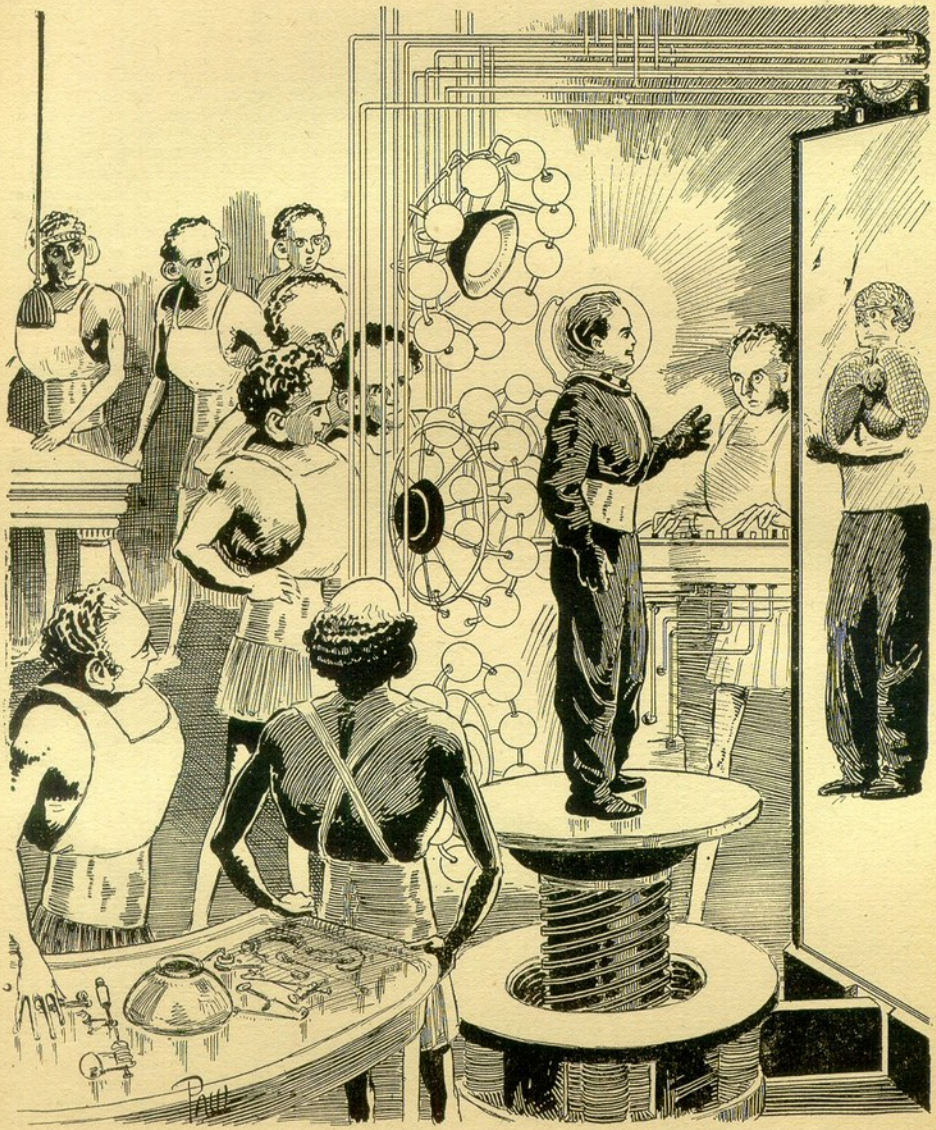
# The RETURN OF THE MARTIANS

## by Cecil B. White

A Sequel to "The Retreat to Mars"



I was suddenly bathed in a greenish glow and on the screen before me there appeared an image of my figure as seen from the front. Suddenly the chest of my protecting suit seemed to be sliced away in the figure, then the flash appeared. . . . Gradually the section plane cut deeper and deeper into my body until the lungs, heart and stomach were shown in section.

## CHAPTER I

LITTLE did I dream, when I penned the account of Dr. Hargraves' epoch-making discovery under the title of "The Retreat to Mars," which appeared in the August issue of this publication, that even more astounding events were to take place within a few short months.

Soon after I had forwarded the narrative to the Editor, I received a telegram from Washington, signed by Hargraves, asking me to come at the earliest possible moment. Naturally, it was not long before I was on my way in response to his request, for I knew that my friend would not call me away from my work without good reasons. Moreover, my expenses were to be paid, and that appealed to my Scottish blood!

Hargraves met me at the depot on my arrival in Washington and whisked me away to his apartment at once. No mention, other than that it was something big, was made of the cause of his telegram, until I was comfortably settled in his study, after a good hot shower and a general clean-up necessitated by my journey.

When we were snugly ensconsed in front of a comfortable open fire, my host took a pile of foolscap and drawings from a side table, and laying them on his knee, he leaned back in his chair and began:

"I have here a translation of one of the volumes contained in the library and need the assistance of a psychologist and an astronomer to work out details of the apparatus described here and, afterwards, in the operation thereof. It is nothing less than a signaling apparatus with which we can get into communication with the Martians—that is, if they are still there," he added. "It is really a type of radio transmitter, but to me it appears to be totally new in principle. Knowing that you are a radio enthusiast and that you have done much work on the subject, I secured permission to get you to oversee the construction of the apparatus and assist me in getting in touch with the Martians. There are many men in Washington who would be glad to give an arm for the opportunity I offer you, but many of the secrets disclosed in the transcribed library are to become government property, and you will see, there are some that will be of inestimable value to the country holding them. For this reason, we prefer to call in one who has already proved himself trustworthy. If you accept the appointment and pledge yourself to secrecy, all the information that you need will be placed at your disposal. The necessary money for the experiment will be granted without demur, although we have made but the roughest estimate of the cost as yet. You will be granted a salary which, I think, will be satisfactory to you, while you are engaged in the work. Will you accept the appointment?"

"I should say I will accept!" I exclaimed. "It is no use my telling you how delighted I am that you should have given me this opportunity. There is a young chap just coming along and attending University who will be only too glad to carry on in my absence. I will get him to take over my share of the observing while I am away."

"We will settle things tomorrow, then," said Hargraves. "I will take you over to see the 'Chief,' who will make all the necessary arrangements. You can go over this translation and the diagrams, which I have had copied, this evening after dinner—it's nearly time for that now. Like to take a glance at the drawings before going in?"

