being unable to locate targets, while they were open to arrows from hidden bows. The casualties were few, however, as the Sen Lev are poor shots and the arrows will not pierce the tough hides of the troads. Only occasionally did a rider fall from his steed.

"I see a signal from the cliffs!" shouted the look-out. I levelled the glasses in the direction that he designated, and received the message to come in. Hughes, from his vantage point overlooking the whole of the battle, had seen that we were getting nowhere. The cavalry and other ground troops had also been ordered to cease the attack.

The Sen Lev advanced as we retreated, as our troops had definite orders to attempt no battle with them at close quarters.

"This does not mean that we are beaten, by any means," I consoled the men of my crew, "many a battle has been won by a strategic retreat."

From the air and with the force of cavalry among the ground we wreaked havoc among the enemy troops when they crossed the stretches of naked rock, where their colors failed to hide them and where they could be seen to shoot at. This slowed their advance, made them cautious in exposing themselves, but this could last only as long as our dwindling supply of shot held out.

"We must retreat beyond our barrier of wires," Bill told the council, "you have not much faith in that defense since you have never seen what it will do. We lost too many men in this style of fighting. When we have no

more ammunition our losses will be greater. The Sen Lev have lost many more than we, but I am told that they have reinforcements coming up. We have none, but should they break through the electric wall we can fight them with the fire balls. If we must we can abandon the city temporarily, recapturing it, when we have made ammunition enough for the big guns."

The dissenters were overruled and we made a forced march back over the route we had traveled. When our purpose became clear to the savage hordes, they came in full pursuit. There was not much danger from that source however, because they cannot travel at the fast pace of the Vereans. The mounted detachment cut down those that ventured ahead of the main body, further slowing their advance. The barbarians, scenting ultimate victory, did not halt but kept on the march and we were thus forced to continue with no rest, but we forced the pace at the last, outdistancing our slower enemy.

Inside the fifty yard wire barrier we halted and replaced the movable sections as quickly as possible and soon we had a current at sixty-six kilovolts traveling over the wires. This I counted upon as our best defense. We waited in battle formation in case the enemy broke through.

"It is an awesome sight" said the King, "see the lights which dance above the wires." He referred to the corona around the conductors caused by the ionization of the air in the vicinity. In the dim light this could be plainly seen.

"There they come!" Bill shouted as the vanguard of the attacking party came on at their fastest pace, "they are sure of victory—we shall soon know."

Conversation ceased as a few, more eager than their fellows, swept far into the lead. The first man touched the obstructing wire—a short hideous scream

rent the air, followed by the odor of burned flesh. Others attempted to cut the barrier wire with their heavy swords and were electrocuted as soon as the blade touched the wire. Those that touched any that were connected to the system became a part of the circuit and immediately died. The Vereans gazed in awe-struck wonder.

"Tiva!" the King exclaimed, "it is a terrible ending, struck down by an unseen power."

Wave upon wave of the men from the inner lands charged against the barrier—only a few lived to return again to the main body.

"They are going to attack at a point further away," said Groten.

"It is no matter," I replied, "the result must be the same; the only way they can check the power is to cut off our water supply, for the power which kills comes from the water that flows so peacefully a few hundred yards away."

The forces of the Sen Lev stopped their futile attack. A detachment approached the barrier slowly and stopped a few yards from it. In their number I recognized Ig, leader and cause of the bloodshed. He raised his hands clasped above his head in the Mercurian truce symbol and shouted across the space.

"The chiefs of the Dar would parley with your leaders."

He spoke in the Darian tongue which Bill translated to me. We hastily discussed the situation and King Eo gave them his answer.

"Send your forces back into the hills, only your chiefs may parley with us. When this has been done you may come beyond the enclosure."

There was a lengthy council over this among the Darians which we could not hear but finally they reached a decision and their forces took up the march towards the dim, distant peaks. With my crew I scouted the march, fearing treach-

ery. We did not return for many hours, not till we had seen the last of them beyond the point where they could stage a surprise attack. Following a much needed rest we met late the following day to hold council with the men of the land of Dar. No sealed and signed treaty could be drawn up since these men could not write. We met on the level land just inside the harmless appearing wires which had proven so deadly. Most of the Vereans that were physically able to be there formed a huge throng, before which the Dar chiefs were assembled. They were about three hundred in number. The circuit had been closed and the current turned on in the barrier. The high voltage hissed and smoked along its carriers.

Bill having spent considerable time among the Dars was ordered to be our spokesman by the King and council.

"Great chief Ig, and all chiefs of Dar. We are here to make peace. What purpose can be served when creatures of intelligence slay each other? There are beasts in plenty among the forests and birds enough in the air to furnish food for all. In all directions lie the fertile lands, more than enough for centuries to come. The men of Sen Ver wish no bloodshed, but for every Verean that is killed they promise that ten of his enemies shall fall! You ask then: why did not the Verean hold his ground when you met him in battle in the open field? The answer is that the magic of the stick that kills was low. The Sen Ver expected you to attack but not so soon. They will make sure that, in the future, enough death-dealing magic is ready. Then there is the wall of flame which they have made and can control, through which no living thing may pass. We desire to take for our own as much land as we may need, that Verean hunting parties may not be slaughtered and that the women of the race shall not be

spirited away. In return for this the Vereans promise not to molest the Dar, to teach to the agent of Ig all the arts, except the secrets of war. These we must keep because we are few in number against the many."

For a long time the savages discussed my friend's words heatedly and more or less violently. This in itself was a good sign, since it presaged that the ultimate decision would be sincere to a greater degree. If they had consented to our terms too easily, we should have had good reason to expect that they would forget them as soon. The ultimate decision, on their part, I felt, rested with one man, Ig. I watched him closely but as yet he had taken no active part in the argument, but remained aloof, though listening carefully to all that was said. Once more I felt that here was an exceptional character among his kind. He was thinking about the problem and in this lay the qualities that separated him from his fellows, for when a man ceases to let his impulses or passions guide his speech or his deeds, but debates them to himself in the cold light of reason, then indeed does he start to advance. The limit of his advancement is controlled only by his ingenuity and by the time the great Director has allotted him to play upon the stage.

At length, Ig called for silence among his chiefs and such was the power of the man that he obtained their complete attention. That he ruled them by sheer physical dominance mattered little, the important fact was that he did rule them. For about five minutes he spoke to his leaders and their decision was reached.

He approached Hughes and spoke. "Leaders of the Sen Ver, we have come to a decision on what has been said. We have had visions of power, visions that must be abandoned. I can see that we cannot conquer the pale men from the outer lands. Your terms are fair.

While I am great chief of the Dars they shall be kept."

The great mass of the attacking party took up the march back into the lands from which it had come. The great chief and a few of his leaders were staying with us for a short time. They were given the freedom of the place to a certain degree but were not allowed in our quite modern electric plant or to study certain other things that we were doing. After a time they also departed and we again took up our work where it had been interrupted at the time of the attack upon us.

CHAPTER XVI

North of the Equator

INTERSPERSED with the work of repairing our ship we made many flights over the surface. The purpose of these were twofold: first to map the whole terrain, and secondly to search for a place where another colony might be started. We felt sure that no attacks upon us would succeed against our defenses, particularly the system of electrical wiring that we had set up, and so the entire population had moved to the surface. The abodes inside the mountain were kept intact in case of an unforeseen emergency, but everywhere houses were springing up in the valley. Given the ideas of surface structure, the native mechanics soon put them into operation.

The one valley was adequate for the needs of the present population but with the means of protection that we now had in operation it would cease to support the Vereans of a decade hence.

Venturing farther afield on one of these tours, we followed the plain at the end of the great morass. In the distance we sighted a great body of water extending inland. According to our calculations, we were about one degree,

Mercurian measurement, north of the equator.

Numerous streams empty into the outer sea, but this one was the largest body of water that we had encountered extending from west to east.

"I believe that this is a sea quartering the globe," I told our assembled party, which consisted of the King and Queen, Dianna, the regular crew of the ship, Bill Hughes and myself, "and that it will be of considerable width. We have as yet found no suitable location. Shall we turn inland or cross this body of water? We have food enough for several weeks and fuel enough to complete the circle of the globe can be carried in a man's pockets."

"By all means let us continue," said the king, "I would like very much to see if this northern continent is like our own land."

We brought the ship down, however, on the southern shore before continuing. We found that this was not a sea but a river of huge proportions as there was a perceptible current flowing in the direction of the sea. We flew over the great river early the next day and found a land similar to that on the south except that the plains were more extensive, the mountain ranges not as high. We had travelled many miles north with Bill using the glasses, when he suddenly spoke to me.

"There is a queer phenomena displayed below. Large areas of the surfaces are opaque, I am unable to see through them."

I looked through the glasses and passed them to the Vereans, thinking that possibly with their superior vision they might pierce the veil and discern what was below.

"Perhaps it is some natural condition," I said, "we can land on an elevation and investigate."

My curiosity was aroused. Certainly

these invisible areas were similar to nothing that I ever had heard of or seen.

We landed on a small ridge of land beside a small valley, through which a stream wended its way. It was a good place for a camp, the elevation was sufficient for us to see a good distance in any direction. Most of the personnel, taking advantage of a chance to exercise, left the ship and we started down the length of the small valley on a preliminary tour of exploration.

As usual, my insatiable curiosity urged me on and I drew away from the main party. We had seen no signs of life and the possibility of danger did not enter my mind. I came to a small intersecting valley from which flowed a trickle of water. Thinking that I would find a spring back in the shadows I entered. I was very thirsty and longed for a drink of cool water. Most of the water on Mercury is very warm, except when its source is underground or in small springs. I found the spring and obtained my draught of water.

As I arose from the rocks I could see that the main party was entering the opening through which I had come, about two hundred yards distant. I shouted to them that the water was very cool and decided to wait for them there.

They had covered more than half the distance when I raised my eyes along the steep sides of the fissure and saw something else. On these slopes were beings! Completely enclosed in armor of some black substance they carried a peculiar sort of weapon or instrument. A large bellows was carried under one arm and a flexible tube extended from it, which was manipulated by the opposite hand. From these tubes were issuing sheets of an opaque vapor which hung dead and lifeless in the air. These opaque sections were man-made and were not a natural phenomenon! Their object was to envelope our whole

party as the vapors were being directed towards the mouth of the valley and travelling in that direction with considerable speed.

"Run, Vereans," I shouted, "attack from above!"

I drew my pistol and fired at our attackers but the missiles struck the vaporous substance, which they had craftily laid below the level on which they stood, and were deflected from its surface. One of them carelessly left half of his body below the veil. I brought him down the sides screaming horribly.

I could not make the entrance. Bill and Dianna had stopped, he was vainly trying to urge her on, losing precious time.

"Run, you fools!" I shrieked, lapsing into English.

My friend picked her up bodily and started on again but the load slowed his speed and the cloud of vapor was over and beyond them dipping downward to catch the balance of the party. The three of us were in the trap but I could prevent the capture of the others.

In my pockets I carried two small bombs of storbite, a terribly high explosive. Quickly I adjusted the detonators and threw them at each side of the valley beyond the curtain and back of our retreating comrades. The explosive burst with a terrific crash as the sides of the narrow valley caved in leaving the three of us effectually bottled up, but cutting our assailants off from entrance into the larger valley. I knew that our friends had time to make the not far distant ship.

I came up to Bill and the girl who were waiting for me.

"The opaque wall is settling around us" said Bill, "I wonder if we can break through".

"I do not think so." I answered. "Shot from my pistol will not pierce it". We fired a volley at the wall but

to no effect. We could discern no alteration at all in the substance at any point where our shots should have pierced it.

"We can only await developments—look—it is dissipating already! They are probably using the same weapon but another compound to counteract the first."

"They are coming forward now," said Dianna.

True enough as the mists disappeared we could see six of the number approaching while the others remained at a distance. Those that were nearest did not carry the funny looking but effective weapons.

"Do not shoot, Bill" I warned, as I saw him reaching for his pistol "the others would only cut us down."

The leader opened the helmet to his suit revealing a smooth shaven face. In his eyes, large and bright, an expression of cruelty predominated.

"I fear that we can expect very little mercy from these men," Dianna exclaimed and exactly the same thought was in my own mind. He addressed me in an unknown tongue. I answered in Verean but he did not understand. Bill spoke to him in the language of the Dars and much to our surprise our inquisitor understood and answered him. I had never learned the language of the wild men, so upon my partner must fall the burden of interpretation.

"What desire you, strangers, in the land of Nimara?"

"Only to see what lay north of the water" answered Bill, "our land is another world than this, from which we came in the ship that travels in the air. Doubtless you have seen it."

Nithon, for that was the leaders name, stepped closer to Dianna looking at her with covetous eyes.

"Perhaps that is true of yourself and the other man, but the woman must be a species of Sentor."

I had been inwardly boiling with wrath because of the manner in which he looked upon her. When he reached forward and touched her, reason left me, swift as a flash I reached out with a blow to his uncovered jaw which felled him before he could lift a finger to protect himself. None of the people of Mercury can match the speed with which an earth man can move. Those guarding came closer with weapons ready for action, but the leader, now recovering from the blow, got to his feet and waved them back.

"Tell the hound to keep his hands off the girl and take us to his superior," I said to Bill.

"I am the ruler," answered Nithon, when this was translated.

"You have a false tongue" said Bill. My surmise was correct. He was only a military sub-commander.

Our weapons were taken from us but I was not extremely bothered by this fact, since I had been robbed of my weapons so often since coming to this world that it was becoming a habit. Quickly they marched us away from that locality, always keeping to forest trails until we were at a point beyond where the others who had returned to the Transstel ship could locate us on the march.

A camp was made and a curtain of their protective vapor was spread over the camp. There were hundreds of these opaque sections over the land, it would be practically impossible for our friends to locate the right one. Even if they did they could not attack it successfully. We remained there for two days and nights until the scouts reported that the ship had ceased its bombardments of the different "umbrellas". The Nimar give this protective covering the name of "tourij", which may mean umbrella in their language. We never learned the language of the Nimar as

they speak a Daran tongue as well and have little to do with their slaves in any event. The general shape of these gaseous envelopes is that of a huge umbrella.

We were not molested again, and when the Transstel ship had been reported to have flown into the south, the whole party was loaded into motor transport vehicles that had arrived for this purpose, and we departed for the north.

This race of men have developed motor transportation to an amazing degree of perfection. The vehicles are much more powerful and smoother in operation than any that we have on earth. Perhaps this is because, on earth, practically all transportation, except freight, has taken to the air. The Nimar have never constructed a successful heavier-than-air craft for flight and so have concentrated their ability on perfection in another direction. Actually, the conditions that prevail in the Mercurian atmosphere are not altogether favorable for flying.

At the first of the journey, over inferior "roads," as they called them, our speed was from fifty to sixty miles an hour. In a few hours we came to the beginning of the great Nimar highway system and our speed from that point on was steadily better than one-hundred miles per hour.

Internal combustion engines are used, but they are powered by a fuel of which I know nothing, except that it is extremely efficient and practically noiseless. The vehicles that they use are also much better sprung than any that I had seen before.

The highway systems are on the same principle as those of earth. Express traffic, all going in one direction, is overhead. Only specified stops are made. Slower traffic and cross traffic travels on the surface—not much different from

our surface travel on earth but faster and better regulated. A large settlement loomed in the distance.

"Our speed is slower," said Bill, "we must be approaching our destination."

We entered a huge terminal shop and came to a stop. News of our coming had been sent on ahead. A guard of armored soldiers awaited us, armed with their queer looking but efficient weapons; there was also a great crowd of civilians, both men and women. In the few moments of waiting we had an opportunity to study them. The men invariably gave the appearance of high intelligence and the women were extremely beautiful.

"They appear as cruel as images carved in stone," said Dianna, "whatever our fate may be, I do not think that we can expect any mercy or help from any of them."

We were transferred to another vehicle and were soon moving through the streets of the town.

"Where do you take us?" Bill asked the leader of the patrol that was with us.

"To Duneen Thiunter, our ruler," he answered, "your disposal will be upon his judgment. Were you from the inner valleys we would throw you to the slave quarters without his counsel; since you are of another race he must decide."

"Not a very pleasant outlook," I said, when the rather lengthy speech had been translated. "I only hope that we can keep together. These men are cold, cruel and sensual."

"If we must be separated, my loved one," I cautioned Dianna, "put on an appearance of ignorance and uncleanness."

We had obtained no chance to remove the grime of our long journey. Dianna surreptitiously worked the dirt into her fair skin, tangled and mussed the flaxen hair and her eyes assumed a vacant look. The change was miraculous. I hoped

that in comparison with the beauty of the native women she would be overlooked by any of the Nimar.

"Your appearance is certainly changed," said Bill, "I would not know you for the same woman."

"Am I bad enough?" she asked in a rough, strained voice.

"If you can only keep the part," I told her, "but don't drop the masquerade."

Soon our car stopped before an imposing building fronted by a huge stairway of solid metal. The building was constructed externally of some burnished metal, which I assumed must be of very light weight. Doors slid back noiselessly for our entrance. Inside we passed through an immense hall decorated in a marvelous manner with gold and silver predominating in the scheme. Silent guards were everywhere; the regal guard, I assumed. At the end of the long hall gilded doors opened and we entered a smaller chamber in which were assembled a number of men.

One, an elderly man, sat behind a desk on a raised dais, the others were grouped in a semi-circle of seats on the floor below. The whole effect was not unlike a court room on earth. Our guard advanced to a position in front of the raised dais, saluting smartly. When bid to do so, he made his report in the native language, during which time the ruler and his aids looked us over.

"The two males are of a race unknown to Nimara, the woman is not. You say that the large one speaks the mouthings of the Inmar."

The leader turned his attention to Bill and questioned him at great length about his origin.

"You would have us believe that you and the other man have come here from another world. There is no other world. Nimara ends at the great waters north and south; the Boiling Seas to the west and the waters of the Great Pits far

away extend into the land of no light."

"But if you have explored to the east you must have seen the stars in the sky," Bill argued, "it is from one of these that we have come."

"The lights in the heavens are there, but they have nothing in common with our world."