I took the proffered papers and glanced at the diagrams. As Dr. Hargraves had intimated, the ideas were new to us. Though it would be classed as a radio transmitter, it was totally different to anything I had ever seen before. Gone were the familiar valves and oscillating circuits, they were replaced by purely mechanical methods of setting up the ether disturbances. The instrument was directional, sending out a beam that deviated from parallelism by an extremely small amount, hence the output of the arrangement was conserved, necessitating but a minute fraction of the power that would be required to operate even the most efficient of our beam transmitters.

During dinner we discussed the probability of our signals being heard. According to Hargraves, the Martians had erected permanent receivers at various points on the planet, connected with an alarm and recording system, so that as soon as the Earth replied to the long-delayed message, the inhabitants of the other planet would know that we had at last found their gift to us. They had promised that the receivers would remain in place and in order, as long as there was the slightest chance that the Earth would reply.

At the conclusion of the meal, we again repaired to the doctor's study and there I read the instructions for making the receiver and the transmitter. With all the facilities that were to be placed at my disposal, I knew that it would not be long before the first signal would be directed towards its goal. I could not understand the fundamental principles on which the operation of the apparatus was based, but from references given in the text I learned that I would find them elucidated in another volume; Hargraves promised to have this translated for me immediately.

*THOSE of our readers who have read "The Retreat to Mars" will be interested in the present story, which is a sequel thereto. Mr. White, the author, who is an astronomer, is so well informed about this subject, that we read with bated breath, his most unusual, as well as powerfully written story. Many things are brought out here, which, very likely, the average reader never realizes, yet the story is not technical at all. On the contrary, it will hold the interest of practically every reader, no matter what his inclinations may be.*

The following morning I was introduced to Dr. Smythe, the head of the department under which I was to work, and arrangements were quickly made that were satisfactory to all concerned. With three assistants I set to work without losing any time and in a few days the instruments were well under way. The work was carefully apportioned among the three men so that no clue as to the exact nature of the apparatus they were constructing could be obtained by any one of them, and the secrets of the instruments could not leak out. As it came to me, part by part, I carefully checked them over from the original specifications and assembled them into the components of the finished transmitter. Gradually I began to understand the exact nature of the power used, and as I studied the works referred to in the text of the instructions, I learned how to adjust and operate the apparatus when in operation.

As soon as the transmitter was completely assembled, Hargraves and I left Washington for the west coast, where my observatory is located, to install, test and adjust it. A powerful telescope was needed to direct the beam of the transmitter to the far distant receivers, and the necessary instructions for its construction and its operation were given. We had advanced more than far enough to take care of this part of the work ourselves, so these instructions were only read in a cursory manner, though they contained several new and far-reaching ideas that would repay later study. It was unnecessary to construct an instrument specially for this work, as the one I owned in my observatory was powerful enough, and, with the slight modifications we were able to make, we could use it in conjunction with the transmitter. The receiver lacked a few minor parts when we left Washington, and these were to be forwarded to us as soon as they were finished.

The projector was connected to the telescope in due course, all other work being suspended, and was adjusted so that the axis of projection was parallel to the optical axis of the telescope. This adjustment was very delicate for, as I mentioned before, the beam was practically non-divergent and, as the area it would cover on the planet's surface would subtend a solid angle of but four seconds of arc, the greatest care had to be taken in making this adjustment. We had also to ascertain the effects of flexure of the telescope tube in different positions and to make a table of the necessary corrections to be applied to eliminate this error in setting.

Through some misunderstanding, the parts for the receiver had not arrived by the time we were ready to make our first attempt to communicate with Mars. Nevertheless, we decided to make an attempt at letting our neighbors know that we were at last ready to communicate with them.

Anxiously we watched the sky the afternoon before the actual test took place, but it was cloudless and there was every indication of a good night. I checked up my computations carefully, so that I was sure that there were no mistakes in the position of the points to which the telescope had to be directed in order that the signals might reach the Martian receivers. It was necessary, of course, to direct the beam to a point where the receiver would be when the signals reached the planet—the velocity of the radio waves being finite. Three factors had to be taken into consideration on directing the beam. The first was that the planet was not where we observed it to be for, due to the finite velocity of light, the planet was somewhat ahead of the point where it was observed, the amount depending upon the relative positions and distances of the Earth and Mars in their orbits; then again the time that the signals would take to reach the planet had to be taken into consideration. The second correction was due to the refraction a beam of light suffers on entering our atmosphere except when coming vertically downward, this phenomenon making an object appear higher in the heavens than it really is. The third factor has already been mentioned, that due to the flexure of the telescope tube.

Two o'clock found the planet high enough in the southeast to warrant the attempt. The seeing was fair and with a power of six-hundred it was not difficult to set on the computed position. Hargraves pressed a key of the twelve-keyed keyboard used and a single long dash was sent on its way, hurtling with the speed of light towards its goal, 82,000,000 miles away.

The Martian code is difficult to describe without entering into it fully. It was sent with the aid of twelve keys, each key altering the characteristic form of the "carrier-wave." The keys could be pressed in combinations, with the result that a competent operator could send a message almost as fast as speech. Hargraves had become quite an adept with it and I had made a little progress, but not enough to transmit well. That was left to my companion.

Following a series of calling dashes, Hargraves sent off the following communication:

"We have discovered the library that was left by your pioneers after their attempt to colonize this planet had failed and, according to the instructions left for the discoverers, we are attempting to establish communication with you. Do not reply to this message, because our receiver has not yet been installed. We will inform you when we are ready. We are now going to repeat the signals to another receiving station in case this is not heard. We are transmitting from a point on the Earth which coordinates 78.856 and 19.440 N."

The coordinates that Hargraves gave in his message were obtained from one of the Martian maps made during their stay on this planet. It must be remembered that any translation that can be made from the Martian language into our own, must, of necessity, be decidedly free. The two languages have nothing in common, only the thought-forms can be given. For this reason, the above is but a free translation of the messages sent hurtling through space to the planet of mystery at the rate of 186,000 miles per second.

The call signal was repeated four times, and four times the same message was sent out that night, each time to a different receiver, in the hope that one of them, at least, would reach its destination. We would have to wait until the remainder of our receiver arrived before we could learn if we had been successful or not.

Four days later the receiver was completed and was rapidly installed, but much to our chagrin the night was cloudy and never once did we catch a glimpse of the planet, although the telescope was kept pointed to it throughout the night and the eyepiece was never left for an instant when there was the slightest chance of catching a glimpse of it.

The following night was more favorable, and we were able to see the planet long enough at a time to allow a setting to be made on the computed position and to send our call out once more, this time followed by a short announcement to the effect that we were ready to receive.

For fifteen minutes, in which time a returning signal should have reached us, we waited anxiously. Minute by minute passed without a single sound emanating from the receiver phones, with which we were both equipped. Our attempt, we thought, had failed. Again we tried; and for a few minutes, the clouds parted long enough for us to train the beam on a second station. Again we waited anxiously, but no reply was heard. Clouds prevented us from making another attempt that night, and with the dawn we closed up, filled with disappointment.

I awoke about eleven o'clock to hear Hargraves calling me. He entered at my answer and in his hand he held a copy of a late edition of the morning paper.

"Look at this," he said, pointing to one of the front page column heads. This is what I read:

RADIO EXPERIMENTER CLAIMS TO HAVE HEARD MESSAGE FROM MARS

*Calgary, Alta.*—Robert Eastwood, a radio experimenter of this city, claims to have heard signals last night which he believes to have come from an extra-terrestrial source. The signals, Mr. Eastwood states, were extremely faint and were heard when he was measuring static intensity at different wave-lengths. The amplifier consisted of six stages of audio frequency, preceded by a very sensitive detector of his own invention. The signals were likened to the whistle heard in a regenerative receiver and, as his detector cannot oscillate, they could not be due to that cause. They were badly distorted by the high amplification used.

It seems most likely that these were the harmonics of some commercial transmitter rather than what Mr. Eastwood claims them to be, though he is most emphatic in his denial of this possibility.

"Have I made a mistake in the position of the receiver that I gave them?" I exclaimed, jumping out of bed and hurrying to the den in my dressing gown. "No," I replied to my own question, "there has been no mistake. I wonder if those signals were meant for us."

"A very strange coincidence if they were not," replied my companion. "Can the Martians have made a mistake in our position or an error in their direction?"

"Hardly likely," I exclaimed. "Wait a minute, though, I have an idea." Going to the telephone I called the meteorological observatory, the director of which is a friend of mine, and asked for a report on the general cloudiness of the night before. The reply was what I expected—Clouds covered the northwestern States and western Canada as far east as the Great Lakes; the general conditions over the western hemisphere, north of the tropics, were cloudy. Evidently the Martians could not get their bearings well enough to direct their beam to the correct position for it must be remembered that we were on the unilluminated side of the Earth. Eastwood had heard the signals intended for us, we thought.

The cloudy spell broke that afternoon, leaving us with a clear sky. Full of expectation, we sent our signals out once more as soon as the planet was in position. Twenty minutes after our first call, the headphones, with which we were both equipped, clattered violently, causing us to remove them. Reducing the intensity, we replaced them and Hargraves commenced to put into shorthand, the message that roared through.

"Train upon the Elysium receiver," commanded my companion, after the phones had ceased sounding. I rapidly computed the new setting point and directed the telescope thereon.

At my "All set," another message was sent out. Guiding the telescope, as I was, I had no idea of what was going out or coming in. I would have to wait until we were all through before I could learn the context of the messages.

It was the biggest thrill I had ever experienced as I sat back there on the observing ladder, with my eyes glued to the binocular eyepiece and my fingers on the slow motion controls with which I corrected the slight irregularities of the driving clock. Now and then the image would be blurred by a wave of poor seeing, and I would strain to hold the cross wires on the point on which I was guiding, my landmarks having disappeared in the general blur.

Two hours were taken up in this way, without a break other than was necessary to turn the dome or shift the ladder, as the rotation of the Earth carried the planet across the sky. Eventually Hargraves made the cryptic remark, "Well, that's that! All through, old man. Come and get some coffee and have a smoke; you need it. I'll read this out to you."

I was glad of the respite, for the strain had been great and my eyes and head ached with the intensity of my efforts.

## CHAPTER II

IT would take up too much space in this account to repeat the messages sent and received, word for word. The reader who wishes to read the exact messages will find them published in the special bulletin issued by my observatory.

Our first message was to the effect that we had attempted to communicate with them the preceding night and were now ready to receive. Then we reported that signals had been heard by an experimenter in another locality, some three hundred miles away, and inquired if these emanated from their transmitter. At this we stood by for the return message, which, as you know, nearly deafened us with its intensity. The message ran as follows:

"Congratulations. We were expecting the library to be found about this time. Our observations showed that it was still where we left it. We heard all your signals; they were quite strong and well directed. It is unfortunate that you did not hear us last night; the error was ours. Conditions at our transmitting station were none too good, and this, combined with the masking of the lights of your cities by dense clouds, caused an error to be made. You were evidently just outside the beam. Tell us how the discovery of the library came about. Now transmit to us for 0.0049 day*—during this interval we will transmit to you, then stop to receive the message, which will take that time to reach you. In this way no time will be lost."

Following the receipt of this message, Hargraves sent to our Martians an account of his deductions and the resulting discovery of the library. A few moments after his conclusion, the phones sounded again and a communication of about seven minutes' duration was received. This was followed by others at intervals of the same length. My companion's messages were accounts of the progress of civilization on this planet and need not be recorded here. The following is an abstract of those received:

Shortly after the *Retreat to Mars,* another unforeseen catastrophe overtook the Martians. The survivors of the expedition, unknown to them, carried the seed of death back to the parent planet. All known diseases had long since been eradicated from

*The decimal amounts to nearly seven minutes. The Martians, being unaware of our system of measuring time were compelled to adopt this method of conveying the time interval to us. This system is used a great deal in astronomical work for, as will be seen, it facilitates computation considerably.

the planet Mars, but the returning pioneers carried with them a new and more malignant enemy than had heretofore been encountered. This did not attack those who carried it back with them, as their special physique and the acclimatization to which they had been subjected, had rendered them immune to it, even though they were carriers. Within a year of the return of the survivors, the wonderful system of the Martians was sadly disorganized; over half the population were dead or dying from the awful plague which swept over the planet like a scourge. Despite their knowledge of bacteriology and medicine, the plague continued unchecked until no more than one hundred and fifty of the original millions of the planet's teeming population were left alive. All these were survivors of that ill-fated expedition to the Earth.

A stupendous task confronted the survivors. Men of their calibre could not stand by and see all that they had gained lost without a struggle. To the everlasting credit of those heroes of the past, let it be said that the loss was small and the Martians of today have them to thank for the advanced position they hold. Picture, if you will, the problem before them. The survivors, few of whom were scientists, as they understood the term, had to set to work to educate their offspring and to inoculate them with the high ideals held by the vanished Martian community. The sciences which were first stressed were those of fundamental importance to the economic life of the race. They included biology, chemistry and engineering in all its branches, all the applied sciences which were vital to the perpetuation of the race.

It must be remembered that the planet was fast losing its water supply and that the first thing to do was to continue the operation of the vast works already constructed to conserve the planet's vital fluid. Truly a tremendous task for so few.