When this had been translated to me, I could understand how a very complete civilization had been built up here without any attempt at exploration. These men were convinced that their world was flat; that the limits to which they could travel were imposed by the land that they could see. To venture beyond this meant extinction, dropping into nothingness, and so they had never ventured beyond the bodies of water which surrounded them.

"Take them to the slave-quarters," said Duncen, "I do not believe their story."

We were marched out of the palace and into the car. We were taken out of the city and into another of ranshackle quarters, and dilapidated huts which for the most part at this time of day were deserted. We drew up in front of what looked to be a headquarters. From the interior issued a number of men in general appearance like the Dars. All of these were injured in one way or another. They ordered Bill and me out of the carriage.

Bill spoke to the leader.

"What of the girl, where are you taking her?" We supposed that whatever happened we should not be far separated."

The leader leaped to the ground, ignoring the question and grabbed Bill by the arm as if to pull him from the seat. My friend left his seat readily enough and hit the ground with a rush. One terrific blow felled the leader. I followed snatching one of the Nimars weapons which I trained on the re-

maining four. They were clad in their protective armor, but as is customary when not in action the helmets were thrown back. They could not use their weapons!

The Nimars witnessing the brawl dared not interfere in our behalf, but I could see that they were enjoying the roughing of one of their hated masters. It was some moments before the man recovered from the wicked punch that he had received.

"I am afraid that we cannot fight them very long, Bill," I said.

"I know," he replied, "I have probably let us all in for this man's vengeance, but we must know what they intend to do with Dianna. It would be better for the three of us to die fighting right here, than for her to become the plaything of this type of man."

We had spoken in English, he now addressed the leader who was rising from the ground.

"Will you answer my question now or must I beat you to death? Even if it costs our lives."

I don't suppose that this captain had ever been crossed in this way or slugged quite as hard in his life, his expression certainly showed surprise—and hate.

"The woman goes to the female slave quarters. You will pay dearly for striking a Royal Guard."

"Keep your courage," I said to Dianna, "I believe that in some way we can outwit these people, clever as they are. As long as you are amongst the slave women you are safe. If it would gain anything for you we would make a last stand here. I see that you still have your deadly amulet. Use it only as a last resort. There must be some means of communication and I will let you know if we can do anything. If I should crush you close now, it would be something for them to hold against you, hence I must refrain."

CHAPTER XVII

Slavery

OUR fellow slaves, for there was now no doubt as to our status here, collected around us. One fellow, a larger man than even the famed Urd, came forward. His arm was in an improvised sling.

"You are not of Imar, great man," he said to Bill, "yet you speak the language of our fathers, from whence came you and the others?"

"From another world, comrade," Bill replied, "a world beyond the darkness of the inner lands and far away on one of the stars that may be seen from your homeland."

"I have seen them," answered Zuth, for this was the man's name, "for I was born a free man. Most of the captives, slaves the Nimar call us, were born here."

I noted that Zuth did not doubt our story of coming from another planet. It demonstrated the fact that, in some ways, the mind of the ignorant savage was more open than that of his well trained and educated master. The Nimar ruler and his following had refused to accept our explanation of our presence upon Nimar soil, because their books have said that there is no other land than Nimara. These simple men accepted our story without question.

There were more than one hundred slaves in this building, and I saw that all were incapable of doing work, from one cause or another. This seemed to be a sort of a hospital and a very poor one at that. That these men held us in great respect was evident from their attitudes. Those able to do so crowded around Bill, asking him many questions. We learned much of their history and mode of living in a short time. We also found out a great deal about their masters. Some of these men, Imar is the name of the race,

had been captured in the lands of darkness and brought here, a greater number had been born in captivity. All hated and feared the men that they slaved for, but none seemed to have the resourcefulness to organize a successful revolt, although outnumbering their masters. A number of sporadic attempts at escape had been made within the memory of Zuth, but the results had been so disastrous that they were at the point of complete submission. I wondered why the leader had thrown men, such as Bill amongst these, but could find no other explanation than that he rated us as very inferior in intelligence, or else was secure in his belief of the infallibility of Nimar defense.

A plan was forming in my mind. We had numbers, if we could learn the secret of the Nimar armor or of the weapon that they used, we might stir up and direct a revolt. Bill and I talked this over for some time and finally he addressed the men gathered about us.

"You say, men of Imar, that you have never been able to escape from the men that hold you. To us this seems strange. As slaves of the Nimar, some of you must know the secret of their weapons and of the material that prevents them from being destroyed by the gas that they use as a method of destroying others."

To this Zuth replied in such a way as to show us conclusively, how the few could hold such a large number of men, much stronger physically, for so long a time. He said in reply, "To be sure, we make the armor and the weapons that the Nimar oftentimes uses to slay us, but they guard their secret well. If they find that any slave has given knowledge of the materials used, or if they find any of those materials missing, they simply slaughter all of the slaves in any way connected with the manufacture of these things! We could easily gain

the knowledge, but it would be of no use to us under these circumstances."

I was dumfounded at the extent to which the Nimar carried their cruelty, as just unfolded to us by Zuth. Naturally no slave would dare to let as much as a word about these secrets cross his lips. We understood quite readily, that any break for freedom would have to be planned differently. But Bill was scheming for the same result, from another angle.

"It seems to me, men of Imar," he said, "that you have neglected to use the most effectual weapon of all, and one that can never be taken from you as long as you live."

"What is that?" he was asked.

"Your great physical strength and the speed with which you can hurl a stone. At least the Dar of the southlands, who resemble you very much, have these attributes."

"Yes," said Zuth, "our people still are adept at the hunt and we have considerable chance to practice, for in this manner the Nimar obtain much of their food supply. All of the younger slaves, particularly, delight to have a turn at this work, as it is the only pleasure that we ever know. Our masters, realizing this, make of it a sort of a reward for faithfulness, as they consider it."

Bill's plan in short, was that all the Imar should be informed that a break was to be made sometime in the near future, that, under penalty of being killed by their fellow slaves, no mention was ever to be made of this plan except at the time when we were locked in quarters for sleep, at which time we were sure that no inquisitive ears would hear our conversation. We planned to dig our way out of our quarters, capture our guards by surprise, and armed with their weapons and armor, to fight our way to the land of darkness. The success of our plan was dependent upon

our attacking the guards before they had time to bring their weapons into play, until a number of us were armed, after that, our armor protecting us from the gas, we planned to kill any others with their own weapons, or, failing that, to beat them to death. We counted a great deal on the fact that the guards, except when actually in combat, leave the helmet of their suits open, and that we could put them out of action before they could prepare to fight.

The Imar argued over this long and heatedly. Most of the older men considered it as impossible, but the younger slaves were all in favor of some sort of action. They had lacked a leader. Zuth, a powerful influence, was hesitant, undecided.

"You say," argued Bill, since he wished to win Zuth over, "that all may be killed? It is only a living death that you have now. There must be many of you, who, like Zuth were born far away under the light of the stars, and to whom the first years of life are remembered as free ones. Then there was no lash to sting your back when you were so exhausted that it seemed that you could not go on, you had only to kill the game to feed yourself and your family, only the worry of finding a cave suitable to sleep in. To men of spirit, freedom is worth dying for if necessary." He finally persuaded Zuth that the plan had a very good chance of success and so won him to his views.

We had talked a long time. An Imar posted at the door shouted to us that slaves were being driven in and that of course guards were with them. Soon after that the hundred men in the long room were berded into line and marched to another long low building, where we were fed. Much to our surprise, the food, though coarse, was wholesome and there was plenty of it. Apparently the Nimar were crafty

enough to realize that a creature, whether man or beast, can do more work when well fed. No conversation was allowed while eating and the table was ringed by a number of guards with weapons. There was no time for conversation in any case since a man must grab what he desired quickly. We wondered at the haste displayed and discovered the reason, when we were ordered away before my companion and I had found time to satisfy our hunger. We were hurried back to the first building and it was barred from the outside. I was thankful in one respect, in that no move had been made to separate Hughes and myself. I would have been greatly handicapped had our captors done so, since I knew only a few words of the tongue. Excitement was at a high point after our guards had left. Zuth and his companions were gravely discussing the ideas that Bill had given to them.

We learned that the Imar women, of whom there were not many, as compared to the males, were kept in a separate section of the town. Each day they were transported to the city proper where they performed the menial tasks of the household. Meetings between the two sexes were few. In spite of their mode of living the Imar were much further advanced in civilization than the wild men of the southlands. Living in contact with a civilized scheme they must of necessity absorb considerable of that scheme. Conversation soon ceased in the building and they all slept. We were soon to learn the reason. That sleep was the sleep of complete exhaustion. In the dim light of the following day we were routed out by the guards and herded once more to the mess-room. Bill and I, taking our cue from the experience of the previous day, wolfed our victuals the same as the others, managing in the confusion to fill our stomachs.

Conveyances were lined up outside waiting for us and we were soon in the foothills of the mountains. The gang, that we were in, were mining copper which existed here in a huge vein of the native metal. For five hours we were compelled to swing a heavy hammer drilling the holes that other slaves would fill with explosive. It was man-killing toil without a moment's rest. If the pace slackened for a moment, we felt the lash of the guards' great whip across our backs.

"I begin to see the hand of the captain of our guard in this," I said. "I notice that the other drilling crews are not rushed at the pace which is forced upon us."

"I imagine that we will be continually harassed," answered Bill, "since that is the nature of the cruel man wherever he may be."

We were allowed fifteen minutes in which to eat a midday meal. I was so exhausted that it was necessary for me to force the food down my throat but knowing that I would be in better shape if I ate something I did so. Then we were driven back to our work. I noted that the other drilling crews were changed but that my friend and I were given the same assignment. The latter half of the day passed somehow. We were in the best of physical condition but unused to hard physical labor. I was thankful indeed when the signal for a halt was given and we were marched to the cars and started on our return journey.

In the seat beside us was a young Imar who opened conversation as soon as our vehicle was under way.

"The Nimar intend to kill you by work," he said. "I overheard two of the guard talking in Niman. Some of us understand their language, though they know it not. The big captain that you struck cannot have you killed outright, but should you refuse or be unable to

work, he will have his guards beat you to the death! If we could help you we would."

"Thank you, friend," said Bill, "the only way that you can help us will be to persuade the men to organize into a revolt. Should the labor be not more severe than to-day we can get along."

"They have put you to the hardest work that there is. As you may have observed, in the other gangs they take turn about and only work one-half the day at the hammer and drill. We did not believe that you could last the day."

"We can last many days," Hughes replied, "but as soon as the Nimar discover this they will find other means of getting rid of us."

The routine in the days that followed was much the same as the first. We were fed and locked up each night in a hut that contained the physically fit men. The aged one, Zuth, I saw was in the same shanty. He told us that he had been returned to the mining gang.

"We have had word of the she that was captured with you," he said one night. "She has been taken by one of the wives of Duneen, as her personal slave. She will be safe from any Nimar, except perhaps, the ruler himself. Being more comely than the Imar women her mistress will take pains to protect her from all other Nimar."

Every night for one hour we tunneled under our prison walls. One thing in our favor was the fact that once the doors were barred our guards never molested us, unless the covers were lifted from the lights, which was never permitted to happen during this time.

One month from the day of our capture word came in from all sources that the Imar were ready for the break. To me it was pleasing news. I swung the hammer almost joyously that day under the glowering, baleful glare of our guards.

Two hours after we had been checked into our building. I pulled away the false support that held up the scant six inches of soil that remained between us and the outer air. Very carefully we scraped away this layer until a hole big enough for egress had been made. I poked my head above the surface and took a hurried look around. The guard on our side of the building was just disappearing from view around a corner of the structure!

CHAPTER XVIII

A Surprise Attack

WITH a low spoken word directing the others to follow, I grasped my club and went out after him. I reached the corner of the building, around which he had disappeared, and in the shadows I awaited his return. As he came into view, his helmet open, I recognized him as one of the many who had crossed my back with the lash, leaving scars that would remain with me for many years. Seeing me, he reached for the visor of his helmet, to close it, but he never had a chance, the heavy club, painstakingly fashioned from the poles of flooring, descended upon his head crushing the skull.

The two remaining guards to this building were stalked, surprised and killed before they could give an alarm. Bill and I left the disposal of the corpses and recovery of weapons and armor to some of the others and ran to the nearest adjoining building. As we made our attack there, the slaves inside came through and joined us, and so we spread our conquest throughout the vicinity. As we collected numbers, and obtained armor and weapons from the slain guards, I called some of the leaders to conference, Bill said to them:

"Meo of Imar, the other white man and myself, being swifter, will run

down and kill any that may get free. You, men of the inner lands, must bear the brunt of the attack."

The buildings were invariably guarded by three men. Sometimes one, in a few cases two, of the guards would escape the slaves who are very slow of movement. Our earth-trained muscles enabled us to run these down before they could escape, and clad in their own armor the weapons did not harm us.

Our forces were now large enough so that some sort of campaign could be followed. We called the council together once more, Zufh was chosen, by them as their spokesman. Bill gave him his instructions.

"Very soon the Nimar from the other city will be here in force, if they have not been warned already. Our plan of action is to lead them away from their headquarters, on to the open plain. There we will destroy all of their conveyances and prevent them from returning to their city. Pick a strong force that shall remain concealed near the bridges. After the Nimar have crossed they shall come forth to prevent any from returning."

We went on, and soon came to the section of the town housing the Nimar women. This section was not nearly as large as that which held the men; the Imar women were few in number. Quickly we went through their quarters but no where did I find Dianna!

Bill questioned one woman. "Where has the strange girl gone?"

"She must still be in the city upon the hill. I will get you a woman who was quartered in the same hovel with her."

"Do so at once! There is no time to lose!"

Soon the woman put in an appearance.

"They keep the white one at nights now. I do not see her often but she tells me that she has to entertain the Nimar."

The slave town was in our hands now and but for this circumstance we were ready to leave it. Bill and I called the Imar together. They were all near as there had been strict orders that there should be no looting, no disturbance to rouse the upper town. Now the order was changed, we called for a score of men to follow us to the regal quarters where I believed we would find Dianna. The response was not as spontaneous as it would have been, if we had been dealing with Vereans, who would gladly follow either of us through fire, although in justice I must say that the dissenters were greatly in the minority. At last we picked a score of the younger, more daring, only to find that none knew the upper town. They had never been beyond the river in their captivity, but we soon found a woman that had been there many times.

"Twenty minutes after we cross the bridge, create as much noise as you can, until you know that the entire Nimar town is aroused. Retreat to the open country, leaving men to blow up all the bridges but the one. These men are to wait for our raiding party here."

We sallied forth, a small band against a great town. Our advantage lay in the fact that nearly all of the populace were asleep. We had no means of knowing what policing system prevailed here. We had traveled a considerable distance when one of our party spied a sentinel. The Imar have sharper eyes than their masters. The party came to a halt.

"I will circle around him," I said to Bill, "since, if I am seen, less notice will be taken of me. Your great stature makes you a marked man in any company here."

The man was standing partly in the shadow of a building that faced the street. He had not moved since we had sighted him, but the Imar told us that he was not apparently directing his atten-

tion to us. I went over into the next street and hurried along its length till I had him in a position directly between myself and our party. I was returning slowly towards him when suddenly he started in my direction! Twelve feet above my head was the railing of a porch. I leaped in the air with my arms outstretched. I was again thankful for the lesser gravity of Mercury, as I grasped the railing and hauled myself over! Tensely I waited as he approached but nothing seemed out of place to him as he sauntered along. When he was directly underneath I launched myself at him kicking out hard with my feet as I neared the bottom of my leap, to give the blow the necessary power. He fell to the ground—dead. The body had hardly ceased to convulse, when Bill came up ready, as ever, to take part in any trouble that might develop. However, the episode had passed so swiftly that no one had been aroused.

We signalled to the rest of our party to come forward so that we might continue on our way. Behind us, at the edge of the river, pandemonium broke loose! Heavy explosions sounded and fire broke out in many places, as the Imar, following our instructions, wrecked buildings near the river front.

In the shelter of a huge storehouse, we heard the alarm sounded in the streets about us. In a very short time, we saw, from our hiding place, the Nimar forces marching *en masse*, to the settlement across the river. I climbed to a point on the roof and made as accurate a survey of their numbers as was possible. I was able to estimate their numbers quite accurately, as they collected at the bridges and were in the full light of the burning buildings. There were about five thousand of them when all had arrived, practically all of the male population. From Zuth we had learned that there were between twenty-five and

thirty thousand Nimar in the city, attended by a force of about forty thousand slaves, the large majority of the slaves were adult males. This was what we hoped for, that the noise would call all of the fighting forces to the lower town, leaving us an easier course in what we wished to accomplish. I left my post and hastened to join the others, because from now on we must work swiftly.

As fast as the Imar could travel, we hurried through the town, our objective the palace of Duneen, which was located on a hill overlooking the town.

"There will be guards here, Bill," I said, "spread them out, use clubs and stones!"

The dozen guards in the outer grounds fell under the blows of the Imar. Their armor could not protect them from blows delivered. The same armor on our persons rendered us immune from the gas that issued from their weapons, though that same gas disintegrated sticks and stones in the few times that they had time to bring it into play. The element of surprise was what beat them.

"The grounds are cleared now," one of the Imar reported. "I have learned that Sanu knows the way to the slaves entrance, it is unguarded, she says."

"Then take us there immediately!"

Through the barred windows I could see a light upon the second floor and faint sounds of revelry came to us occasionally. We skirted the building following the lead of the Imar woman, who was running as fast as she could in that direction, but at a pace which seemed unbearably slow to me.

Intuition, telepathy or whatever sense it is that at certain moments whispers to us of the future, was telling me that the one I loved above all others was in that lighted room and that she needed help.

First to arrive I found the door barred. I could make no impression on it with my weight as it was built securely and made of metal.

"Let me at it Master," said one of the Imar, "for a long time I have wanted to break one of these apart. Bring me yonder big block of stone," he pointed to a large obelisk at the head of the walk a short distance away.

Four of our number lifted the slab as if it were a toy and brought it forward.

"Place it so that I can wedge between it and the door while I get rid of this clown suit."

His back and shoulders against the door, his feet braced against the stone, all of his powerful strength was exerted. His legs began to straighten as the center of the door began to buckle. I heard a click as one lock snapped followed shortly by another as the other lock gave way. It was a marvelous exhibition of brute strength.

I was inside the building almost before the door had stopped swinging.

CHAPTER XIX

The Whip

"COME on Bill, let's hurry. The rest can come on as fast as possible."

It was poorly lighted here on the ground floor, but I could see illumination streaming down from above, at a not far distant stairway. I was up the stairs in a flash, my friend close behind me. From the noise, there seemed to be a party in progress at the other end of the corridor. At a doorway stood two guards, I thought, since they wore armor and carried weapons. I had lost my club, but in my present state of mind I never gave it a thought. Their interest was centered in the room that they were guarding, I was close to them be-

fore they knew it, although I took no pains to make my progress quiet.

Perhaps for this moment alone, had I put in eight seasons upon the gridiron. I sped over the remaining short distance, left my feet and hurtled through the air. This time, as I desired, I took out two men, sending them both spinning, to bring up with a crash against a wall, *missing* their weapons.

"Get their weapons, Bill," I shouted, "and guard the doorway!"

I entered the room. The noise in the hall had attracted the attention of its inmates, but it had been over so quickly that they had not been able to arm themselves, and Bill had the drop on them as I entered. Well in front of the main group stood a man, in his hands one of the slave whips. At one side lay Dianna, covering her nude body as best she could. Across her back were great red welts, -from which blood streamed! All this I saw at a glance, but vengeance came first, escape later. Bill stood ready to use the weapon.

"Do not use the gas," I said, "this brute is going to get some of his own medicine!"

As I advanced, the man with the lash drew back his arm, yet before the motion forward was completed, I was upon him. Speed has its place, and an important place is in combat. Across my shoulder his arm was bent the wrong way, I was greeting him with the "devil" hand-shake," and I used the trick to it's fullest degree of harm, the result was a broken arm!

As he lay on the floor, writhing in pain, I tore the clothes from his back and picked up the heavy whip where it lay on the floor. "You like the lash," I snarled, not realizing that I was speaking a tongue that he could not understand, "you shall have the lash!"

Time and again the whip bit deep into his body as I vented some of the pent-

up fury that was in me, upon him. He would not forget this beating soon and he was not the only one that would know my ire. In common with most cruel men, he could not stand punishment. I turned away from his screams and babblings, disgusted, and advanced upon the ruler of these merciless men, it was only fitting that he should get some of the same sort of treatment. While his subjects looked on in helpless fear, I advanced and gave him stroke for stroke, the number of lashes that I had received from Nimar guards!

"We had better be on our way, David," my friend interrupted, or perhaps I would have lashed all of the Nimar present. "The Nimar will return soon, this would be a bad place to get caught. He turned to the woman who had accompanied us. "Clothe the girl," he ordered. "Stay where you are, people of Nimar, perhaps your countrymen will return and free you, it is possible that we may destroy the building, of one thing you may be certain, if you attempt to follow us you will be killed!"

We barricaded the two doors to the room, this would hinder them greatly, and left the palace at once.

"Did they harm you very much, my loved one?" I anxiously inquired.

"Except for the terrible lashing to-night I have not been hurt."

"Your world is a land of superlatives. The Vereans docile to a high degree, the Nimar extremely cruel, the Dar abysmally ignorant. Even nature manifests her wonders in contrasts of splendor and gloom. She rears her mountains in bold relief, contrasts the riot of color of the vegetation with drab skies. On earth many of these conflicting qualities exist, but side by side, indeed often existing in the thoughts of one human being, each quality in its proximity tempering the others."

We found the one remaining bridge

in the possession of the Imar, who had hidden themselves in the vicinity, while the main force led their enemies a running battle out into the open country. When the fighting had been carried to a certain distance they had emerged and wrecked all the bridges but one.

In possession of armor and weapons the slaves, now slaves no longer, waged an even contest, only retreating because they wished to do so, always making their way towards the range of mountains and into their own land.

Soon we overhauled the rear ranks of the Nimar and in the confusion of the battle we worked our way to the front ranks, forging on ahead of the main body of troops. It was surprisingly easy to get ahead of the Nimar forces in the guerrilla type of fighting that was taking place, but some of our men were clubbed to death before we could convince our own forces that we were not enemies.

"Now we can begin an attack of our own," I said to Bill, "lead a force to flank them on the other side of their column, while I circle them on this side."

The Nimar attempted to outflank our forces but smart soldiers that they are, they did not have the numbers or the weapons. As soon as they saw that they could not succeed, that they stood in grave danger of being surrounded and slaughtered, their ranks closed into regular formation and they started their retreat. I called a halt.

"There is no use in pursuing them," said Bill.

"But we can capture the entire band," argued Zuth.

"That you cannot do. In the first place you are not able to march as fast as the Nimar, secondly, without doubt a message has been sent to other cities. They can recruit a sufficient force to capture us, if indeed such a force is not already on the way."

For many years the Imar had acted

on the thoughts of others. Like everything else, it becomes a habit in the course of time. Soon we had disstaded them and were continuing on our way.

CHAPTER XX

Two Times Two

"HOW wonderful it is to be again free," a soft voice whispered in my ear, as I sat apart from the others in our first camp.

"We have still a long way to go before we see the City of Man, Dianna."

"Of course I am anxious to see my mother and father and to set at rest the fears of my people, yet the journey will pass too quickly."

"I do not feel as happy as I should, but why is it that you are not?"

"Because soon you and the other man will vanish into space and leave us, for your own Earthland and you will probably never return. You will be famous men and probably one of the fair maidens of your own race will claim you."

Something in her eyes, the wistfulness of her voice, both aroused in me the desire to break the barriers of custom and race that had ever seemed between us. I clasped her tightly.

"Will you, dearest, can we persuade the King and Queen, would the council?"

"The answer to all is, yes," she murmured happily.

"But what of Bill?"

"Bill can take care of himself, fair lady," a voice near at hand replied, "I have been waiting a long time for my bashful friend to make up his mind. Congratulations to you both. I have no desire to leave this interesting land permanently."

"I can name the girl in one guess," said Dianna. "She is the younger sister of Groten."

Bill turned a share redder and jiggled

from one foot to the other like a big kid, who has been caught stealing jam. Romance had been in progress right under my nose, and I had never even suspected its existence. He couldn't fool the woman, however, so the congratulations were mutual.

CHAPTER XXI

Homeward Bound

OUR sentries must have slept at their posts. I could not find it in my heart to blame them. The preparation for our revolt, working long hard days at the same time, followed by the unusual and violent exertion of the last twenty-four hours could easily have been enough to slow their sensibilities. Not being trained soldiers, who realize that they must stay awake, no matter how safe the position may appear, they had undoubtedly grown careless in a sense of security.

Hughes shook me roughly awake from a sound slumber.

"Come out of it, Dave, we are surrounded!"

Quickly he explained the situation to me.

"The Nimar are using different methods. They have thrown up a breastworks entirely around the camp. All about us they have put down a curtain of gas masking their movements. We can walk through this, those of us that are armored, but they are using explosives in the form of bombs. It appears that they intend to starve us into submission!"

We were walking around the inside of the wall of gas. I lighted a pipeful of the Mercurian substitute for tobacco that Bill and I used. Thoughtlessly I cast the match from me and it landed, still aflame, at the base of the gaseous substance.

"Look, Dave," Bill shouted, "it will

burn! Quick, smother it before it burns through the wall. We are not yet ready to make use of the fact!"

The stuff was burning quite rapidly but by working fast and with the aid of several of our men, we succeeded in getting it extinguished before it had become noticeable to the opposing force. A ticklish procedure, since we knew not whether the armor that we wore was inflammable or explosive. Fortunately it was neither.

We had organized the Imar into units, of a score each, choosing as leaders those that, in our judgment, were mentally best fitted to lead. The men were responsible to the captains and they in turn to us.

"Find the leaders immediately," Bill ordered the Imar present, "and send them here at once."

When they had assembled he said to them.

"Our best chance is to set fire to the wall on the semi-circle towards the valley. When the wall burns through it will make much smoke. If the majority of the enemy concentrate on that side, those of us that have armor can break through the wall nearest the hills and take their fortifications. The ones that have no armor must burn the barrier after we go through. You will have to work fast before they return to cut us off, as soon as they learn that we have tricked them."

We were only partially successful. The gas burned very fast as the blaze gained headway, but the force that opposed us was both desperate and well trained. They ceased trying to use their deadly gas, falling back and relying entirely upon grenades of high explosives.

Some of the men however, won through and set fire to the outer film of

gas that the Nimar had spread over the whole sector. It went up in a blaze of glory.

Dianna, Bill and I kept together; for the two of us harbored one thought and that was to protect the girl as long as possible; also if the battle went against us we were determined never to be taken alive again.

Dianna, with her keen eyes, saw it first, coming up swiftly from the south in the dim light. It was less than a thousand feet up and rapidly coming closer. The great searchlights cut the air.

"Back, Imar to the center of the circle!"

We sent the command along the line of fighting men. Powerful glasses I knew were up there, searching the field below to separate friend from enemy.

The Nimar located the Transatl ship, but in the confusion we got clear of the first lines. Then the big guns of the ship went into action, supplemented by the smaller arms as the Vereans sent a rain of steel from the clouds. Before gas weapons could be brought into use the issue was settled. Those that remained of the enemy force were in full flight across the plain. Such is the power of rapid fire small bore weapons when used by men who know them.

In a few days we had covered the march of the Imar beyond the first high range. It then seemed unlikely that they would be immediately followed and we left them to make their way to their homeland.

It was with satisfaction that, at the controls of the ship, in the mystic half-light that is neither night nor day, I lay our course southward into the land I had learned to call home, the one I loved seated at my side.

THE END

The Radio

By
DIX
VAN
DYKE

Once upon a midnight stuffy while I pondered, peev'd and
huffy,
On the quaint and curious variants of that ancient genus
"bore",
As I nodded, nearly napping,
Suddenly there came a tapping
As of crabbed canines scrapping. I ceased wrath at every
pore.

Ah, distinctly I remember, 'twas a sweltering September,
And my last cigar's last ember was then damaging the floor.
Vainly I had sought to borrow
One sole dime for grub tomorrow.
Rage, resentment, hunger, sorrow, through my tortured
vitals tore.

Then—a cursed Radio going turned my blood to poison
flawing,
And I screamed, "There's murder owing and it seems to be my
chore."
Lender swelled the raucous clamor.
Through my teeth I hissed, "A hammer
Or an axe I'll get, and jam 'er." Life a crimson color wore.

But the Radio, never quitting, lessening, or intermitting,
Kept on with its din ear-splitting—told me to my being's
core,
"Wretch," I begged, "here's one hee-hee-hee,
Vile Contraption, that your screeches
You will take, your jazz and speeches, to the night's Flin-
tonian Shore!"
Quoth the Radio, "NEVERMORE!"

And the strident, shrill, insulting sound went soaring, exta-
puking,
As of fiends malign exulting. Cried I, "Tell me, I implore,
Has some wandering banshee strayed in?
Cense, before I get my blade in
You infernal nuisance made in Satan's workshop!" Then I
score.

What I said would pass no censor. All my muscles stiffened
tenser,
Up my sleeves went (I'm a fencer, and a half-back, with a
score).
Down I rushed—the guy had risen—
"This is KFI—just listen!"
Booh! I surely gave him his'n, wrecked his "set" and spilled
his gore.

Now I'm permanently pent in gloomy gruesome old San
Quentin;
But even here are programs sent in! Through the grating
of my door
Seals a faint but everlasting
Tinkle of some far broadcasting
All my hopes of respite blasting.

I'LL ESCAPE IT—NEVERMORE!!

An Epos of Posi and Nega

By JOE W. SKIDMORE

We have another episode in the lives of the two interesting little beings, Posi and Nega, whose protonic and electronic lives are so full of strange adventure and adventure not a whit more strange than the unvarnished truth of the history of molecules would read, if put down in cold print.

PROEM

AGAIN we adventure with Posi and Nega, our diminutive, electronic friends. In past prefaces of Posi and Nega narrations, I have rashly promised you that the little beings will some day live in the brain box of a great scientist and philosopher—that you and I might attempt to share the thoughts of the mighty.

Such a vast, temerarious conceit on my part! Shakespeare in "Hamlet" wisely observes: "Conceit in weakest bodies strongest works." The eaglet must flutter its weak wings before it may soar. This weak pen, too, flutters and falters—so hold with me in patience. Mayhaps again, Posi and Nega may ——?

After all, it's not important what my impotent pen records of Posi and Nega. Even you and I are not important in the vast, incomprehensible scheme of things!

But it is important that you and I think—and think! Atlantean thoughts! And that we marvel in reverent wonder at the incredible scheme of things—the vastness—the smallness of things!

So let's hope—"the mighty hopes that make us men." (Tennyson)

J. W. S.

"WHERE are we now?" vibrated Nega, the trim, young negative electron. Her speeding, flashing orbit glowed an agitated purple.

"Say, you dumb, female electron!" snarled Posi, the positive electron, "I've told you before we're on our way to the ocean. We're in a cursed sewer, built by those stupid Tellurians! Of all the bad luck! This is the limit!"

Nega, politic as women can be, ignored the fury of the angry proton and turned to other electrons in her atom of oxygen for information.

Posi and Nega, the two tiny electrons, had experienced many incredible adventures together in various elements. They were born far out in the "cold places" of endless space—mothered by the mysterious cosmic rays and fathered by that incomprehensible energy that gives life and motion to electrons.

Posi was created a positive electron, sometimes called by Tellurians a "proton." Nega came into life a negative or orbital electron. They were first met in an atom of helium gas. For countless eons they lived and loved, drifting hither and yon in the vast voids of space. A



*They are drowning even now! The dirigible is fast breaking up!
The engines and heavy structures have torn loose and sunk.*

care free existence, whirling and dancing strange dances of love; singing vibrating, hissing melodies with the amazing speeds of their flashing orbits. A diminutive solar system!—that atom of helium, with plenty of room for Posi and Nega to oscillate with only four positive protons in the compound nucleus, partly balanced by two orbital, negative electrons.

Strange! but Posi was 1840 times heavier than the radiant, vivacious Nega. The mighty and inscrutable Intelligence that directs all life and motion has visited negative electrons with an astounding power. In the composition of the elements known to humans it usually requires but *one* tiny negative electron to balance one of the massive, positive electrons.

Posi, the positive electron, was male; Nega, negative, or female—as it is in human life.

Posi was many thousand years older than Nega and had braved many dangers on various planets and stars. Then, in the mighty vastness of space, they by chance drifted into the powerful pull of the sun's gravity. For years they sped, with ever increasing velocity, toward the blazing, exploding furnace of the sun. Had they been drawn into Phaethon's fiery blaze, they would have been exploded. The positive charge of their atom would have helped with its infinitesimal bit to form a sun wave or pulse of energy—to warm and light the planets.

Thus electrons are transformed into energy, to add to the heat and light of the sun; to prevent that mighty orb from turning cold and freezing the entire solar system. Just a small unit of the incredible and orderly scheme of things!

A giant space car picked them up, barely in time, scooping millions of the helium atoms into one of its forward impellation tubes. The space car, carrying hundreds of Vega travellers and *en route* to earth, collided with an immense me-

teor. In the frightful heat developed at the impact, Posi and Nega were transmuted by the terrific heat and pressure into the structure of an iron atom.

The meteor and the space car, now a fused, shapeless piece of metal, being within the attraction of earth, plunged to Arizona soil. For years Posi and Nega led a very dull existence in their iron atom, 1400 feet under the soil.

A party of earth scientists, ever searching for truths and facts, dug a shaft to the meteorite and took samples for experiments. Posi and Nega were among the countless billions of electrons that made up the mass of the tiny fragment of the meteorite taken by the scientists for laboratory tests. Then followed for the two little beings horrible experiences.

The scientists put their iron atom along with billions of others into a deadly "Alpha Ray" machine. The tiny fragment of iron was bombarded with rending, streaking rays. The scientists were trying to disintegrate atoms!

The result was a mighty debacle of atoms, protons and electrons gone mad! Incredibly small solar systems flying berserkly from their orbits! Worlds—universes—smashed—disintegrated!

By some miracle Posi and Nega escaped destruction, not being struck squarely by any of the darting, swording "Alpha Rays." They were, however, driven into the lead lining of the device, to become part of a lead atom.

Years passed; the "Alpha Ray" device, worn out, was sold for junk, to the supreme disgust of the excitable Posi, who was exceedingly vain and proud of his knowledge and experience brought about by his long life on many planets and stars.

The lead was finally sold to a factory, where it was melted and cast into bullets. Posi and Nega in their lead atom that helped to make up the mass of a bullet experienced a very exciting adventure.

A human used their bullet to murder another unlucky human!

After a mighty explosion in the laboratory of the crazed doctor, who committed the murder, Posi and Nega found themselves literally blown into an atom of oxygen. They drifted in the atmosphere and, to the added indignation of Posi, were breathed into the lungs of a human infected with typhoid fever! They were introduced into the patient's blood stream and were carried to the human's alimentary system. There they were attacked and eaten by a dreadful *Typhosus Bacillus*. Posi's rage knew no bounds when they suffered the indignity of passing through the diseased human's digestive system—into a sewer!

Thus it is we find Posi raging with stark fury, and Nega sweetly and mildly excited, on their way to the ocean!

"A FINE piece of business!" snarled Posi, suddenly breaking a long and sullen silence. "But at least we're out of that infernal sewer."

"Where are we?" purred Nega, eager for information and glad to observe Posi's better humor.

"Watch your orbit!" vibrated Posi sharply, as if the whole universe depended on his command. Nega in her excitement had oscillated the slightest in her speeding flight.

"Watch your own fight!" hissed Nega. "I've as much orbital pride as you. I'm getting sick and tired of your surly growling! I——"

"Wait a minute! Don't get excited, my darling Nega. I just wanted to make you mad. Do you know, my sweet, you look so lovely when you glow that charming, angry red? It fits you like the tail of Halley's comet."

Posi smugly fancied in his vast conceit that he was the great lover of the atomic universe. Jurgen, in the novel, boasted no greater conquests of love than Posi did.

Nega, ever gullible and eager for flattery—as women usually are—was instantly mollified.