A century later saw the planet's population increased to a little over twenty thousand inhabitants. These were divided into district groups, each group being responsible for the upkeep of all the state machinery within its borders—a tremendous task, for much of the apparatus and plants had suffered from neglect during the early part of the century. Thanks to the alloy—which we have called arenium —that was used in its construction, corrosion and oxidation did not affect the pumping machinery of the water conservation system; in many places. though, neglect had played its part in rendering inoperative many of the great public power plants.

The social system, that had been developed before the cataclysm, held steadfast throughout the greatest trials that any system could be subjected to, and never once did it waver throughout the darkest times the planet ever knew. It must be said, however, that the survivors and their descendants continued with the desperate remedy, instituted long before, of eliminating all who would or could not work under their system, thus saving the unity of the whole at the expense of a few.

Under these adverse conditions, it is not to be wondered at that the Martians made no progress. Until they discovered how to conquer the subtle disease that ever threatened them, little advance was made in any of the sciences except bacteriology and medicine. Eventually, the corps of workers who were continually engaged with the problem discovered the means of eradicating the loathsome disease, which was akin to leprosy. From that time their advance had been slow but steady.

It will be of interest to my readers, I think, to record here the report we received on the reception of our first signals. The first receiver we had trained on was one located in the Solis Lacus region, the time there would correspond to about 2 P. M. here. This particular receiver was located in an observatory and the quiet of the afternoon had been broken by the mellow sound of the alarm, followed a few moments later by a second. Immediately the members of the observatory staff were in a state of suppressed excitement; the Earth had awakened from her long lethargy. Connections were at once made to all the public annunciators and before the message came through, the whole of the planet knew that the Earth was in communication with them at last. The direction indicators that were at once applied, gave them the position of our transmitter. They recognized that the signals were coming from a building they had always suspected of being an observatory. A few minutes later the second receiver, the one in the region we call Arcadia, sounded its alarm and the second message—a repetition of the first, was received.

I was somewhat surprised at the fact that the Martians admitted showing excitement at the receipt of our signals, for I had thought that the emotions would have become practically non-existent with the high development of the Martians. We learned later that they had wisely preserved these emotions, some being developed even. Had this not been the case they would have become machine-like automatons and this state was looked upon by them with horror; only the undesirable had been eliminated.

On the conclusion of our inter-communication, they asked us to call them the following night as there was an important problem under discussion and they expected to give us some interesting information.

## CHAPTER III

THE following night the sky cleared about eleven o'clock, much to our relief, and remained clear throughout the rest of the night. Fifteen minutes after our calling signal had been sent out, the answer arrived. As the message came through, I heard Hargraves exclaim, "Good Lord!" and then relapse into silence. Imagine my curiosity! The message ceased and Hargraves turned to me with the question, "How would you like a trip to Mars?"

"Are you joking?" I asked in amazement. "No, I am not," he replied. "The opportunity is offered to us. Do you accept?"

"Of course I accept," I answered at once. "How is the journey to be made?"

"I'll tell you later, if you are sure you want to go. We can take two others along with us. I am going." With that he turned to the keyboard and sent a short message.

In a few minutes the Martian signals commenced again, and continued for the space of perhaps thirty minutes. When they ceased, my companion said, much to my surprise, "That is all for this time."

"What is wrong?" I asked, for we had arranged to ask quite a number of questions in the hope of solving some of our individual problems. "You

haven't actually sent out all that stuff, have you?"

"No need to," was his reply. "We are going there to find things out first hand."

"When?" I asked.

"In about fifteen days," Hargraves informed me. "Listen to this." I sat on the steps of the observing ladder while he read the message he received. It ran as follows:

"Since receiving your first signal, we have been considering which would be the best method of learning all we can from you, as well as instructing you in all the things that we think will be of value to you. It has been decided that the best method will be for you to visit us during the coming conjunction of your planet. To this effect we will send you one of our space machines to bring you to this planet. As you probably know, we are not able to withstand the extra strain to which our bodies are subjected on the Earth, so that we are not able to stay for any length of time. Moreover, we do not wish to run the risk of bringing disease back to our planet again, so we believe it will be best for you to come here with our representatives in the machine that will be sent for you. You will understand, we feel sure, that it is necessary for us to safeguard the health of this planet above all things, hence you will not feel that you are subjected to indignities, if special precautions are taken for our protection.

"The constitution of the atmospheres of the two planets is nearly identical, so that you will suffer no inconveniences in that respect though the pressure will have to be increased for you. We will supply you with protective coverings in which the pressure can be kept suitable to your well-being. We would like to obtain as comprehensive a collection of your books on social, engineering and scientific subjects as possible. If you can obtain these for us, let us know." (Hargraves informed them that this could be done.)

"If you consent, the machine will leave here as soon as it is equipped and should arrive at its destination in fifteen days' time. We desire you to be prepared by then, as it is not advisable that our envoy stay on the Earth any length of time. If these arrangements are suitable for you, let us know. We will resume in five minutes."

When Mars is in opposition to the Earth, the Earth is in conjunction with the sun to observers on Mars.

At this juncture Hargraves sent the message signifying our assent to the Martian plans. During the interval that had to elapse until our message was received, the following came through:

"You may wonder whether we have visited the Earth throughout the ages that have passed since our first experience there. We have, several times, but we found the conditions not ripe for any attempt to communicate with you. Consternation and terror was manifested by those that saw us even one hundred years ago, our year being equal to 687 of your days, 669 of ours; since then, however, you have evidently made rapid progress. The rapidity of your recent advancement shows that your men of science, at least, are breaking away from the savage superstition that always surrounds a race in its development. You have learned, we believe, the great lesson that, because a thing or phenomenon is not understood, it is not necessary to call in unnatural or supernatural explanations to account for it."

Then came a brief pause followed by:

"Your acceptance of our offer has been received. It will be as well for you to prepare a store of provisions to last you at least fifty days, in case that the food which we can supply proves unsuitable for you. In case you have perishable supplies, we will provide methods of preserving them. Our machine will 'land' on the water of the landlocked bay due south of your observatory, unless you inform us that it is inadvisable. It will aid the pilot if you mark your position with a large white banner with a black circle upon it. Kindly be prepared to board the machine at once. Unless you have some important question to put to us, or information to give us, this will be the last time we will communicate with you, until we see you here on this planet. We will close this communication by wishing you an interesting and profitable voyage to this parent planet of yours."

"Well, old man, what do you think of that?" said Hargraves, as he concluded reading the messages.

"I don't know what to think of it," I replied. "It seems more like a dream than reality. I'll believe it to be true when the Martians arrive."