"Please tell me where we are." Nega's vibrations were beseeching.

"We're now in the ocean called the Pacific by those dumb humans. We've been carried out to sea about five miles by offshore currents." Posi's humor was better as he went on academically.

"This Pacific Ocean is a great place after all. Those foolish Tellurians are very proud of their land, but they don't realize that their little planet, earth, is surfaced by many times more of an area of water than of land. Maybe this won't be so tough. After all, you're always with me!"

"What is this water that makes up the mighty oceans?" purred Nega archly, pretending great ignorance that her lover might appear important. "You are so wise, Posi. You know everything!"

It seemed that the colossal conceit of the positive electron fairly increased his mass as Nega's words vibrated on his consciousness.

"My dear Nega," buzzed Posi, with vast importance, and using his best scholastic manner, "ocean water is a most interesting liquid. We will drift about and meet many electrons who live in different elements. Of course you know that oxygen atoms, and you and I live in one of the oxygen atoms, combine with hydrogen atoms to make pure water. I've lived in ordinary water before, and it was not so exciting. But in sea-water it's different. The salts in sea water are seventy-eight percent sodium chloride, fifteen percent magnesium salts, and four percent calcium salts."

"But that's only ninety-seven percent," sang out Nega, quite critically and proud of her numerical observation. "What is the rest?"

"Oh, just various—other—substances," whistled Posi quickly, to cover his con-

fusion and lack of knowledge. "Yes, my darling Nega, we will meet lots of fine magnesium, sodium and calcium electrons. Oh! don't ask me! I know you want to know what these elements are. You stupid, female electron! Well, here goes! Watch your orbit!

"Magnesium is number twelve in atomic number and has an atomic weight of twenty-four and thirty-two hundredths, taking hydrogen as 1.008. As a consequence, it has in each atom twenty-four protons like myself, and each nucleus is balanced by twelve free, orbital, negative electrons, like your own trim self. Magnesium is a silver-white metallic element, ductile and light as to its specific gravity. I once met a female electron named Mectro on the planet Venus—the planet of love. Mectro was lovely, and oh, so——"

"Never mind about your ancient love adventures," snapped Nega in a sudden, bitter rage. "What is calcium?"

"Calcium," hastened Posi, anxious to cover the slip of his amorous retrospection, "has in each atom forty positive electrons (40.7) with twenty planetary negative electrons, like you. Calcium is a silver-white, soft metal of the alkaline earth group. When heated, it burns with a brilliant light and tarnishes quickly when exposed to air. And, my sweet, but ignorant, negative one, if you want to know more, calcium melts at eight hundred and ten degrees centigrade and has a specific gravity of one and fifty-six hundredths. Calcium is bivalent, a constituent of the highly basic oxide, Ca O (quicklime) and hydroxide Ca(OH)₂ (slaked lime) and other compounds valuable to these elemental humans. Those ignorant Tellurians didn't isolate it until their calendar year of Eighteen hundred and eight. Then one of their truly greatest scientists, named Davy, discovered it."

"I suppose," buzzed Nega, with ominous vibrations, "that you have flirted with many negative calcium electrons!"

"Yes, on the planet Mercury, where the temperature is seven hundred and fifty degrees Fahrenheit, I met Caeol, a young negative electron—I—Oh! Now what am I talking about? I was just dreaming!" lied Posi shrewdly, remembering his former social error and hastening on to cover his embarrassment. "You wanted to know about sodium, my lovely, radiant sweetheart. Oh, yes! Sodium has twenty-three protons or positive electrons, I am a proton, you know, in each atom with eleven free or orbital, negative electrons, each one just like your own beautiful mass. Sodium has a specific gravity of nine seventy one-thousandths, and a melting point of ninety-seven and five-tenths degrees centigrade. It oxidizes quickly in the air, reacts violently with water, producing caustic soda and hydrogen. The erudite Tellurian scientist, Davy, also found sodium for the first time in the earthly year of eighteen hundred and seven.

"And I knew about sodium a million years ago—and that," concluded Posi, "finishes your chemistry lesson for this time, my stupid but exquisite pupil."

"My! we are certainly going to meet a lot of electrons in this nice ocean. Thanks, Posi, you darling, for the information."

"Lots of good it has done. I don't suppose your feminine mind will retain any of it! Wait! Here is some news that is news. We're going to have an adventure!" Posi's sudden glow of purple showed his keen excitement.

"What is it?" shrilled Nega.

"More bad luck!" snarled Posi, quickly changing to an angry vibration. "We've just been breathed in by a large fish."

"I don't understand," whined Nega. "Are we in any danger?"

"No, but this cursed flounder, that the Tellurians call a *Parasichthys dentatus*, is a most remarkable fish. It inhabits the deepest waters where fish can withstand the terrific pressures, and it has a habit

of migrating frequently to shallow waters near the shore lines. Don't you see? This flounder fish may take a notion to take for deep water, and we may have to live in the deeps for countless ages. Pilet says it is about time for the flounder to swim for deep water."

"Who is Pilet?" shrilled Nega.

"Pilet is a positive electron, living in a bismuth atom in the tiny brain of the flounder. Pilet has been there for many years and is much discouraged about his dull existence. As soon as we were drawn into the flounder's gills, I established a fine line of communication along the energy that flows through all electrons, until I have a perfect line of contact. Billions and billions of oxygen, positive electrons are listening in. Pilet is almost crazy to hear news of the Universe. He's a talkative cuss, just like you female negative electrons."

"Why did the fish draw us into his gills—and what are gills?" Nega allowed her orbit to oscillate as she asked the questions in frenzied excitement.

"What ignorant chucks you negative electrons are!" grated Posi. "The fish has to breathe; it must have oxygen. Our flounder draws water into his mouth and expels it through the clefts between the bronchial arches of his gills, thus aerating his blood stream, which circulates in the thin-walled gills. From its heart, which has but one auricle and one ventricle, we will pass by the ventral aorta again to the gills, and from there to various organs of the fish, and unless we are stopped to restore some tissue or cells, the blood we are in will return to the heart in a venous condition. While I tell you this, we have made several round trips. Just now we are in the gills again—and here is news!"

"What now? Is it exciting?" squealed Nega, as she saw Posi glow a sullen, angry violet.

"Exciting? It's worse than the sewer!

It's rotten luck. We've just been absorbed by a *Nogagus Latreilli*!"

"Cosmos!" shrieked Nega. "What is that?"

Posi did not reply for some time. Nega did not know he was trying to re-establish his contact of communication with Pilet, who lived in the brain of the flounder.

"We've been absorbed by a dirty fish louse." Posi's tones carried supreme disgust.

"A fish louse?" from Nega, for once her feminine complacency shaken.

THE smallest of microbes, barely visible to the most powerful human microscopes, are made of elements, that are in turn composed of atoms and electrons. Each atom of the millions comprising one single germ, are in turn made up of countless diminutive solar systems. The scheme of solar systems, whirling orbitally and spinning in amazingly orderly flights, is the theory of the basic plan of all matter from a tiny grain of sand to the mighty universe.

This impotent pen again poises uncertainly. Would that it possessed inspired power to describe the wonder of that vast Intelligence that directs the timed flight of the smallest electron and likewise that of the mighty star!

"Yes, a louse!" shrilled Posi, still angry. "Humans have lice, their domestic animals and other animals have fleas and lice, and our flounder has parasites, or fish-lice, if you wish. Thousands of them, that infest the fishes' gills. Our louse, a *Nogagus Latreilli*, is a member of the true Copepods. You see, Nega, these lice live in the soft, feathery folds of the gills, where the blood is almost exposed for oxygenation. These parasites suck a little blood from the sponge-like, thin walls of the gills. Thus it happens that we are in the stomach of this louse."

"I'm just as happy," sang Nega.

"We're still in our atom of oxygen, and what difference does it make?"

"None, I guess, at least to you," snapped Posi. "Yours is a case where ignorance is certainly bliss. I don't like this place. But, one thing, it won't last long, for the life of this pesky louse is only a few hours by Tellurian time. Hold fast! Here's news! This may prove exciting!"

"What is it now?" Nega fairly sibilated in her excitement.

"Our flounder started for deep water and has just been attacked by a large and vicious barracuda. This roving terror of the ocean has torn our flounder to pieces and is gorging the large portions. There we go! Our louse is now floating in the water, quite free from the struggle. We are free, Nega! At least we will be soon, for the louse has died of old age and is beginning to disintegrate, due to the eating by even smaller bacteria in the water."

"Then what will happen to us?"

"I don't know!" rasped Posi. "I hope we are near to the surface, so that, in a thousand years or so, we may be picked up by the sun in the form of water vapor."

"What is water vapor?" asked Nega.

"Oh, don't bother me for a few years!" snarled Posi. "I want to establish some new lines of communication.

"I'll be glad to leave you alone," retorted Nega. "Don't forget, there are seven other nice, handsome protons in our atom of oxygen."

Truly the retort of a woman in love!

TIME, the ever-flowing force of the timed, intricate dance of the Universe, flowed on and on in its mighty dimensional stream. Time? Is it a force? Tellurians have called it "the measure of duration." Which is rather an evasion.

Posi did not know the true meaning of time, but he and Nega did realize that

many years (as figured by Tellurians) passed. All this while their atom of oxygen drifted hither and yon with the urge of whimsical currents. For a while they lived in the body of a floating argonauta, a large specimen of the genus Cephalopoda, with eight arms or tentacles—then in the soft body of a drifting jelly-fish, a medusa of the order Ctenophora. A giant sperm whale, a ninety foot specimen of the genus *Mystaceti*, scooped in the jelly-fish along with millions of others, and Posi and Nega traveled a thousand miles in their immense host's sluggish blood stream before a courting group of the ferocious killer whales, (*Orca gladiator*) literally tore the huge whale to small pieces to appease their incredible appetites. And once more the two little beings were floating freely in the ocean.

Posi and Nega drifted for months with the warm Japan current toward the shore line of North America. By this time the irrepressible Posi was reconciled to life in the sea and was his usual vivacious, cynical self.

"Well, Nega," he sang in happy vibrations, "we are now almost at the surface of the ocean. There's an upward current, and the sun is high and hot. This is a chance in a million. We may be picked up—evaporated by the sun!"

"I don't understand. Tell me more," pleaded Nega.

Posi hastily glowed his best color and began. The smug little positive proton was ever eager to show his knowledge. It pleased his vast conceit. Ten million years old was Posi and still but a young chap. He had lived on many planets and in various elements. A great talker and a good fellow, he had acquired an astonishing fund of information.

"Listen carefully, my dumb but beautiful Nega. The land of earth must have rain. Water out of the ocean in the form of water vapor is drawn into the air by

the powerful pull of the sun's rays. The process is called evaporation. Heat is absorbed in the process of evaporation—but the more heat, the more rapid the creation of water vapor. Normal air contains oxygen and water vapor, all necessary for animals and humans. And also carbon dioxide for plants and tree life, and nitrogen to dilute the oxygen.

"Moist air is lighter in weight than dry air, this: because when moisture enters air, it displaces other components, mostly oxygen and nitrogen. An oxygen molecule is nearly twice as heavy as a water molecule, and a nitrogen molecule weighs a little less than one of oxygen. Therefore an increase in water vapor means a decrease in density of the air, whereas a decrease in water vapor causes an increase in the proportion of the heavier components, and therefore an increase in density."

"More water is evaporated by the sun at the equator of the earth than on other portions. The sun draws at the equator about eight cubic feet per year per square foot of the ocean; the sun evaporates over five hundred pounds of water from every square foot of surface. In the polar regions the evaporation is only about one-tenth as much.

"It rains from the clouds when the air reaches the point of saturation, when it will hold no more moisture. I don't suppose any of this is registering on your stupid, female mind, but——"

"Oh, yes, my dear Posi. I understand perfectly," lied Nega.

"All right, my beautiful one," went on Posi. "A cubic foot of air at fifty degrees Fahrenheit will hold about four grains of water vapor; at sixty degrees Fahrenheit, about five and three-quarter grains; at seventy degrees about eight grains, and at eighty degrees, about eleven grains. So it's like this—suppose a large mass of air at eighty degrees Fahrenheit, holding eleven grains of

water, suddenly enters an area where the temperature is colder and where it reduces the entire volume to fifty degrees Fahrenheit. Don't you see?—each cubic foot of air will have to lose or discharge seven grains of water, which, of course, will be precipitated to earth, drawn there by the force of gravity. Do you see now why it rains?"

"Oh, yes," purred Nega, in her sweetest vibrations. "Of course I do—it's caused by the force of gravity!"

"Cosmos!" groaned Posi in dismay. "What's the use of trying to explain anything technical to a woman!"

"Oh, Posi, don't be angry. Tell me about humans, and how they make love."

"Well, now, that's different!" laughed Posi. "Swing in your orbit a bit closer. You see, my sweet one, it's like this. There! Love is my dish. Just a little closer, my sweet!"

WATER, all important to human life and comfort, is a remarkable liquid. Hydrogen is the simplest form of all the known elements, number one in the atomic scale and 1.008 in atomic weight. Thus hydrogen has a nucleus of but one proton, or positive electron, with one orbital or negative electron. This monad, or univalent element, is a colorless, tasteless, odorless, inflammable gas. Free hydrogen occurs only very sparingly on earth, though it is abundant in the atmospheres of the sun and many stars. This scientists are able to prove by the use of their spectroscopes. Though not resembling the metals physically, hydrogen is electropositive and is the positive ion of all acids.

Oxygen, eight in the atomic scale and sixteen in atomic weight, is a colorless, tasteless, odorless, chemically active gaseous element, occurring in a free state in the atmosphere, of which it forms about 23 percent by weight and about 21 percent by volume. Oxygen is the most

abundant of all the elements on the earth's surface. Each atom of oxygen contains 16 protons, (positive electrons), and eight bound electrons in the nucleus, with eight free (orbital) electrons. Oxygen is absolutely indispensable in respiration.

Pure water, that fluid so necessary to humans, animals and plants, consists of hydrogen (11.186 percent) and oxygen (88.814 percent) by weight.

A strange paradox that water, without which man could not exist, is slowly destroying the earth—but infinitely slowly. Water is drawn by evaporation from oceans and lakes into the air. Wind currents carry the clouds laden with water vapor over the land and mountains. Rain falls, each drop, wind-driven, cutting away a tiny particle of soil or rock. The drops form rivulets; rivulets form brooks; brooks form rivers, that rush to the seas, lakes and oceans, almost all eventually flowing into the ocean. As the waters rush from the mountain slopes to seek their level, man harnesses its fall to give power and uses it for irrigation. But every drop of water that eventually reaches lake, sea or ocean, carries a tiny burden of soil or mineral that it has absorbed. That is why the oceans are salty, because for eons rivers have been depositing water laden with salts and minerals, while the sun evaporates and picks up only pure water.

So the mighty liquid cycle of water is a steady, relentless process, wearing down mountains and hills. There will come a time in infinitely remote ages, when the ever-moving water will have worn down all land, and our globe will be a vast sphere of water. But Providence will find a remedy—perhaps by the cooling of the sun that the air may not absorb so much water to become rain.

All matter—even planets, stars and suns, seems subject to decay—to self-destruction. But many million, million,

million years will pass before such a catastrophe and long, long before that, the human race will be able to move to other stars or planets, or will have succeeded in controlling climate and water erosion.

FINALLY an upward current of warmer water pushed a mass of water to the surface of the gently heaving Pacific. Posi and Nega in their atom of oxygen had reached the surface!

"Everything is perfect," sang out Posi with startling suddenness, after a prolonged silence. "Cosmos! We're at the surface at last. The sun is hot and high!"

"What do you mean, Posi?"

"Just this," buzzed the happy and excited proton. "I believe we're going to be evaporated. Our luck is great as Betelgeuze. Conditions are perfect. But there's some risk connected with this evaporation business. We stand a chance to become separated. As we change into water vapor, hold tight to me with all your pull!"

"I do hope we won't be separated. Will something happen to our atom?" Nega's questioning vibrations were harsh.

"Small chance," consoled Posi. "As we turn into water vapor, our water will be changed to tiny molecules, so that they can be lifted by the sun's rays. But I never heard of an oxygen atom being disintegrated by evaporation. I guess we're safe, and it will be a thrilling adventure to be back in the atmosphere again. I do hope we lose that funny hydrogen atom that insists on crowding our oxygen atom. Only one proton in that hydrogen atom, and he's a nut. He is an awful braggart; says his hydrogen atoms are the building stones of the universe. And his stupid negative electron, she's a tough old bird. Told me I was an ignorant wretch and a hopeless flirt. What do you think of that, Nega? I, Posi, a

wretch and a flirt! Did you ever hear of such unmitigated nerve!"

"I guess it's about time we're moving," sighed Nega. "It looks like our neighbors have found you out and are gossiping. The negative electron in our neighboring hydrogen atom is right, Posi."

"Say, listen," snarled Posi, in a fierce, quick rage, "you have no right to insult me. Wait! Hold everything! Here's news, my sweet Nega. We're being lifted into the air! At last! We're being evaporated! We're on our way to the sun!"

And Phaethon, the mighty sun god, one of the uncountable hosts of the universe's suns, blazed merrily and fingered the earth caressingly with beneficent, flashing rays from—

"This majestic roof fretted with golden fire." (Hamlet)

"BY the beard of the Comet, this is great! We're on our way to the sky!"

Posi's excited vibrations strummed out a rondo of joy.

But Nega, ever inquisitive, was a bit fearful.

"But what will happen to us now, Posi?"

"Who cares, you dumb but beautiful negative one? All that matters is—we're going to have some new and wonderful adventures!"

"Will we fall again as rain after we reach the clouds?" persisted Nega in her sweetest vibrations.

"Stars of Pegasus!" snapped Posi. "You would think of that! We're almost bound to fall again as rain water! And if we fall in that cursed ocean, we will be right where we started. Our only hope is that strong wind currents will carry us well out over the land before we fall as rain."

Fate, or Kismet, had plans for elec-

trons—and schemes for mice, men and stars. Chance—or I should write fate—drifted the mass of water vapor of which Posi and Nega were infinitesimal parts into a colder area, and instantly Posi and Nega were plunged toward the ocean again as rain water.

"Iapetus of Saturn!" wailed Posi. "Our tough luck is still working. We're on our way back to that stupid ocean!"

"How long will it be before we fall into the ocean?" purred Nega, quite composed as usual.

"Just a few seconds," began Posi. "We—wait! We've had great luck! A human's airplane speeding along has picked up a drop of our water, and we're in that drop. What splendid good fortune! But we're only on the smooth fuselage of the plane, and we may slip off into space again. No! We won't! The strong air-blast is forcing us through a crack in the door! We slip and roll through. We're safe, Nega, my beautiful one! We're safe inside the plane's cockpit! Vega of Lyra! what a break! We're going places!"

"Where are we going?" buzzed Nega. "How do I know?" whistled Posi. "I do know it's warm in here, and our atom of water is fast drying out. We're going to lose those funny hydrogen atoms that cause us to be water. We are becoming free oxygen gas again! Fine! We're floating free in the air now! Here we go! The human piloting this plane has breathed our atom of oxygen into his lungs. Now we're in his blood stream and just pulsing through this human's sturdy heart! We—"

"Do you think we'll get in this human's alimentary system like we did last time we were on earth?" asked Nega with embarrassed, red vibrations.

"Don't mention that!" snarled Posi. "It makes me sick to even remember that horrible adventure. Wait, Nega!

I've established a perfect line of communication with an old positive electron named Pitron! Pitron has lived for years in the brain of this human. And what do you think, my beautiful but dumb sweetheart? It's good news! Our oxygen atom has lodged securely in the *Crystalline Lens* of this human's eye. We'll no doubt stay here for a long time, and just think. There are only a few trillion atoms between us and Pitron! Talking with Pitron is a cinch, and I've a lot to ask him. So keep quiet a few hours, will you Nega? You can talk to the other seven stupid positive electrons in our atom—but mind you—don't flirt!"

The business of life for humans is birth, play, fundamental learning, work, love, marriage, procreation, more work and finally the inevitable and total disintegration of cells. A busy, whirling, useful cycle of life! All guided by a mighty impulse or instinct.

The business of life for electrons is a cycle or service much the same as for humans. The little electrons whirl and vibrate in their orbits. Various numerical combinations of the tiny beings form the different elements, which in turn make up sealing-wax and kings. Who can safely say that electrons, (the basic elements of all matter), do not actually possess life and intelligence? Who dares to make rebuttal?

Man, toiling at the bottom of a vast sea of yet undiscovered wonders, gazes at the stars, with his puny telescopes; and smugly claims that life does not exist in the atom or the planets. He fancies in his vast conceit that all the trillions of stars and moons were placed in the heavens, merely that he be dimly lighted by night!

Such a colossal ego!—such unmitigated self-importance! Why should man, yet but an infant in knowledge and unable to comprehend the mighty stars, set up

that electrons are but tiny, lifeless particles of electrical energy?

Man will always toil, strongly and bravely. Man will always gain in knowledge, but will always wonder—and wonder—

"I wonder, in my soul,

What you would ask me, that I should deny."—Shakespeare.

At length Nega could no longer restrain her impetuous, feminine curiosity. She swung her orbit closer to Posi, who with the other seven positive electrons made up the nucleus of their oxygen atom.

"Have you heard any news?" vibrated Nega.

"I'll say so!" twanged out Posi in excited vibrations. "We're going to have a most astounding adventure! The human piloting this plane is a famous scientist. His brain has become diseased from a horrible, eating cancer. The poor human with one portion of his fine brain, keen and normal, and one portion diseased, has become insane. He is obsessed with a mad plan to destroy the universe. Pitron, who lives in his brain, is worried. He says this crazed scientist really has a practical scheme and device to wreck the universe. Poor Pitron and millions like him are doomed! Every day the loathsome cancer consumes its way nearer and nearer to him! What a horrible way to die! Pitron tells me the mad scientist is now flying to his laboratory. There he plans to carry out his plan to destroy all existing matter!"

"But how can he do that?" shrieked Nega.

Posi glowed importantly as he continued.

"The mad scientist has discovered a way to disintegrate all atoms and since atoms are the building stones of all matter, it looks mighty serious. Pitron tells me the scientist has worked for

many years to develop atomic power for the lazy humans to use. Say! If we electrons possessed those wonder hands, we'd be glad to use them! The scientist discovered how to greatly speed up the self-disintegration of atoms, such as occurs in the element radium. Then one unlucky day this scientist accidentally discovered a powerful ray of static electricity which will cause the protons and electrons in an atom to actually meet and coalesce. A sort of cosmic "short-circuit!" For instance, I am a positive charge of electricity, you are a negative charge—if we were subjected to this ray and forced into actual contact, our charges would cancel, or neutralize each other, and we would instantly become a splash of energy in the ether and spread out in electro-magnetic waves carrying us off as energy. It's awful, Nega! Instantly our atom's explosion would explode our next atom, and on and on! All mass and matter would instantly disappear and energy would take their places. We would become Cosmos knows what! Perhaps a seething, incredibly hot, heavy gas, like some of the younger stars. It looks like serious trouble ahead for us, my dear Nega! The scientist's reason snapped when he made this awful discovery. His poor, half-rotted brain became obsessed with this insane scheme to explode the whole universe. And all because the terrible cancer is eating up his brain cells."

"What is a cancer?" begged Nega, apparently undisturbed by the threatened debacle of atoms and worlds.

"A cancer," buzzed Posi importantly, "is a large group of anarchist cells that sometimes attack humans. Normal cells that make up the soft, weak bodies of those humans, stick to their job of restoring worn and damaged tissue. They cooperate with all the human's other cells in a well-ordered, mutual scheme

of common benefit. But disloyal or anarchistic cells group together and eat off other cells without any regard for the common weal. So the multiplying cells of cancerous tissue expand and grow without organization—no cells acting as carriers or scavengers—no nerves, no veins to relieve the growth of disease. A cancer is the essence of all evil—selfishness! It—"

"Oh! that's enough, Posi. Don't tell me any more. It's too horrible!" begged Nega, now thoroughly alarmed.

"Well! well!" snapped Posi. "You asked me!"

"Where are we now?" mollified Nega.

For some time the irrepressible Posi did not reply. Nega knew, from his deep, purple vibrations, that the tiny proton was receiving some important information.

"Well, my beautiful Nega," from Posi in great agitation, "now we're in real trouble! It looks like the finish for us—for everything! The crazy scientist has landed his plane and is now in his laboratory. Pitron is sending out a general alarm to all us protons. This insane Tellurian is going to blow up the universe with his infernal atomic disintegration machine! He—"

"What good will the general alarm do?" buzzed Nega. "We electrons can do nothing to prevent the scientist from destroying the universe!"

"Keep quiet!" hissed Posi. "Pitron is calling an emergency council of all positive electrons within the range of his vibrations."

"How many will that be in number?" vibrated Nega, apparently unconcerned as to the impending fate of the universe.

"Cosmos!" whistled Posi. "What a question, and at such a time. You female electrons are surely stupid. I should say about a trillion raised to the trillionth power. Now, my dumb, but

exquisite one, you count them while we have this great conference. And keep quiet! This is a man's job! Maybe we can do something to prevent the scientist from starting his deadly machine. We've got to do something quick for he's adjusting the device right now!"

Nega remained quiet and anxiously watched Posi's color turn to a deep, portentous purple. Minutes passed that seemed eons to Nega. Her fear and anxiety increased as she noted the orbit of Posi was oscillating and his usual repellant force to her was suddenly weaker. She knew that some mighty fear or problem had possessed her lover. In sudden feminine sympathy and understanding, she timed her circling, flashing orbit to compensate for Posi's erratic movements. Instantly she vibrated an urgent warning to the other seven negative electrons in her atom of oxygen to help hold the rhythm of their atom. Nega now realized that some great crisis threatened. She was Posi's woman—she must help!

"A perfect woman nobly planned."
(Wordsworth.)

Dangers and catastrophes make all mankind kindred. A nation invaded lays aside all personal, internal matters to better resist the common enemy. So it was with Posi and Nega and the countless trillions of their kind. But no man's courage ever knew the mighty fortitude and bravery that is woman's in time of greatest dangers!

Usually impetuous, yet now Nega waited with a mighty patience—and spun well her tiny part in the vast scheme of things.

Finally Posi's orbit and color regained normalcy. His harsh, excited vibrations almost hurt Nega's consciousness.

"Nega, my dear sweetheart, it looks like the finish for us! Be brave, my sweet one. The crazy scientist is about

to start his cursed atomic engine! Pi-tron is a mighty leader—a great proton! He once lived in the brain box of the great Archimedes. There is a bare chance for the world—for the universe!"

"Tell me," begged Nega, "what chance have we?"

"There's some hope," began Posi with incredibly rapid vibrations. "At the mighty conference of positive electrons we just held, many plans were discussed. Some of the greatest electronic minds in the universe had a voice. It was decided to kill the mad scientist and save the universe!"

"But how can electrons kill a human?" sang out Nega in amazement.

"Listen carefully, my sweet one. We're trying to kill him now! It's amazing yet simple. You see, Nega, in the soft, weak body of this insane scientist are many millions of selenium atoms. Selenium is element number thirty-four in the atomic scale. Each atom of selenium contains thirty-four negative electrons like your own sweet self, and in the nucleus of each selenium atom there are seventy-nine positive electrons like me. Now get this carefully! Arsenic, element number thirty-three in the atomic scale, has in each atom thirty-three negative, and to form the nucleus of each atom seventy-four positive electrons. And arsenic is a deadly poison to those soft humans! From each selenium atom in the scientist's body, four glorious positive electrons and one negative electron have heroically volunteered to die and save the universe! What noble martyrs! What splendid self-sacrifice!"

"But how?" shrieked Nega. "I don't understand."

"Don't you see, my lovely one? When four positive electrons and one negative electron in each selenium atom destroy themselves by deliberately dashing themselves together and ceasing to exist, all

the selenium atoms in the scientist's body will then have the same atomic number and atomic weight as arsenic atoms. All the selenium in the human's body will instantly become arsenic, and the dangerous scientist will die of arsenical poisoning!"

"But what about all those heroic electrons? Where will they go?"

"I don't know," puzzled Posi. "No one knows. Not even the aged and wise Pitron. They will die!"

"Great deeds cannot die." (Tennyson.)

For a time Posi was silent. Nega knew the little proton was listening in for news. Finally Posi sang out in joyous vibrations.

"It worked, Nega! We have destroyed the insane scientist! The universe is saved! Pitron says the scientist collapsed and died of arsenic poisoning just as he was about to start his devilish machine! Humans on earth will never know how we saved their little globe and the other billions of stars, moons, suns and worlds. We electrons never get credit for what we do."

"What will happen to us now?" buzzed out Nega.

"I've been too busy to think of that," replied Posi. "Of course we're now in the dead body of the scientist. Say!" Posi's vibrations became a sudden, snarling whine. "This is not so good! Our bad luck has caught up with us again! These ignorant tellurians have a barbaric custom of interring their dead. So we stand a good chance of being buried under the ground for a few thousand years. Adib of Draconis! what cursed luck!"

"Never mind, Posi," strummed Nega. "We have each other, and just think! We electrons saved the universe! It's wonderful!"

But the irrepressible Posi was not to

be so easily cheered—even by the ministrations of the delightful Nega.

Some considerable time passed, and Posi remained silent, glowing a sullen violet. Time! Man has wondered how to best define time. Cogent and careful thought proves that a mass or body must be of three dimensions—Length, Breadth and Thickness. But a mass or body to exist in these three planes of space must also exist in time. For most certainly, my pen, that is now scribing these impotent phrases, has the three dimensions of Space, and without question this pen exists in time. And that time is *now*. Not yesterday or to-morrow—but *now*. So is it not an incontestable summation that my faltering pen exists in Length, Breadth, Thickness and—Duration?

Time is therefore the fourth dimension! But this is not an essay of science to deal and conjure with abstruse theories. It is a record of Posi and Nega and their atomic love, emotions and adventures. And, also this unlearned pen is getting into deep waters! So let me record—that it was quite a while before Posi buzzed out of his intense, angry silence.

"Well, Nega," from Posi at last, "we must make the most of it. We may escape being buried. There is great excitement in our dead scientist's laboratory. The silly tellurians have discovered our dead scientist's body. And what do you think? These humans are making a great fuss over the corpse. They are grieving and proclaiming he was a great benefactor because of his scientific work for the human race. Skat of Aquarius! What fools these humans are. If they but knew what their so-called benefactor was planning to do! It makes me sick! Even now our miserable corpse is being conducted through the streets in high state! A great crowd of these stupid, pump-loving

humans are standing bare-headed. A famous minister is giving a fine oration. He is eulogizing this madman who planned to destroy them! Sirius of Canis! but I wish we could get away from this stupid planet earth!"

"Why, I think it's all been very exciting," purred Nega.

"You female electrons are surely ignorant," snarled Posi. "Can't you realize that when this pomp and ceremony is over, the earthlings are going to bury this cursed corpse. And it will rot, with filthy worms gnawing at us and we may be under-ground for thousands of years. I'm a young chap, and I want to see the universe."

"Ha ha!" teased Nega. "You're not so young. Your atmospheric rings have turned a bit silver in the last ten thousand years!"

"Say, you dumb female," shot out Posi with sudden anger, "you—wait! Here's news that will ruffle your feminine poise. We're going to be burned!"

"What do you mean?" shot Nega, instantly forgetting the impending quarrel.

"The humans are going to cremate the body of the dead scientist!"

"Great Cosmos!" Nega squeaked. "Will it hurt us when we are getting burnt?"

"Sadr of Cygni!" flashed Posi with happy vibrations. "You negative electrons are stupid! Do you think the temperature these foolish humans can produce in their crematory furnace will harm us electrons? The heat will reduce this filthy cadaver to gasses and ashes, but the higher temperature will only exhilarate us. Besides, my stupid, but charming Nega, this is a great break. We stand a good chance to escape in one of the light gasses, which will form as the dead body burns. And then we can have some new adventures.

If we could only get into some other kind of an element for a while. This oxygen is a shifty, tricky element; besides I'm getting fed up on the silly other seven positive electrons in this atom. They're a dull bunch."

Nega's orbital speed increased with a quick rise of rage. She flashed a quick retort across the distance that separated them—a distance as vast, in relation to size, as the space between the planets. "I notice you're not tired of the other seven negative electrons in this atom! You're always flirting every time I go to sleep. You couldn't be true to one woman for a thousand years!"

"Well! well!" sizzled out Posi. "Can I help it if the decorative sex admire me?"

"Never mind, you—you hopeless flirt!" hissed Nega. "Tell me, what's happening to us now."

"Hold everything!" screamed Posi. "We're in the crematory furnace! Can't you feel the heat? And our orbital speed is increasing!"

"Oh, Posi," whimpered Nega, "it seems terrible to be cremated."

"What feels the body when the soul expires

By time corrupted, and consumed by fires." (Ovid.)

The ancient philosopher, Empedocles, classed fire with air, earth and water, and called fire the fourth element. Aristotle added a fifth element—ether, which he thought composed the stars, suns, moons and planets. Even the mighty Shakespeare was influenced by these earlier great minds, for the "Bard of Avon" wrote—

"Does not our life consist of the four elements?" The modern scientist says that fire is the principle of combustion as manifested in light and especially flame, and in heating, destroying and altering effects. Flames are usually the result of chemical combinations with at-

atmospheric oxygen. Smoke is one of the products of burning organic materials. Smoke is rendered visible by the presence of small particles of carbon; and hydrocarbons and soot. Smoke is always the result of imperfect combustion.

All this to say that when the body of the mad scientist was cremated by fire, it was but changed in element forms. The body became heat energy, gases, smoke and ashes. Every electron that existed before the cremation rotated on and on, but perhaps in another element.

Man can neither create nor destroy energy; he may but change it from one form to another.

"Things are happening fast, Nega," shrieked Posi. "Hold tight! We're going to experience a change of elements! The heat has reached us! The heat, steam and pressure are disrupting our atom! Try and hold your orbit around me as we change. Spica of Virgo! Here we go!"

Posi was old in years and experience. He suddenly changed his usual repellent force to Nega to that of a powerful attraction—that their chances of remaining in the same atom be greater. Posi and Nega experienced no discomfort from the amazing transmutation that occurred from the heat of the tellurian furnace. A mild vortex of shifting atoms and electrons. The irrepressible Posi was in a great ecstasy of delight; Nega but mildly and sweetly excited.

"Hold tightly to me, Nega!" whirred Posi. "We're going into another element. Cosmos! look at those pretty negative electrons crowding into our atom!" Then in a harsh, vibrating snarl to a strange and intruding proton: "Keep your distance, you fool, and watch your rotation! I'm Posi. I—"

Chemistry is an old and ancient art—old as the history of man. Once it was called alchemy and the early alche-

mists were most greatly concerned with the vain hope of transmutating the baser metals into gold—and to find the elusive secret of eternal life. These ancient searchers for truths are not to be depreciated—their efforts paved the way to great discoveries. An old Chinese manuscript written two thousand six hundred and ninety years before Christ tells of a great Chinese alchemist named Wong Tai. This ancient "Father of Medicine" prescribed crab's eyes for stomach disorders, and pulverized toad skins for cures for other troubles!

Don't smile!—just think! for modern chemists now find that crab's eyes are composed mostly of calcium carbonate—a fine remedy for stomach hyperacidity. And that pulverized toad skins contain bufagin, efficacious in dropsy, and ephedrine, which is a splendid tonic for weak hearts!

The erudite scientist of over four thousand years ago could well smile at the conclusions and findings of to-day. But such a future scientist will not smile at the rungs we have fixed in the mighty ladder of knowledge. Rather, his incredible and tolerant mind will be amazed at our small but important findings and more greatly amazed at the wonders yet to be unfolded to him.

Nature, in her marvelous laboratories, can in many ways surpass man's puny efforts. In man's laboratories, a temperature of two thousand four hundred degrees Fahrenheit—enough to melt pig iron—is required to separate the carbon and oxygen atoms of the carbon dioxide molecule. White Sundrops and Pink Abronias (tiny flowers struggling for existence on the sandy wastes of the Mohave Desert) and many other plants can separate these atoms without difficulty in their tiny cell laboratories!