"I feel somewhat like that myself," said my companion. "It does seem too remarkable to be true. However, I guess we had better send a wire to Washington for those books, if they are to be here in time. We have plenty to do before we leave. Now, then, who are to be the other two that will accompany us?"

"I would like to take my wife along. I am sure she would like to go," I said. "We should take a member of the gentler sex along with us, anyhow, don't you think so?"

"Of course, she must come along with us," was Hargrave's comment. "Who else?"

"Nay. That is up to you," I replied. "I suppose that one of the Washington people should go. They made this thing possible."

"I think that I will leave it to Smythe to select the fourth member. I'll wire him right away," said Hargraves.

The following days kept us busily employed, for there were many preparations to be made. My wife had agreed to accompany us after only a moment's hesitation, and many of her suggestions were exceedingly useful to us. The books arrived from Washington with a day to spare. There were nine large crates of them. I wondered if there would be room for them all in the space flyer.

The fourth member of our party was Dr. Smythe himself. He decided to accompany us as soon as he read Hargrave's telegram. He had taken the greatest interest in Hargraves' work and read the Martian language as well as the discoverer of the library could. He would be an exceedingly useful member of the party.

## CHAPTER IV

NATURALLY we were all on the *qui vive* on the day that the Martians were expected, and never before were the heavens watched with greater excitement. At about three o'clock, a dark speck was sighted in the blue which rapidly became larger, revealing it to be a machine—evidently the one we expected. After a long spiral glide, the machine struck the water in a cloud of

spray. It was traveling at a high rate of speed—about two hundred and fifty miles an hour, I judged—when it landed, and shot along to the dock, where we waited. We had marked our position, as we had been directed. Luckily, the dock, which belonged to a marine engineering firm, was deserted, for it was Saturday afternoon and the employees had left. Only the watchman was present, besides ourselves, as the space flyer swung alongside. The machine was about one hundred and twenty-five feet long, with a diameter of perhaps thirty feet. It was torpedo-shaped, with single wings, and a span of a good hundred feet formed the supporting surfaces when in the air. It had the familiar rudder and elevators, but it lacked any visible means of propulsion.

A large glazed port swung inwards as we pulled the machine to the dock, disclosing a figure which at first glance appeared to be clad in old-fashioned armor. He was a giant, fully nine feet tall and, if one could judge from his protecting armor, with a chest like a barrel. His head was enclosed in a transparent globe, which fitted into the neck-piece of his covering, permitting us to see the smile of greeting upon his rather handsome features. His forehead was broad and high, and his head was crowned with a mass of curly chestnut hair.

What the watchman thought, I do not know, but I heard a gasp and a "Lor' lumme!" from him. We had told no one of the intended visit.

As our little group approached the open port, the giant handed us a sheet of material upon which something was written. Hargraves read it and turned to us, saying, "Bring the baggage to the edge of the dock." With the aid of the watchman, we trundled the cases up to the machine on a hand truck that we had borrowed, and as each piece was brought up, a jointed arm, built up on the lazy tongs principle, shot out and clasped it, whisking it away into the interior of the machine. In a very short time all our effects were on board and we followed.

We found ourselves in a broad passageway traversing the craft, at the opposite end of which was a second glazed port similar to the one that now swung to behind us. The space was half full of the baggage that had come aboard. Leading aft was another smaller passage, and down this we were led by our guide. Four compartments opened off from this alley and we were directed into one of them. As we entered, there came a rushing sound and the machine began to plough slowly through the water. Through the broad glazed windows of the cabin we saw the dock slide by. The sound grew to a roar and the water slipped past us faster and faster, until our view was obscured by a dense cloud of spray. Suddenly the spray cleared and we saw the surface of the water dropping rapidly away from us. We were aloft and swinging northward at an enormous speed over the harbor.

The land dropped away and the topography of Vancouver Island unfolded itself below, its lakes appearing like little gems glittering in the sunlight. Northward we flew, ever climbing. Soon we could descry the smoke of Vancouver, lying like a pall over Burrard Inlet, and the Fraser River winding eastward into the distant hills. Ever climbing at a terrific rate, we sped over the mountains while the fjords of the coast appeared below us and the Queen Charlotte Islands rose out of the blue Pacific to the northwest.

So great was our pace, that the land, many miles below, could be seen swinging by like a panorama. We were up in the rare atmosphere and the roar of the driving jets, as I supposed it to be, gradually diminished in intensity with the lessening atmospheric pressure until presently it was but a faint murmur. Gradually, even this faint sound faded out as we passed beyond the limits of the earth's envelope and the familiar blue of the sky gave way to the blackness of interstellar space, studded with its brilliant suns.

The cabin was now brilliantly lighted by circular transluscent plates on the walls and ceiling, behind which the source of light was hidden. This illumination was now necessary, for the diffuse light which illuminates a room through its windows, when there is a considerable amount of air present, was now lacking, only a bright patch of sunlight appearing on the forward bulkhead of the cabin, which shed a faint light in the cabin.

I am afraid that the impression we had given our first Martian acquaintance was not very favorable, for, in the excitement and interest of leaving the Earth, we had neglected the elements of courtesy. This thought seemed to strike us all about the same time, for Hargraves turned and wrote a short sentence on one of the pads with which we had provided ourselves, and handed it to the Martian, who had remained seated since he ushered us into this cabin. After reading it, he took a small box from his belt where it hung, and connected a tube, leading from it to the lower part of his helmet. He then spoke for a few moments. The voice, though muffled by the casing, seemed soft and melodious. After he had spoken, he took a sheet of paper-like substance from the box, where it had gradually jerked into view as he spoke, and handed it to Hargraves.

"I apologized," said Hargraves to us, "for our rudeness in neglecting our host the way we did, and explained that the novelty of the situation was the cause. Our friend here understands how we feel about it. His note goes on to explain that the covering he wears is to protect him from the danger of contracting disease, as well as to protect his body from the pressure of the air in the space flyer, which will be kept at the barometric height we are accustomed to. We will be required to wear somewhat similar suits when we go into other parts of this craft. This portion is sealed off and assigned to our use; there are two sleeping chambers opposite and the cabin is next to this. He will now see about storing our food supplies, if one of us will go with him. By the way, this is the commander of the craft."