For a moment Posi and Nega felt a queer shifting about of their positions and orbits. They were amazed to see

four positive electrons and two negative electrons suddenly dart fast as light from their atom! It was astounding!

"Atik of Persei!" gasped Posi. "Did you see that! We're losing our old friends!"

"I'm glad to see that negative electron, Neta, leave. She was old and fat and was always fairly orbiting herself at you."

"You're just a jealous female electron, Nega," sizzled Posi smugly. "But something has happened to the numerical composition of our atom. Wait till I get a line of communication and find out what we are. This is great luck!"

Nega conversed excitedly with the other five remaining negative electrons in their strange atom.

Posi's excited vibrations broke in with happy impulses.

"Great luck, Nega! We've been changed by the chemistry of the burning from an oxygen atom to a carbon atom! Carbon is such an interesting element, and we're sure to have exciting adventures! And best of all, my sweet, but dumb Nega, only a few atoms away lives an extremely old and wise positive electron. His name is Proto. He's a million, million years old, and has been everywhere. He has wonderful lines of communication. I met him ages ago on Saturn. We lived in the same atom of sulphur. I remember Nivel, a beautiful negative electron. We had—" Posi stopped, suddenly realizing his amorous slip of vibration—"never mind about that adventure now—I'll tell you some other time. Proto has told me a lot already. Nega, my sweet, we're in an atom of carbon! And we've gone up in smoke!"

"What do you mean, Posi? Tell me more!"

"We're afloat in the glorious sky!" sang out Posi. "We're in an atom of carbon, which is part of soot, which in

turn makes smoke. So, my darling, negative sweetheart, we're up in the air in a cloud of smoke!"

"How interesting," Nega purred, "and what is carbon?"

"Chara of Canis! I expected that question. Carbon," said the conceited but wise little proton, raising the pitch of his vibrations that all the negative electrons in the carbon atom might hear, "is the sixth element in the atomic scale. You know now, of course, that there are twelve of us positive electrons here in the nucleus of this carbon atom, and that six of you lovely negative electrons revolve around our nucleus and make up our atom. We've more room to oscillate in this carbon atom."

"I knew that already," impuled Nega. "Tell me more about carbon."

"Propus of the Twins!" snarled Posi, "but you're getting wise! But do you know that carbon volatilizes at sixty-three hundred and thirty-two degrees F.? Did you know that chemically carbon is bivalent and quadrivalent? Does your dumb, but sweet little brain know that our atom is a most interesting one—that it has the remarkable property of forming complex compounds because our carbon atoms can unite with others in chains and rings. Just now, we're only soot drifting about in the air. But anything might happen to us now. If we should happen to be subjected to enough heat and pressure, we become part of a diamond. And diamonds are interesting. Why, do you know, Nega, the male human gives a diamond to the female when they're in love!"

"Love," purred Nega. "Is love an element?"

"Alph Serpentis," squealed Posi in vast amusement. "Nega, I believe you're reaching maturity. Love is not an element. It's a romantic and passionate affection for one of the opposite sex. It's a mighty, electrical, energized at-

traction among us electrons to complete the needed positive and negative poles for our precious cosmic energy-current. Among these stupid humans it's an instinctive sex impulse. Say! if I could tell you what love is—I would be the greatest philosopher in the atomic universe. And you, a red-headed woman, ask about love! This is rich! Say, Trona!" Posi impulsed to a spinning negative electron in their carbon atom, "tell this poor child, Nega, all about love. You're old—I—er—mean you're older, and you've been around a lot on those hot planets. Tell Nega what every young girl should know!"

Trona, a silver violet glowing around her plump figure, moved her orbit in a bit closer.

For many hours Trona buzzed intriguing words into Nega's eager ear. At times the great rogue, Posi, attempted to listen. But two women were exchanging delightful confidences.

Nega's softly glowing orbit reflected an embarrassed red.

"Oh, Trona!" throbbed Nega, "tell me more about love!"

Love is—

"The sweetest joy, the wildest woe." (Bailey.)

"Say, you gossiping dames, you're missing something! Here's news. I've just learned from Proto that our carbon atom in the soot is settling back to earth! That means some new adventure for us. Wait a minute! Here's news! Our carbon atom has settled to earth. We've struck something solid! Hold everything till I find where we are."

Nega waited patiently as possible and finally Posi flashed.

"Furud of Canis! What do you think, Nega? We're in a crow's nest!"

"A crow's nest?" shrilled Nega. "What is that?"

"It's this way," sizzled Posi in his

best scholastic vibrations. "These stupid earthlings have built a large gas bag which they call a dirigible airship. This craft is just now leaving its hangar for a flight, and we were lucky enough to fall on it. So we're going to take a nice flight."

"But what has that got to do with a crow's nest?" asked Nega.

"You're such a dumb cluck!" rasped Posi. "On top of this big gas bag is a lookout station where one of these silly humans stays to watch and help navigate the ship. It's called a crow's nest. Some of our soot settled into this lookout station, and by a strange chance we fell squarely into the muzzle of a signal pistol! If something happens to this dirigible, the human in this lookout may fire the signal pistol, and we will fly out into the atmosphere again. Here's more news from Proto!"

For a considerable time Posi conversed with the learned Proto, while Nega waited, glowing an impatient purple.

"Nega!" impulsed Posi at last. "Here's fine news. These earthlings who built this large dirigible are making a test flight. They think it's large—it's eight hundred feet long."

"How long is a feet?" asked Nega.

"My beautiful Nega," squealed Posi, "it's a shame your delightful sex has no brains! But it doesn't matter. Anyone so alluring has no need of brains. Listen, my heart's delight. Our atom is one hundred millionth of a human inch in diameter. Twelve of those inches make a foot. So figure it out yourself. Don't be so stupid."

"I'm sick and tired of your wise cracks about us women being stupid!" shrieked Nega, in a sudden, bitter, violet rage. "I guess we're just as important as you male electrons. Don't I fill just as important a part in our atom as you? When two of you vain protons get to-

gether—quite by accident—doesn't it take but one of us negatives, or females, to balance you?"

Nega's vibrations and orbit speeded to a shrieking whine. Her vast patience was gone.

"Where do you get that stuff, calling yourself a proton? You must mean a moron! Look at your great, lazy hulk! Why, you're eighteen hundred and forty times heavier than I, and I can balance you and another lazy bum just like you! You're a big bluff! You're a scamp—and—a hopeless flirt! You don't love me any more. You—"

"Now, now, my sweet Nega," mollified Posi, "I was only teasing you. You're as important to atomic life as I am." Then the clever rogue used his best sophistry.

"Woman, the negative pole, is necessary to man's positive. So it is with us, my atomic beauty. There, dry your pretty eyes and glow that lovely, becoming red for me."

Nega, ever gullible, scintillated a fiery red, and her speed increased until her orbit fairly whistled.

"Zosma of Duhr!" muttered Posi to himself. "This little dame is getting into a temper. I'll have to change my line. Hold everything, Nega, here's news! The dirigible has been blown out over the ocean and has encountered a severe storm. Proto says it looks bad for the foolish humans on board this silly craft. You know this dirigible is lifted by helium, and we know helium, like hydrogen, loses some of its lifting power when it enters an area of low barometric pressure, such as occurs in storm centers. The huge craft is sinking! This looks bad. If we strike the water, we may have to live in the cursed ocean again for years. There! Proto says we're climbing again, but the storm is growing worse. It looks like more trouble for us!"

"What do the humans use these dirigibles for?" asked Nega.

"To make war on other organized groups of humans. I know the humans are ignorant, but I can't understand why they construct these slow, costly and bulky dirigibles—even to make war. They are quite useless for anything, especially warfare, for their unwieldy bulk and sluggish maneuverability would be a ridiculously easy target for anti-aircraft guns and fast airplanes. Besides, they are so large and fragile. Proto says even now the light aluminum braces of this craft are breaking up because of the terrific twist of the storm on such a large bulk. Only a few minutes more and this great craft is a total wreck."

"But why do humans make war on each other?"

"They don't know any better," replied Posi. "It was only a few million years ago that humans were but single-celled creatures in dismal, thermal swamps. With evolution, the protoplasm was activated by the cosmic rays and took strange forms and crawled—some remained aquatic things that swam. Some developed feet and walked. Humans in some mysterious way developed the power of reasoning, of course, but yet in a small way. And what was just as important for these soft, weak humans, they developed hands—fingered, wonder hands. Humans owe to these marvelous fingers their supremacy of the earth as much as to their yet slight reasoning powers. Humans are advancing in knowledge, and a time will come when they will not kill each other. They are toiling upward strongly and bravely. Of course they're not so wise as we electrons, for they have the fearful handicap of living on earth less than a hundred years. And look at me! I'm ten million years old, and just a young chap yet. Wait! Here's news! The dirigible struck the center of the storm, which has

a powerful, twisting, downward air draft. The structure of the huge craft is bent and warped from the twisting of the storm until it will no longer respond to the engines and controls. There! We've struck the ocean with a fearful crash! This dirigible was traveling a hundred miles an hour when it struck. At that speed the water would be as a solid mountain of rock. What a shame! The poor humans on this unlucky craft are doomed. They are drowning even now! The dirigible is fast breaking up! The engines and heavy structures have torn loose and sunk. Wait! Proto is calling me!"

Nega buzzed excitedly with the other negative electrons. They were all excited and nervous.

Posi's vibrations suddenly flashed in a high pitch.

"Nega, the strangest luck has come to us! The great dirigible broke up, and the forward part with our crow's nest has risen from the water and is rapidly gaining altitude! We're on our way to the sky again! There's three humans—poor fellows—in the crow's nest. They are the only survivors of the wreck, unless human boats picked up some of the others from the water. These three humans have no way to communicate with other humans. Their soft, weak bodies are suffering horribly from cold and the thin air, for our gas bag, without the weight of motors and rigging, is steadily ascending. I feel sorry for these three people.

It's hard to die. But there's no hope for them."

"Whate'er event the doubtful question clears,

Death must be still unworthy of our fears."

(Lucan's Pompey)

"Jusa of Giansar!" throbbed Posi after a short silence. "Here's something! One of the three men has taken the signal pistol in his hand. He is talking to the others. They are desperate—almost freezing and gasping for oxygen. They are stout, brave humans. Hold everything! The human is pointing the pistol in the sky. He hopes other humans searching for them will see the rocket, which will fire from the pistol. Our atom of carbon is in this pistol barrel. He's going to fire it!"

"Will it hurt us much?" shrilled Nega.

"Not a bit, my dear Nega. In past adventures, we've had impetus shocks a million times stronger. Don't worry."

"I won't, Posi," purred Nega. "Any adventure with you is glorious. You're so wise—so strong—so handsome and—"

"Here we go, sweetheart!" sang out Posi. "The human fired the pistol. Move over closer so I can hold your orbit. My, you're a lovely woman, Nega! You're so young—so round and trim. I wonder what will happen to us now. We're off for a fine flight!"

"Challenged Cupid at the flight."

(Shakespeare)

THE END.

IN THE FEBRUARY ISSUE

Island of White Mice

By David H. Keller, M.D.

The Valley of the Rukh

By Harl Vincent

And other engrossing science-fiction stories by well-known writers.

The Tale of the Atom

By PHILIP DENNIS CHAMBERLIN

ATWAR spun his motor-chair deftly about and rolled over to the blue enameled all-metal cabinet. Pulling out a drawer he withdrew a small instrument and sped back to his slate-topped workbench. Once there he made a few adjustments in the weird machine that stood upon it.

A weird machine it was, a jumbled mass of wires that led to a small, porcelain-like chamber within which the wires seemed to be fused into a solid mass. Above the chamber was a compound microscope of peculiar shape, with a double eyepiece and a sort of keyboard mounted on its side. There were other peculiar things about the microscope; for instance had one been able to examine it, he would have noticed that all the illumination was provided through a microscopic aperture underneath the chamber, and that the light was artificial, provided by a mercury lamp of some type and filtered through two lenses before it reached the hole. Had Atwar been in a talkative mood, which he never was, he would have explained, that the purpose of those lenses was to increase the magnifying power in a peculiar system of his own.

Atwar was quite proud of the affair for from bottom to top it was his own invention and the thing he proposed to do with it, of course with the help of his assistants, would undoubtedly astound scientific circles if he succeeded, and he knew he would succeed.

While he made a minor adjustment with two right hands, he prepared a pad and pencil with a left hand and reached

for a bottle of small transparent crystals with the other left hand. An assistant rolled briskly into the room, one of Atwar's four huge compound eyes turned from the instrument to him; in silence the assistant received the thought-order and sped out of the room. A second later he was back bringing with him a group of thought-readers who were to read Atwar's mind during the experiment and to accurately record his impressions at first hand; this made it equivalent to having four separate people perform the experiment.

Silently Atwar bent over the microscope, two huge eyes focussed upon the stage, a third was on the paper pad on which he would write the results of the experiment, while the fourth eye gazed straight at the group of thought-readers, in order to facilitate their task, for it is through the eyes that the mind is most easily read. With deft six jointed fingers he picked up a pair of tweezers and placed a minute crystal of the substance, which was in the bottle, upon the stage. He fingered a button on the keyboard and the stage became illuminated. Under the enormous magnification the myriad of wires no longer seemed fused together, rather they were seen to be skillfully woven into a fine screen of some sort and on that screen lay the crystal; he adjusted the focus.

CAREFULLY he twisted the knobs that controlled the microscope's adjustments, the crystal faded into vast nothingness. But was it nothingness? The blackness seemed to be filled with small, blowing points. He gave the

knob another twist. Slowly materializing out of the blackness, a dull reddish ball about the diameter of a cent appeared, and about it spinning at great speed were minute specks, like grains of dust in the sunlight, or was it only his eyes? His fingers adjusted the knobs and the red ball grew to the size of a small orange, covering the whole stage. He slid the stage slightly to one side and three of the specks came into view, now as large as pinheads. By careful manipulation he counted eight, it was as he had thought; now he must finish; the committee met at seven and he wished to have a report ready. He made a rapid calculation as to what wire the atom must be over and pressed a button. There was a flash that half blinded him, but that was all; he had miscalculated. Speedily he worked out the correction on the pad by his side and pressed another button.

* * *

The earth was terror stricken. Men no longer rode daily to their work in the great synthetic food plants; the huge, pleasure parks were deserted, for in the year G73000 the end of the world had come at last. Panic had descended upon the earth and science was helpless. Prophets of a god who had been forgotten over seventy-eight thousand years before, (and reckoning in old time it was now the year 86,300 A. D.), were arising and proving by a forgotten volume called "The Holy Bible" that all this had been prophesied years ago and that now was the time for repentance. There arose also another and more generally followed cult which held the direct opposite of the first, namely that the end was here and now was the time for pleasure; the streets of the cities were the scenes of wild debaucheries, and robbery and murder were rampant. Also there was a small group which, strange

to say, kept their heads. They were chiefly the great scientists of the planet, those who knew it was up to them to save the world. All day long and far into the night they worked, trying to devise schemes that stood a chance of being successful; they had all the laboratories of the world at their disposal and they worked with feverish haste, most of them even taking to a vice which had died out centuries before—dope—to keep them going; and they had to go on; if they failed the world was doomed.

DR. ALICE NOAH was undoubtedly the head of the group, she had been head of the government laboratories for a bare two years, when the catastrophe came, but already she had a world-wide reputation and she was unanimously chosen to head the body. A part of her speech of acceptance of leadership is quoted, in order that the reader may understand the situation.

"My colleagues," she said, "we all realize that it is on us that the fate of the world depends; we have been called together in the eleventh hour to undertake a task it would be difficult to complete in a lifetime, and we *must* do it! . . . We should have taken warning three hundred years ago, when Sirius was wiped out by a strange flash, but our ancestors took no heed and now we find ourselves attacked without adequate or even partial protection. . . . We all know what is threatened, something is rapidly exploding in the sun! Unless it is stopped we have only six months left, before we shall be without a solar system, and we shall go flying out into space, a dead, cold meteorite. Ladies and gentlemen, it is up to us to see that it is stopped!!! Already the sun is showing signs of vast electrical disturbances and from Mount Wilson comes the report that a blue flame of some sort is rapidly approaching Sol,

our sun. My friends, we know that flame is the same thing that destroyed Sirius and unless something is done it will do the same thing to our sun. I await your suggestions."

Many ideas were advanced and rejected. For the most part they were as foolish as the theories of those who set out in space-ships for Mars, not realizing that, with the break-up of the sun, Mars would be as badly off as earth. A number thought of establishing some sort of a counter-current, but it was pointed out that it was not known whether or not the "destroying flame," as the religious fanatics had named it, was electrical or not, and that, if it were such, there was not enough electrical power on earth to successfully neutralize it. Another group tried to make out that the dangers were overestimated but without successfully convincing even themselves. The greater part of the group, however, could think of nothing and so they remained deadlocked for two months.

It was the sixteenth of Sol (thirteen-month years had been adopted centuries back) that Dr. Hubbard Granstedt proposed his plan, and the entire convention stood amazed at the bearded old patriarch's suggestion. For two precious weeks it was fought for and against, but the doctor had his facts and figures so clearly disposed that it was finally adopted. Then all the body went into action, and by that statement it is meant that twenty billion tireless robots started to labor, day and night, to complete the terrific task.

Everything was in readiness by September eleventh and the world was waiting, waiting breathlessly for the result of the test of the forlorn hope of humanity. From points all over the globe huge structures, like the long range guns of a bygone day, were pointed skyward, and a network of some sort of pipes completely checkered the globe.

An anxious world was waiting its time.

THE eighteenth of September was the fatal date. At three-thirty in the afternoon the blue flash streaked across the solar heavens, heedlessly annihilating Venus and Halley's Comet in its course and struck the sun. There was a huge flash, the like of which had never been seen before, and the sun crashed into hundreds of flaming pieces which flared up in the solar heavens each a little star in itself. Throughout the entire universe there was a jar as the stars readjusted themselves to the loss of their brother and things started to quiet down.

It was the instant the flame had struck, that Dr. Granstedt had thrown the switch which was to save or ruin the world. From the vast network of pipes that lay over the world had arisen huge clouds of gasses that dimmed the explosion of Sol to all human eyes. Slowly, in great billowing clouds, they went upwards, until they seemed to merge into one vast mass that completely surrounded the atmosphere. Then the change took place. The clouds seemed to lose all cloudlike aspect and to take on the appearance of a solid ceiling; there was a singing sound as of metal understrain and then all was quiet. An experimental rocket was projected; up, up it went until it reached the ceiling; then it seemed to strike something solid and in another instant it was falling back to earth, its steel head buckled by the impact of a collision. Dr. Granstedt smiled for the first time in many months; it was as he had hoped and planned; the gasses, no longer warmed by the heat of the sun, had solidified and formed a solid casing around our earth and her atmosphere. Terra had retreated within her shell.

To an observer from the outside Terra

now had a strange appearance, it was no longer truly round for at intervals huge, spike-like tubes protruded from its coverings, tubes which, an instant later, began to shoot forth streams of fiery gasses into the void. There was a horrid lurch, and the planet started to move!— Terra was seeking a new master; the world was in search of another sun!—

It was a long journey through space; the world had become a new and gigantic space-ship, propelled by huge atomic rockets, and carrying its natural atmosphere and heat hermetically sealed within its transparent man-made shell. It was not so hard to reach its new sun, as if in preparation for the catastrophe from time immemorial the Sun had been rushing toward Vega at an inconceivable speed and now the earth under its own power completing the last lap of the trip for it was toward Vega the independent planet was traveling.

It took nearly a year to complete the journey but then, as if prearranged, the earth fell into an orbit about the star and took for itself a place where the heat from the second sun would be adapted for human life. Dr. Granstedt had calculated the flight to perfection. It was six of the new length years (1,362 days) before the semi-transparent outer shell was melted off into gaseousness by Vega and when it happened, a strange sight was revealed. There lay the world, still surrounded by its atmosphere and still temperate in climate, but there was some difference. Where were all the mountain peaks that had once risen into the atmosphere, where were the long low plains? Everywhere things seemed different. Where was the land?

All over the surface of the planet was a vast shallow sea, with here and there a tiny island dotting its surface; all the main land was submerged!! Dr. Granstedt's travel idea had been perfect but he had forgotten one little thing; *he had left the moon behind!!!!*

IT was a horrible death that the human race had suffered, the uncontrollable water had swept the land clean of life, the very surface of the earth, without the moon's continual pull had buckled and twisted, throwing masses of lava into the steaming sea. The earth had become a chaos in which no life could have hoped to exist, however hardy it might be. But that is all over now and scientists on one of Vega's inner planets are still trying to figure out in their reptile heads, for intelligence is not a strictly human feature, what brought the watery planet to join the huge star's coterie.

* * *

Atwar pushed back his motor chair. "I knew I could do it," he said, or rather his eyes passed on the message, for his race carries on all conversation in that way, not having been equipped with vocal cords. "I always have said that the atom could be exploded and now I've proven it. It was all as I expected it to be, except that I can't understand what made the third electron jump to another atom, but of course that is a minor detail. But come, we must announce our findings and the committee meets in five minutes."

Whirling his motor chair he glided from the room.

THE END



DISCUSSIONS

In this department we shall discuss every month topics of interest to readers. The editors invite correspondence on all subjects directly or indirectly related to the stories appearing in this magazine. In case a special personal answer is required, a special box of 25c to cover time and postage is required.

The New Zealand Science Fiction Association Editor, AMAZING STORIES:

This letter is to announce the advent of a much needed Science Fiction organization in New Zealand. Would you be good enough to publish it in the Discussions section of your excellent magazine?

The New Zealand Science Fiction Association is to be a body for the promotion of this type of literature in New Zealand, and a medium through which all members may communicate and express their views. We aim to bring all lovers of Science Fiction together in this cause.

Would all New Zealand and Australian readers interested, please communicate with Mr. N. Patton, Pokeno, New Zealand, or myself? To such enquirers we will mail further information. The subscription rate will be low, and we are thinking of publishing a small monthly bulletin, through which we may come together, and discuss Science Fiction of the month. This will come when we have reached a sufficient membership to warrant it. Meanwhile, wishing AMAZING STORIES every success.

N. S. Jenkin,
48 Gilbert Street,
New Plymouth,
New Zealand.

(We have always felt much interest in hearing from readers in the Antipodes, nearly 180° degrees from Greenwich, Eng., whichever way you go (naturally). We wish Mr. Jenkin every success in his work for developing an interest in science fiction.—EDITOR.)

An English Edition of AMAZING STORIES Asked For

Editor, AMAZING STORIES:

This is my third letter—but it won't be my last, although I have not yet seen any of them in the Discussions column!

AMAZING STORIES is fine nowadays—much better than the old ones. Of course, I'm taking it as a whole, not individual stories. I managed to pick up an old number the other day and read "Seeds of Life" by John Taine and I don't think I've ever enjoyed a story so much. His characters lived and he didn't go over the bounds of possibility . . . which made the story perfect. That story, in fact, has been instrumental in introducing A. S. to many other friends of mine . . . they are now regular readers and eager for more stories like that! They all agree in saying that Morey knows more about the illustration racket than anybody else . . . and they're right! Although he used to be terribly "scribbly" he seems to be paying more attention to details now.

I see one, yes, just a feeble one, letter in the Discussions column from England which asks for an English editor of "AMAZING" over here. To this I add my signature! It's a grand idea, it's stupendous, it's colossal!—When are you going to start it working?

Jules Verne, I see, is continuing to appear in our mag. Ed. A. Poe too, is on the pages. Say, why not send over here for some works by Shakespeare? These stories are good enough in their place, but why the Heck must they take up the room in which a modern story could be set? We want modern stories, written in a modern less colorful language. Granted the mag. is nearly perfect, but why not make it 100 per cent?

If there's anybody listening from England, I'd be glad if they'd write up and agree with me. There's a helluva lot of your magazines sold over here—and I'm doing my best to increase the demand which is growing steadily.

Anyway, here's to modern science fiction and so long to Victorian hlah!—And, of course, good luck to AMAZING STORIES!

L. A. Petts,
21, East Court,
North Wembley,
Middlesex,
England.

(Recently we have received a great many letters of foreign correspondents, especially from English readers. This one is especially interesting as it is the second one in which a writer asks us to publish an English edition. There is nothing we would like better to do, and there is no knowing what the future may bring about. We are still in the middle of a depression here, and it is an open question how soon our peculiarly academic government in Washington will get us out of the trouble. We have not given receipts for several months so that rather eliminates your criticism. We thank you for your good wishes.—EDITOR.)

Science Fiction Societies in England Editor, AMAZING STORIES:

It is so common for you to receive letters from England nowadays that this epistle of mine will have no distinction other than this: the writer has been one of the most enthusiastic and admiring of your readers (English or otherwise) since 1927, and has a collection of your magazines commencing with the December, 1926, issue.

Another thing: for almost as long I have done my utmost to interest my friends and strangers in Science Fiction, which I believe

to be the greatest force in modern literature, despite the fact that it is practically entirely neglected by British publishers—a sin that I have also tried hard to rectify.

It really amazes me, the large number of English readers' letters there are published in your pioneer magazine in 1934. There must, I believe, be thousands of Science Fiction "fans" in this country to-day, though when I myself became converted there were very few indeed.

As secretary of the Ilford Science Literary Circle, which I formed some years ago with the object of furthering the movement, I communicated with a considerable number of these English readers, many of whom, in their turn, have now formed similar organizations, and, in many cases, much more successful ones. It affords me great pleasure, I can assure you, to see their letters in your journal from time to time.

But even if British publishers refuse to appreciate the existence of these fervid adherents of science fiction, British authors who have the ability necessary to write such engrossing material, have not been so asleep.

I had the pleasure, some time ago, of making the acquaintance of Mr. J. M. Walsh, the gifted English writer of many excellent mystery stories, who, in the name of H. Haverstock Hill, recently contributed "The Terror Out of Space" to the columns of *AMAZING STORIES*. At that time, he was very anxious to write science fiction, but there was (and still is) little scope for it over here. Anyway, the British publishers' loss, in this respect, is your gain. For Mr. Walsh was quick to seize the opportunities that presented themselves in America.

Then there is John Russell Fearn, another English enthusiast who wrote to me a few words of encouragement when I first formed the Science Circle here, and who has since blossomed out as an author in your columns—and very successfully, too, judging by the complimentary letters you have published concerning his work.

Yes, science fiction has made progress within these shores since I first became familiar with your earliest issues, seven years ago!

But there is one thing that has yet to be done. There are now many organizations scattered throughout England whose members are devout followers of the movement, but who have no means of knitting themselves together in order to further the cause of science fiction more swiftly and efficiently than they can do separately. These numerous clubs—some of them an offshoot of American societies, some self-centered, and others affiliated to bodies in Germany, France, and elsewhere—could work much better if they were co-ordinated into one parent body, publishing its own official organ, by means of which they could keep in touch.

My object in writing to you is to ask you to publish this request for secretaries of all British science fiction societies to communicate with me, to see if something cannot be done to bring

about this co-ordination, and so enable us to achieve still greater things in the name of science fiction.

I shall be glad to receive suggestions as to how best to go about this great, but (to my mind) worthy task, not only from secretaries of the various existing bodies, but from all English readers of science fiction. As one who has been actively identified with the movement in this country for some time, and has therefore acquired an extensive knowledge of the subject, I shall be pleased to render assistance, and do my share of the work that will have to be done.

I will not dwell upon the subject of what things could be accomplished as the result of such a union, but appeal to you, Mr. Editor, to expedite the publication of this letter, so that we can get on with the good work as soon as possible.

For I have no doubt that all English science fiction fans will agree with me that we shall progress much farther in unity than in the loose, scattered state in which we now exist, and so hasten the time when science fiction will be no longer regarded in this country as something so out of the ordinary as to be beyond all serious consideration, and take a deservedly prominent place in English literature.

Hoping to be deluged with letters, and trusting that we shall have the continued support of the first science fiction magazine, *AMAZING STORIES*, I remain,

Walter H. Gillings,
136, Balfour Road,
Ilford, Essex,
England.

(We have another letter from England largely touching on the subject of Science Fiction Societies in various countries. We do not doubt that this letter will bring you the desired result of correspondence from those interested in such work as yours.—*ENROA*.)

A Letter from Ao-tea-roa—the Land of the Moorie
Editor, *AMAZING STORIES*:

About two years ago, my brother, who was perusing some of my short story manuscripts, inquired, "Why don't you have a pop at writing for 'AMAZING STORIES?'" (Do not be alarmed, Mr. Editor, I am not aspiring to contribute to your magazine.) "What are *AMAZING STORIES*?" I asked in surprise, wondering how I could have missed anything of so interesting a nature as he appeared to regard that of the magazine.

I bought two copies, and that is how I became acquainted with *AMAZING STORIES*.

Now I await with the greatest of eagerness, the arrival of the next month's copy. I have only just received the February number, so you see, we are late in getting them here, in the land of Ao-tea-roa, (the pretty Maori name for New Zealand, the interpretation being "Long White Cloud.")

When I see "AMAZING STORIES" in a stationer's shop window, it seems to leap out from all the other magazines, owing to the unusual cover design. I hope you will always adhere to that style.

The February number was especially nice. Mr. Morey has done very well. The expression on the Martian leader's face, being so enigmatical, that one could not resist turning to "Terror out of Space" to discover that it is a story of merit. The author, Mr. H. Haverstock Hill, deserves all the kudos he must be receiving, as he seems to be a gentleman of culture and erudition. I am awaiting the next instalments with great impatience.

I like the stories best dealing with interplanetary travel and "time." I also like your Slogan, if I may call it so, "Extravagant Fiction To-day . . . Cold Fact To-morrow." In fact I like everything about your mag.

The Editorial, by Dr. T. O'Connor Sloane, Ph.D., is always good, and gives the magazine a real scientific standing.

For years I have read very little fiction. Now I think it a great relaxation, after reading say, Sir James Frazer's "Golden Bough," to delve into the refreshing pages of your most excellent magazine.

There seems to be some controversy regarding the size and the quality of paper used. What does it matter, when the quality of the contents is so readable, and the cover design so artistic. Besides, the smaller size is easier to manipulate when reading in bed, in trains or tram cars. Although I must admit to a feeling of disappointment when I first viewed the new size, but I am one of those individuals who do not take too kindly to changes.

I think our Editor deserves great credit and our warmest thanks in compiling a monthly and quarterly of so high a standard as "AMAZING STORIES."

With very best wishes to the Editor and Staff, also to the extremely large "family" of keen readers of our good old "AMAZING STORIES," the magazine, "par excellence."

Kia-Ora.

(Mrs.) Verbena E. Hayes,
577 Manukau Rd.,
Epsom, S. E., 3,
Auckland, New Zealand.

(This is a letter from New Zealand. It is especially interesting as coming from a lady in a distant land, where the race of Maoris formerly held sway. The writer gives us the name of New Zealand in the Maori tongue and ends up with what we suppose are the aboriginal words for "sincerely yours." The combination of good wishes and really intelligent criticism gives the letter a true value and we always find that letters from the fair sex are especially pleasant reading for the much criticized editor of a magazine. Of course criticism from readers is part of the game. It is never resented as such—when expressed in what your "old country" people call "good form."—EDITOR)

A Boy of Fifteen Summers Writes a Nice Letter with Only One Brickbat in It
Editor, AMAZING STORIES:

I have only read your magazine for a short time so perhaps this letter will head for the waste-basket.

I have read many magazines, Westerns, Detectives, Sport and yours is the first Science Fiction one I have ever read.

Among your authors I like Neil R. Jones, W. K. Sonnemann, P. S. Miller, A. H. Verrill, Dr. Keller and J. Lewis Burt. "The Lost City" and "The Master Minds of Venus" were swell.

I don't know much of science as I am but 15 and I read AMAZING STORIES just for the thrill I get out of the stories. Your October cover design was terrible.

I wonder if any of your readers living in or around my home town would send me some of the old Quarterlies with covers, please.

Jack Westerdahl,
Route 5, Box 73,
Tacoma, Washington.

(This is a boy's letter and for a wonder it does not find fault with our humble efforts. Our comment on your criticism of the October cover we would like you to consider it implied, and to be as "terrible" as what you say about it.—EDITOR.)

We Are Glad to Put This Very Nice Letter in Discussions
Editor, AMAZING STORIES:

If you do not succeed at first, try and try again. This we were taught by our earnest teachers at grammar school, hinted to us by high school instructors, in college and through out life we will be confronted by situations testing the strength of this motto.

It is good enough if you live long enough, and perhaps I may live to see the day when one of my letters worms its way through the pages of A. S. into the Discussions Column. Oh, well, may be fate has its thumbs down on me. Maybe I'm one of those persons who unobtrusively slips through life ignored by all the Editors of A. S. & Company.

October A. S. bettered September by a whole length. I ate my way through the Andes No. II like sulphuric acid. Darned good saga. "The Pool of Life" seemed very much like another tale I read in another mag. at first, but I changed my opinion at the end. Very good. "Eighty-five and Eighty-seven"—too short—all good things don't last. "Buried in Space"—no like, odoriferous in extreme. "The Moon Pirates" ended well (all's well that ends well) I didn't read the Editorial yet, but I bet it's good. I wish you would print more about cryptography. Interesting stuff as well as useful.

As a whole, I find A. S. in good health.

Camillo Massoni,
309 Maryland Avenue N. E.,
Washington, D. C.

(We are sorry that for some reason we have

not given you space in our discussions. You certainly write quite vividly and it is about as amusing as it is really valuable from a standpoint of criticism. We shall certainly keep in mind what you say about cryptography. A great deal of work has been done on this subject and it is believed to be almost impossible to do cryptographic writing which cannot be deciphered. It is a comfort that you approve of the "health" of AMAZING STORIES.—EDITOR.)

**A Pleasant Letter from a Young Reader
(16 Years Old)**

Editor, AMAZING STORIES:

Well, well, well. At last I have got around to writing this letter. I have been going to do it, ever since I bought my first A. S. Mag. last January. I have before me the October edition of "our" Mag. and I haven't missed a single edition in between. In these I have read some good and some bad stories, here is how I would grade the most outstanding stories I have read in A. S. since last January:

1. Terror out of Space.
2. The Pool of Life.
3. Moon Pirates.
4. Triplanetary.
5. The Lost Language.
6. The Lost City.

"Through the Andes" starts out very well. The best Science Fiction story that I have ever read however was in a 1933 A. S. that a friend lent me. It was a Professor Jameson Series called "Into the Hydrosphere." Here's hoping there are some more Prof. Jameson stories soon.

Re all this controversy about artists. Keep Morcy and you'll be doing all right, he's O.K. Keep up those editorials by T. O'Connor Sloane also. They make very interesting reading.

The greatest compliment I have for you however is that at last you have dropped those sex advertisements. They were the only cheap thing in the "Mag." Keep up the good work.

Although I am only sixteen, I am one of the most enthusiastic customers you have. I wouldn't miss an issue if I had to roll a peanut all the way to the newsstand with my nose.

Thanking you kindly for granting me this valuable space in our Mag. (if you do),

Bill Doran,
836 Ouellette Ave.,
Windsor,
Ontario,
Canada.

(Sixteen seems to be a critical age, for it has produced so many letters by readers of that age. This letter comes from Canada where we have recently arranged to publish our magazine for the benefit of residents in that country. It is rather a good example to the world that between us and Canada there are over two thousand miles of frontier entirely unfortified and yet neither country has the faintest idea of attacking the other. The fact that both speak

the same language probably operates to increase friendship, but in Europe, Austria and Germany have been having a rather disagreeable time, although both have the one language.—EDITOR.)

**An Interesting Plea for Giving Reprints
"A Place in the Sun"**

Editor, AMAZING STORIES:

Although I have been a reader of AMAZING STORIES since Volume I Number I and have written several letters to the Discussions Column, they have been completely ignored. Do my letters go into the waste basket without being read because I have no typewriter?

I would like to have my say on reprints for that seems to be the main subject of discussion in your columns at the present time.

I have ready an answer for all arguments against them.

First: The works of Poe and Verne can be found in any library.