My wife and I retired with the skipper after Hargraves had "introduced" us. In the next cabin were several large receptacles built into the wall and fitted with devices to prevent their contents from moving. These were the refrigerators which had been promised us. They were kept at a low temperature by the mixture of chemicals, which absorbed heat on uniting—an endothermic reaction. Arrangements were also supplied for heating and cooking, again of a chemical nature; this time the admixture which gave out heat—an exothermic reaction. Two common examples of these reactions are: The heating of a mixture of unslaked lime and water, which is exothermic, and the cooling of a mixture of sodium hyposulphite (the photographers' "hypo") and water—endothermic. We spent the better part of

an hour transferring our food supplies to the food chests. Eventually we finished and at once repaired to the observation windows of the main cabin.

Dr. Smythe asked the commander for information as to our speed and other details. We were now some five hundred miles above the Earth's surface and, as we could see, over the polar regions. Our speed was then about forty miles per second and was being gradually accelerated until we reached the final velocity of the order of ninety miles per second, which velocity would be retained until we got near to our destination. Our guide then offered to conduct us through the machine and let us meet the other members of the crew, which numbered four. On our acceptance of his offer, he showed us where our suits were stored, assisted us to don them and showed us how to adjust them so that they fitted comfortably.

These suits were much like divers' suits, which likeness was enhanced by the globular helmet which surmounted them. Following their adjustment, we were shown how to control the air filter and the pressure adjustments. We then followed our guide forward into a small chamber on the walls of which were several dials and indicators. This was an air lock, and here the pressure was reduced to that of the other compartments. The air was sterilized and our suits were sprayed. Truly the Martians were taking no chances, nor could we blame them, when we remembered the billions of bacilli that were in our system or lurked in our clothing.

After the lapse of a couple of minutes, a second door was opened and we entered a large room about thirty feet long and the full width of the machine. In the center of it a cylinder, about seven feet high and five feet in diameter, rose up through an opening in the floor. From its top led two large pipes, one passing forward and the other aft. A gentle heat radiated from them. On the forward wall of this cabin, on either side of a central door, were a number of valves and gauges, or indicators of some kind. A second Martian came aft to meet us as we entered. He was heavily bandaged about the thighs and abdomen, but wore no other clothing or ornament. The flesh was brown as though from continual exposure to the sun; his head, like that of his commander, was crowned with curly chestnut hair. He walked with apparent difficulty, to where we stood, with a smile of welcome upon his features; then, turning to his superior, who was relieving himself of his armor, took the automatic writer from him and dictated into the mouthpiece for a few moments; then held out the sheet. Dr. Smythe took it and read aloud for our benefit. It contained a word of welcome and an invitation for us to avail ourselves of the opportunity of having the mechanism of the craft explained. This was accepted with alacrity and the second giant then took us in charge.

This compartment, and the one directly below it, contained the power plant of the space flyer. The central cylinder was the mixing chamber in which the chemical fuel of the craft was forced by injectors. The fuel was in the solid form and was pulverized before going to the injectors. On admixture, it exploded spontaneously and the resulting gases were led forward and aft by the two pipes we saw. The pipes divided into four, each branch supplying a nozzle outside the hull of the craft. These nozzles could be turned and thus the machine was guided when in space—the jets of incandescent gas propelling the machine as a rocket is propelled aloft. The tubes and combustion chamber were covered with insulating jackets to prevent undue loss of heat—heat being synonymous with energy in a heat engine. The pressure in the combustion chamber was of the order of fifteen hundred atmospheres or about twenty-two thousand pounds to the square inch; the temperature being 4,200 degrees absolute, which by subtraction of 273 gives the Centigrade temperature of 3,927 degrees.

The first Martian now joined us, attired in the manner of his companion. This attire was to support their inner organs under the greater strain to which they were subjected on or near the Earth. We were now led through the central door in the bulkhead to the foremost compartment—the control cabin. Here we saw the third member of the crew, of the same fine type as the others, but with slightly darker complexion. He was seated in a comfortable padded chair and his eyes were at the eyepieces of what appeared to be the eye-end of a telescope, as indeed it proved to be. The rounded, transparent nose of the craft gave the pilot a clear view of the heavens ahead of him. Above the control cabin, we were told, there was the objective of a huge refracting telescope. When passing through the atmosphere, a streamline hood swung over this. That accounts for our not having seen it. The focal length of the lens, which was over eight feet in diameter, was about one hundred and twenty feet. Sixty feet away, over our apartment, was a plane mirror which reflected the converging beam back again to a point just ahead of the pilot, where another mirror reflected the beam down to the eyepieces. This huge instrument was necessary in order that the pilot might avoid any small bodies in space, for, with a velocity of such amounts as those we were attaining, it was necessary to see a body at least three hundred miles ahead in order to avoid it. Bodies too small to be seen with the power used were too small to damage the craft. Several times during our journey across the gulf we saw brilliant flashes of light on the transparent nose-cap, due to the impact of small particles of matter. This nose-cap was made of one of the toughest and hardest substances known to the Martians, so hard that it was worked only with the greatest difficulty. Objects to be made of it were usually cast into shape, to avoid machining. The components of the great lens over our heads were made of the same material, though of different densities, in order that the lens might be achromatic.

In front of the pilot was a semi-circular dashboard, on which the various instruments of navigation were mounted. These were pointed out and described to us. An air speed indicator, automatically corrected for varying densities of the atmosphere through which the machine might fly; pressure gauges indicating the pressure in the combustion chamber and the atmospheric pressure; a flow indicator that showed the rate at which the propelling gases left the nozzles, while other instruments supplied the other data that were needed by the pilot in the operation of his craft, such as total-run meter and space-speed indicator. This latter aroused my curiosity. How, I asked, could the velocity of the machine be measured in space? The method was explained to me and the theory of it proved to be quite simple. One of two periscope-like arrange-

ments projected an image of the sun upon the slit of a spectroscope of very high resolving power. One of the sharpest and strongest spectral lines formed by the instrument fell upon two fine sensitive wires. If the line shifted one way or the other, the extra heating effect upon one of the wires caused a flow of electricity to pass through it, which, by an arrangement somewhat like the "Wheatstone bridge," automatically recentered them. The wires were connected to an indicator. As the space flyer approached or receded from the sun, the spectral lines shifted toward the violet or red respectively—the well-known Doppler-Fizeau effect—thus indicating the velocity of the machine with respect to the sun. Knowing the angle between the path of the machine and the line joining the machine and the sun, the true velocity was easily found by an elementary trigonometric computation, which was automatically performed.

On returning to our own quarters we were shown how to operate the air lock so that we could come and go at will. My wife had gone to them some time before and, as we entered, we were pleasantly surprised to find the swinging table spread with a hearty supper. I suddenly realized that I was hungry, and on looking at my watch, was surprised to find that it was after eight o'clock, P.S.T. We had been on our way for five hours. The Earth now appeared as a huge silver crescent with a smaller one, the moon, to the right of and beyond it.