Now, my answer to that is—I consider myself a very sincere S. F. fan, as much a fan as anyone else. Half of the "kick" I get out of it is making a collection of every bit of science fiction I can lay my hands on or that I can afford. A book from the City Library must be returned. While poking around in a second-hand book store recently, I came across a very nice looking set of the Complete Works of Jules Verne.

"How much is that?" I asked.

"Eighty dollars," was the very nonchalant reply.

If the works of Jules Verne is given a little at a time in AMAZING STORIES along with many other excellent new stories for a quarter it seems to me the readers are getting something for their money.

Second: Most everyone has read Verne and Poe.

I believe the latest census reports placed the total population of the world at two billions or so. Now, how can one person or group of persons consider themselves of such importance among such a vast multitude?

Third: The stories of Poe, Verne (and Wells?) are old fashioned and smell of moth-balls.

Where can a better, more original story be found than Verne's "A Purchase of the North Pole" Stories by the above authors may some of them be rather dry reading, but there are many people who enjoy real literature. The characters created by the old masters are real people, but the heroes put into stories by many of the modern authors could not possibly survive the many hairbreadth escapes from death they go through. The law of averages says they can't. Thus, they are not real people. I am not taking in all of the newer writers in the above.

As for the smell of moth balls—I dug a copy of Wells' "Time Machine" out of a trunk so I re-read it. I found the camphorish odor did not in any way diminish my enjoyment of it.

It was certainly in a very well-preserved condition, too—Get it?

Fourth: Give the living authors a chance to earn their bread and butter.

Says I—"If any living author turns out a story of merit that is not a rehash of plots originated by the dead authors he certainly should be able to sell it. If reprints will keep mediocre-stories or just plain trash out of the S. F. mags, by all means give us reprints!"

To those readers who might argue that back numbers of *Mansley Publications, Science and Invention* and *AMAZING STORIES* can be had. Most certainly they can but let them pick out just one story in even as recent a mag as the first *AMAZING STORIES* and really try to get it. I have been quoted a price as high as \$2.00 per copy of Vol. 1, Num. 1 of A. S. Then let him go still further back to bring together a complete serial in the old All-Story or Science & Invention. It is not a simple or a cheap task.

To those fans who might say they do not care to make a collection of science fiction, I suggest that they try it. Not just to save their new mags, but to try to collect those back numbers. It is really a very fascinating game. Any money spent on back numbers now will realize a profit if at any time the fan decides to give up collecting.

I am heartily in favor of the three serials running in each issue for the reasons set forth by Mr. Cahendon in the August Discussions.

To those who argue they must wait too long between installments let them wait until they have the complete serial.

They will then say that two or three short stories is not enough reading to last a whole month. Anyone with common sense can see that if three or four part serials are running at once, one of them is almost bound to end in each issue so if he reads 60 pages of short stories and about 25 pages for each installment of the complete serial he will have read about 140 pages which is about the size of any one issue of *AMAZING STORIES*.

Arthur Jones, Jr.,
2717 Santa Clara Way,
Sacramento, California.

(So much has been said against the publication of reprints in *AMAZING STORIES* that it seems quite odd to receive so long a letter approving warmly of their publication. Just for the present we do not anticipate giving any reprints, or possibly one in the near future. One magazine of very high grade published in this city gives nothing but reprints. One thing we do observe about your letter is that it is well thought out and you know what you want to say and express it very well.—*EDITOR*.)

**Copies of *AMAZING STORIES* for Sale—
Covers Missing**

Editor, AMAZING STORIES:

I have the following *AMAZING STORIES* for sale at 25 cents each. 1929: January, March, October and December. 1930: January, March, June and July. 1931: October. 1932: January,

March, June, July, August and October. Covers missing, but reading matter complete. Also have March and April, 1929; part of the first stories missing—15 cents each. Also second part of "Skylark of Space" all there, but rest of magazine not there—15 cents.

Elvin Holley,
Box 322,
Vaughn, New Mexico.

A Very Interesting Letter from an English Reader, with Suggestions and Criticisms
Editor, AMAZING STORIES:

This is the first letter I have written you, although I have been reading *AMAZING STORIES* since the beginning of 1930.

It is going to be a long letter, but I hope it won't bore you too much. When something is being sent about 4,000 miles (a fiftieth of a light second) (which doesn't sound much) you might as well send plenty. I am writing to ask you to publish an English edition of A. S. I have about 50 friends who are all S. F. fans, and they all agree with me. If this were the days of the Chartists, I would send you a petition, but it ain't (where's Miss Robb). They grumble about the Quarterly being late over where you are, but here we've only had one Quarterly on the bookstalls during the last fifteen months. The July and August numbers didn't come over to England I hear from the bookstalls, and from what I've read, I've sure missed something. The February number was a fortnight late. Imagine six weeks again between the Triplanetary instalments. I've still got to wait a week for the third instalment, while you finished it and also "Terror Out of Space" which looks promising. I'm sure an A. S. magazine would be extraordinarily popular in England. Recently a new practical science magazine has started up over here. They sold 100,000 copies of the first number in a week. All S. F. fans read it as it gives developments in science. I'm just showing how popular an English S. F. magazine would be and the sooner the better.

I had a bad shock when I saw your surprise was a reduction in size to the present shape. But still, it's the stories that count, though I shall be pleased when you return to the larger size. I know how bad the trade has been hit over in the U. S. A., but I have just heard the weather forecast. It said "a depression moving slowly over Ireland," so perhaps it has left America.

With the exception of January, 1933, the first S. F. mag. with a decent cover, I've enjoyed every A. S. I've read. That January number though, it had as much science in it as could be written on your little finger nail. What with the new cover, I looked again to see if I had A. S. or what. But the stuff since has been the goods. Keep up the standard and you will have 50 faithful English readers even if the magazine becomes a pamphlet.

Don't have any reprints. I've missed what

must be good stories including most of the Skylark series, but its not fair to other readers. I wish I could get those back numbers, but by the time I've written, the offers have gone. I would like some nice considerable A. S. fan to save me the back numbers he wants to sell and let me know all about them.

I hope I haven't been too blunt but I would like to see A. S. rise to its pinnacle of last Spring.

S. R. Kahan,
317 Queen's Road,
Upton Park,
London E. 13,
England.

(The writer of this letter must remember that our so-called quarterly is really a supplementary publication which does not appear regularly. A great many of our readers say that they like the small size, as it fits in the pocket and is better adapted for the ordinary bookcase. It sometimes seems that we have so many readers that whatever we do it will please some and displease others. We are very much interested in noting that the English reader seems to be waking up to the value of the type of literature which we publish.—*Errors.*)

Another Young Critic Gives Us His Views
Editor, AMAZING STORIES:

There once was a time when I didn't have much respect for "our mag" as it is sometimes called. Those times were when you printed such stories as "Borneo Devils" and also many more of that type. Those were best suited for the cheaper "dime" novels.

At present you print none of these stories. "AMAZING STORIES" has improved very much in the past year or so; while your chief competitor has improved little.

Please don't print any more of Verne's or Poe's stories. There is no need to say more because almost all of the readers say the same thing. I can't say much about the Editorial, because there are many different opinions.

I would enjoy corresponding with another reader in the same mood. I am 17 years of age.

"Peck" Albrecht,
Route No. 2,
Poulsbo, Wash.

(We do not agree with you on your criticism of the story entitled "Borneo Devils." It impressed us as being "Kipling-esque" and we certainly enjoyed it a great deal. To formulate a good opinion about the writing of Editorials, treating science popularly, you should try writing one yourself. We have not seen the many "different opinions" which you mention at the end of your letter.—*Errors.*)

A Letter from the "Space Landing Field"
from a Traveler to Mars
Editor, AMAZING STORIES:

I am sitting in the "space port" at New York waiting for the 12:10 Earth-Mars space liner and reminiscing back over a period of forty

years to the good old year of 1934 when I read my first AMAZING. I remember the September, 1934 issue. My favorite story in that issue was "Master Minds of Venus," by W. K. Sonneman. I often feel that were it not for A. S. we would not have space travel now. Well, now I'll close, but I'll write again in another forty years.

Steve Reckerd,
1139 So. 6th Street,
Terre Haute,
Ind.

(W. K. Sonneman has certainly given us some good material and we hope, when you do start for Mars, that you will have a few copies of AMAZING STORIES to give to Martian readers, especially if, like Venus, this planet has "master minds." We suppose that we may assume that we have your thanks for having shown you the way to interplanetary travel.—*Errors.*)

A Very Friendly Letter with an Enigmatical Ending

Editor, AMAZING STORIES:

With your permission I would like to reply to Señor Carlos Diaz Koller whose letter appeared in your October, 1934, issue.

It seems that friend Koller has taken the viewpoint that we are a bunch of "writing nuts." To the contrary, Señor, we are out to be classed as "outs" but as true lovers of Science Fiction and AMAZING STORIES.

Certainly you could not find a greater or truer lover of Science Fiction than Forrest J. Ackerman. Mr. Ackerman is a friend of mine and I know that he writes his letters with real interest at heart. Interest in AMAZING STORIES, not in being a "master of the pen."

Mr. Koller speaks of "persistence" on our parts; the few letters that I have had the honor of having published were not the result of persistence, Doctor Sloane will vouch for this I am sure.

When I sit down and pound out a letter to A. S. it is like writing to a friend, I know that all editors (Doctor Sloane not excluded) appreciate criticism and kindly suggestions and comments from their readers, by this, and only this can they determine what their reading public desires.

Perhaps Mr. Koller will admit that he has judged us "nuts" a bit too harshly, please understand that our letters are not written for the mere purpose of self-glorification, nor to see our name in print. They are written to help the Science Fiction Cause by lending our views and helpful suggestions. *C'est ça.*

Fred Anger,
2700 Webster Street,
Berkeley, California.

(You speak of pounding out a letter to A. S., and it certainly is writing to a friend, as you expressed it. We want to be told of our faults as well as of our merits, for there are lots of both. Like everybody else authors and edi-

tors must fall by the way. There is a theory which is really a good one to the effect that a person who never makes a mistake is far from interesting. We cannot imagine a writer who develops fiction of the type which we want not making some mistakes in his work. The Editorial staff of AMAZING STORIES watches out for these mistakes, with the firm conviction that some escape us. We have put in your concluding French sentence as you wrote it. We wonder if you meant, *C'est tout!*—EDITOR.)

Favorable Criticism of Recent Stories—
The Larger Size Preferred

Editor, AMAZING STORIES:

I have noticed an improvement in the stories in the past two issues of AMAZING STORIES. This is gratifying indeed and I only hope this change for the better continues.

"The Pool of Life" I found so fascinating I could not lay the magazine down until the story was completed. Come often, Mr. Miller.

"Eighty-five and Eighty-seven" by Eando Binder is one of the best shorts you have published in ages. Plenty of science, but written in such a way that the story was not at all text-bookish and dull. I demand a sequel.

"Through the Andes" is turning out to be the type of story I remember Verrill for. The characters certainly are interesting. The fault with a good many science fiction authors is the fact that they do not pay enough attention to characterization.

"Moon Pirates" ended quite happily.

"Buried in Space" by Lawrence Smith was a nice short.

* * * *

If you could use a smoother finished paper, the print would be much clearer and easier to read. The covers would show up better if a more glossy cover paper were used.

I hope that you do return to larger size at the beginning of the next volume as it will be the beginning of AMAZING STORIES' tenth year. Please correct your volume numbers to read Vol. 10, No. 1, with the April, 1935, issue instead of Vol. 9, No. 12. You skipped an issue last year and there should have been but 11 issues in the 8th volume. You can still make the correction by having but 11 issues in the 9th volume.

Jack Darrow,
4224 N. Sawyer Av.,
Chicago,
Ill.

(You are right in your remarks concerning the characters in Verrill's story. They are drawn with unusual skill and could well be studied by story tellers. As regards the size of the magazine there's no telling what the future may bring forth.—EDITOR.)

A Note on Our Best Authors and on
Some Stories

Editor, AMAZING STORIES:

I have one hundred and two AMAZING STORIES on hand and have read them all. I

have found that the types of story which appeals most to me are the ones dealing with prehistoric times, and adventures far below the surface of the earth.

The best authors in my opinion of this type of story are A. Hyatt Verrill and Edgar Rice Burroughs.

Verrill's "Through the Andes" starts out excellently.

You have published only two of Burroughs' novels, namely "The Land That Time Forgot" and "Master Mind of Mars." I enjoyed these stories immensely. Why not reprint more of Burroughs' works. There are many to choose from, and I am sure they would be well received.

John Lemberakes,
54 North Willow Street,
Trenton, New Jersey.

(This letter speaks for itself and we are always glad to publish simple criticisms and comments on the work of those whom we call our authors.—EDITOR.)

Comments on a Number of Our Stories
Editor, AMAZING STORIES:

The August cover of AMAZING STORIES was not quite so august nor amazing. It would have been much better as an inside illustration. Morey has fallen down lately. A good cover with plenty of scientific apparatus and exciting action has not graced the cover for a long time. If Morey would only draw another cover like the one for "The Lady of Light."

The Editorials continue to be interesting. "Life Everlasting" was great, superb, and marvelous. Keller is a master. His stories are masterpieces. I repeat, the story was excellent.

"The Velocity of Escape" was excellent. Skidmore is swell. The story was well written and exciting. I expect a sequel soon. Morey's illustration for this story was a great improvement.

Santon A. Coblenz came through again with his "In the Footsteps of the Wasps." The idea is not absolutely new, but was written well enough to cover his point. Coblenz's style is truly enjoyable.

"North God's Temple" was very good. I expected something different though.

"Shot into Space" was also very good. Interplanetary stories are still welcome. The idea of space-voyaging still retains its fascination for me.

"Photo Control" was a good story. It had me guessing. The termination was certainly odd. It was the last thing I expected to happen.

The September AMAZING STORIES cover was much better. However there is still much room for improvement.

Editorial O. K.

The two serials promise to be good.

"The Plutonian Drug" was good. I wouldn't like to play ghost with Clark Ashlock Smith. I would not have the ghost of a chance.

"The Master Minds of Venus" was excellent. The story was interesting, well written, and much to my liking.

"The Beam" was very good, although the science seemed faulty. After all a human is not a yeast cell and does not reproduce by fission.

"The Barrier" was O. K. Harl Vincent has done better.

"The Molecule Trapper" was very good.

Now for some advisory hints. The title, AMAZING STORIES on the cover, should be changed to the old comet tail. Its reminiscent of the magazine, and can be noticed more easily on the stands.

Raymond Peel Mariella,
5873 Woodcrest Avenue,
Philadelphia, Pa.

(The August cover of AMAZING STORIES has been greatly admired. Dr. Keller certainly distinguished himself in this relation. We feel that it is one of his best. He certainly has a wonderful knack of writing, if we may so express it. As a leading authority on psychotherapy, fairly standing at the head of his profession, he is peculiarly fitted to write such a story as "Life Everlasting." You speak of there being room for improvement in our covers; there are very few things in this world in which there is no room for that. The trouble with changing the letters of the title on the cover is that there is hardly room for the old inscription.—EUREKA.)

A Letter with a Nice Bit of Humor at the End
Editor, AMAZING STORIES:

Although I am a constant reader of your magazine, I have never written before. I find the comments on the stories very interesting, but I have a suggestion which I and others may find more interesting. Comments in "Discussions" heretofore have been mainly based on the literary value of the stories. My suggestion is to devote a few pages to discuss the science involved or connected with A. S. In these few pages "extravagant fiction" could be made to seem more realistic, and scientific questions puzzling the minds of the readers could be expounded. Another reason for the including of these pages is that the literary value of the stories would be improved. Although the scientific facts in the stories are interesting, they sometime clutter up the story and detract from the emotional interest. And if the beloved editor allows me, let me say that the work on these pages would be trifling since many of the questions could be answered by the authors of the stories and readers who are versed in Technica. This is just a suggestion, but I think it is a practical one. There is just one test; that is, to get the opinions of the readers. And now, for other things. That "Fall Quarterly" is a wow. I enjoyed everything in the issue except the "Breathing of Fishes," and I especially enjoyed "The Sunken World," "Barton's Island," "The Malignant Entity," and "Radio Robbery" were

also swell even though I have read them before. One thing, however, does not leave my mind at rest: That is, that Democracy is no longer considered as the best form of government by most of the learned people. Please give us some more humor (à la Bob Olsen) in the stories. When reading "The Fourth Dimensional Auto-Parker," the rest of the family thought I was nuts because of such frequent bursts of laughter. Until this letter appears in print, I am

John W. E. Griemsmann,
8725 98th Street,
Woodhaven, New York.

(There is one section of our magazine which, in a sense, takes care of itself and that is the somewhat extended number of letters from our readers which are put in with very few alterations, but practically word for word as they write them. You must realize that our magazine is read by many whose knowledge of science is very elementary and we rarely feel that the simpler facts of science appear too often in our stories. Editorially, we wish they appeared more often. You will get a lot more from Bob Olsen who is a fast friend of AMAZING STORIES, and you are only one of many readers who are quite devoted to this writer. How you could object to the few lines about the breathing of fishes was as deep a mystery to the Editor as is the breathing of fishes to him.—EDITOR.)

A Very Nice Letter from the Continent
We Have Learned to Call "Aussie"
Editor, AMAZING STORIES:

I think this is the first time I have written you or your Mag. The first time I read a copy was some years ago, the "Skylark Three" was running at the time, then I lost sight of it again—only to see it recently and now, more of them. "Triplanetary" was one of the best I have read, will Ed. Smith write another yarn around the same characters in the near future? And about the "Posi and Nega" stories, will there be some more? Give us a reprint of the "Skylark" series, I missed part of them but what I read was very interesting.

Here's wishing you the best in stories.

Jack Abraham,
91 Australia Street,
Camperdown,
Sydney,
Australia.

P. S.—In anticipation of your next issue, the Lost City, is about the best I have read this year.

J. A.

(We always get nice letters from the distant side of our terrestrial globe. We do not expect a continuation of Dr. Smith's interplanetary story. Posi and Nega are still travelling, you will hear from them soon. The author of *The Second Deluge* is dead. We have doubts as to reprinting the Skylark stories. It is a real compliment and pleasure to hear from a reader at 155° east longitude.—EUREKA.)

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