The meal finished, we returned to the pilot cabin to find the fourth and last member of the controls and the Martian he had relieved talking to him. Here we remained, learning more about the strange craft and its operation. The air supply, we learned, was replenished with oxygen and the carbon dioxide removed while the air passed through the filters, which it did every five minutes, as this system was continually in operation. For landing, the hull of the craft was flattened below and stepped like that of a hydroplane; it was also equipped with wheels that disappeared into recesses in the hull, much like our earthly "amphibians."

When we retired, a gulf of half-a-million miles had widened between us and the earth, which now appeared as a crescent twice the size the moon presents as seen from the earth. Cynthia herself was visible, now but a third of her familiar self, beyond and to the right of her big sister. The sun appeared to the left—a flaming orb with a single scarlet prominence at least a quarter-of-a-million miles in height on the western limb.

To complete a rather sketchy description of this, our temporary home, I must mention the arrangement of the sleeping quarters. The beds, couches or berths, which ever you want to call them, were slung in a frame in such a manner as to always remain horizontal; below them were cupboards, in which we could keep our meagre personal effects. The machine had been gradually assuming a tilt upwards towards the bow, until we now had to use the hand-rails, when we moved about the craft. We were rapidly losing weight, too; all our movements were being made with the greatest ease.

## CHAPTER V

THE following day, according to our reckoning, found us nearly two million miles on our way. I was caught unawares on awaking, much to my wife's amusement, for I sat up suddenly in bed as is my wont, only to precipitate myself from the bed until I came into contact with what had been the forward bulkhead, but which now appeared to be the ceiling. It took us some little time to get used to this new state of affairs, and many amusing little incidents took place before we became accustomed to the rapidly vanishing effects of gravity.

Day after day went by uneventfully, and during this time Hargraves and Smythe set to work to master the spoken language of the Martians, which proved an easy task to them. My wife and I also set ourselves the same task and worked at it steadily so that before we arrived at our destination we could make ourselves understood. The language of the Martians is as logical as a language can be; there are no confusing "exceptions" and the verbs are as simple to master, as are the written ones that I described in my first account.

We spent most of our time in the control cabin as we neared our destination and watched the surface features of the ruddy planet unfold as its distance decreased. One afternoon I caught a glimpse of a canal like a spider web on the planet's surface, then another and another until the surface was seen to be covered with an intricate network of them.

On the day before our arrival, we were startled to see brilliant jets of flame shoot ahead of us. They were from the retarding nozzles which the pilot had opened. Almost at once the bow of the machine became its floor. For the past few days there had been no up or down to us; now, with our negative acceleration, the direction in which the craft was pointing became our nadir.

In spite of our suppressed excitement, we slept well and awoke on the eleventh day to find the planet a huge disk slightly to one side of our path. The flow of the jets was increased from time to time as we neared our goal. Our pilot was reducing our speed and directing the craft so that it would strike the upper layers of the atmosphere tangentially with the velocity that would carry the machine round the planet like another satellite in a circular orbit, if all power were cut off.

As we neared the planet, its features became more and more resolved, and I was intensely interested in noting the development of details, which I had observed from the Earth as only the most vaguely defined spots or blurs.

We struck the outpost of the atmosphere over the northern point of the Syrtis Major, the great "Hour Glass Sea," which Huygens had drawn three hundred years ago. Eastward we swept, ever nearing the planet's surface until, when over the region we call Elyseum, the Trivium Charontis, a veritable junction of canals, appeared on the horizon.

The Lucus Triviae of the Trivium was our objective and over this we glided in a great spiral, the "oasis" becoming a tessalated region, centered by a vast city beneath our feet. In a couple of minutes we were skimming the roofs of that city; then, as a vast pile loomed ahead of us, there was a slight jar and the machine was rolling along a smooth runway. We had landed on one of the galleries of a huge pyramidal building.

A port below the wings was opened as the machine came to rest and the commander of the expedition stepped out, beckoning us to follow. There were no crowds to meet us—only a single Martian came forward from a large doorway as we alighted. We

were handed over to this newcomer with the advice that we were to go to the official welcome. Led by the guide, we entered the doorway into a small chamber. On our entrance, he pressed one of a row of numbered switches and the chamber glided smoothly away. In a moment or two it stopped and we stepped out into a large, well-lighted room, whose windows looked out on one of the broad galleries encircling the building. The diminished sun was shining through the windows and in the rays of it sat a Martian who appeared to be older than any of the few we had met before. He was clad like those in the space machine after they had removed their supporting bandages after leaving the Earth.

As we entered, he arose and walked over to greet us, welcoming us on behalf of the people of Mars. At his request, we seated ourselves on the four chairs provided for us, in front of a circular plate of some substance that glittered with all the colors of the rainbow. This plate was set vertically in a panel of arenium and around it were arranged a set of reflectors of parabolic form with tiny coils of wire in their foci.

"I am now going to introduce you to the people of this planet," said our host. "This instrument transmits both the sound of the voice and an image of anything placed before it. In this way all may see and hear you. Tell me how you name yourselves on the earth."

Hargraves "did the honors," telling the Martian our occupations as well as our names, and finished by introducing himself. Dr. Smythe added that our presence on Mars was due to Hargraves, who discovered the library. At the conclusion of this ceremony our host pulled out a small knob that projected from the panel. The filaments in the reflectors at once glowed a dull red, and we felt ourselves bathed in a gentle heat through our helmets. Facing the screen, the Martian spoke. I reproduce as much as I can of his speech from Hargraves' account, for I missed most of it, not having been well enough advanced in the language to follow it well:

"Citizens of Mars," he began, "we are able, for the first time, to welcome to their parent planet, four of the descendants of that ill-fated expedition which left to colonize our Evening Star many ages ago. You will all join with me, I know, in making their stay, which must necessarily be short, as instructive as possible. At the conclusion of their visit, let us hope that they will return to their planet, which they call the earth, with the seeds of the great social system that we developed so long ago, and may those seeds fall on fertile ground, so that it will not be long before the divers races of the earth —for there are many, I am told—will become as one, working together for their common welfare and advancement.

"Our guests are: Dr. Smythe—the title 'Doctor' indicating that he has attained a high degree of learning in some special department of knowledge, in his case Archaeology; (Dr. Smythe had risen from his seat in acknowledgement of the introduction; we all did in turn.) Dr. Hargraves, another archaeologist and the discoverer of the records our ancestors left behind; Mr. Arnold, an astronomer who has made a special study of this world of ours and whose instruments so well directed the messages we received a short time ago; and lastly, Mrs. Arnold, the wife of the astronomer, who has the distinction of being the only woman member of the expedition.

"Each of our guests will now speak to you briefly, for they have gained some knowledge of our language on their journey here."

Our replies were short and to the point, expressing our gratitude to the Martian people for the great privilege that had been accorded us and echoing the hope that we should see the chaotic conditions of our social system give way to, and be replaced by, the perfect system that had been so well tried and proved on Mars. We acknowledged our great inferiority and hoped that they would be patient with us and that they would overlook our multitude of deficiencies. My wife concluded by presenting the planet with the store of books, which we had brought with the hope that their perusal would elucidate the difficulties which they must have in understanding such a complex system, or such complexity with a lack of system, as existed on the Earth.

At the conclusion of the simple ceremony, our host outlined the social system of the Martians to us:

As soon as the youth of Mars showed their natural inclinations, they were trained along those lines. On the completion of the training, they were appointed to a vacancy that was opened for them, there being no more prepared for a line of service than it was shown that the branch could absorb. Their advancement from this time on was gradual, until their period of service ended. The period of service varied with the responsibility of the office, the shortest being the term of those engaged in executive positions; the longer of those engaged in tasks which required but little effort. The grading of these tasks had been done scientifically, by actual measurement of the amount of energy expended in performing them. The product of the rate of energy expenditure and a time factor, which was logarithmic, gave a constant quantity for all positions from that of a simple machine operator to that of the President. In return for his labor, each member of the community was provided with the necessities of life, according to the needs of his family. A state credit was also given, which allowed him to indulge in the luxuries the planet afforded. So highly developed were the Martians that they did not need supervising; each man knew his duty and it was done to the best of his ability; no shirkers were present, nor had there been any for many ages. It must not be thought that it was fear of punishment that kept each man to his task, it was the knowledge that he was part of a smoothly working machine and that it was only by the co-ordination of the whole that he could live and enjoy the benefits the system gave him and his millions of companions. This wonderful system had developed from the necessity arising for the united efforts of the planet in the conservation of its water supply, as Lowell suspected and pointed out in his "Mars and Its Canals." Let me quote him:

"—Whether increasing common sense or increasing necessity was the spur that drove the Martians to this eminently sagacious state we cannot say, but it is certain that reached it they have, and equally certain that if they had not they must all die. When a planet has attained to the age of advancing decrepitude, and the remnant of its water supply resides simply in its polar caps, these can only be effectively tapped for the benefit of the

inhabitants when arctic and equatorial peoples are at one. Difference of policy on the question of the all-important water supply means nothing short of death. Isolated communities cannot there be sufficient unto themselves; they must combine to solidarity or perish."

The social and economic standing of every member of the community was the same. The birth rate of the planet was stabilized in order to keep the population well within the limiting number which the planet could support, two to three children being the number allowed each couple. Love and marriage, with its subsequent family, was the ideal of the race. Before mating, the applicants were subjected to the most rigorous tests before the union of the couple was duly recorded. Seldom, indeed, was it necessary for the applicants to be refused this privilege and, once made, never was a union dissolved. The tests, which were psychological and physical, showed infallibly whether the union would be satisfactory or not. Marriage took place at what we would consider an early age—as soon as both members of the union were mature, which corresponded to an age of eighteen to twenty. The women of Mars were much like the men, save for more rounded limbs and slightly shorter stature. The women were as active members of the planet's economic life as were the men; they held the same offices and incurred the same responsibilities, the only difference being that it was not usual for them to assume these positions until their children were no longer in need of them, for the early training was entrusted to the mothers. The longevity of the Martians surpassed that of the Jewish Methuselah, an age of fourteen hundred years not being uncommon. Sickness was unknown to them and death was usually artificial, for on feeling the effects of old age coming upon them, it was usual to go to one of the state institutions where they were painlessly put into the long sleep that knows no waking. To some of us, this may seem cold-blooded, but on due consideration, it appears to be the most humane procedure; to be a useless member of a community and a parasite upon others is not an enjoyable state.

On the conclusion of this outline, our host, who, we learned later, was no less a personage than the President of Mars, conducted us to the upper story of the vast pile, which formed the "Capitol" of the planet, where the quarters which we were to occupy had been prepared for us. These had been sealed and supplied with compressors to keep the air at our customary atmospheric pressure. Our supplies had been removed from the space flyer and carried there. We were hungry, so we were left to appease our appetites, being directed to call our host when we were ready to accompany him to the laboratories, where we had been asked to undergo an examination by a committee of scientists. Our meal finished, Smythe went to the wall, turned an indicator as he had been instructed, and informed our host that we were ready. Donning our suits, we passed out into the gallery through the air-lock, as directed. In a few minutes one of the numerous torpedo-shaped aircraft that we saw speeding along the air lanes swooped down and settled on the gallery. Our host, who was seated at the controls, invited us to enter. Briefly, the machine was described to us before we left. Under the floor we were shown several cylinders, about a foot long and four inches in diameter, to these were connected heavy wires which led to the driving and lifting mechanism. The latter contained many heavy coils of wire, in a case supported on two rails that were rigidly attached to the framework of the machine over our heads. The source of power was likened to electricity, but must not be confused with that. On flowing through the coils, a repulsive action was developed which drove the machine upwards. Sliding on the two rails, the container so adjusted itself that the center of gravity of the machine was directly below it, thus accommodating itself for varying distribution of the loads the machine carried. A similar arrangement in the stern served to propel the craft; this was mounted on a pivot which allowed the horizontal direction of the driving thrust to be varied by the pilot in order to steer the machine, while a second set of coils in the bow served to retard and stop the car. The power carried in the cylinders was enough to drive the machine at a speed of nine hundred miles per hour for thirty hours.

At my request, Hargraves inquired if the Martians had not discovered how to transmit power by wireless. They had, long ago, was the answer, but its efficiency never reached a very high standard, so it had been abandoned, as everything inefficient was abandoned, as soon as they discovered the source of power they now used, which was practically one hundred per cent efficient, compared with but six per cent of the former.

We rose from the gallery as the operator turned a dial, and then shot forward in a westerly direction, about half a mile above the city which shone with wonderful beauty as the afternoon sun brought out the bold but beautiful color schemes of the architecture. Continuing his description of the flyer and its operation, our pilot informed us that the ceiling of the machine was limited—above seven miles the repulsive force was not enough to support it—that was the reason another type had been developed for interplanetary work.

In a very short time we arrived at our destination, covering the twenty-odd miles that separated the two buildings in four or five minutes. Alighting on one of the ever-present galleries, we were conducted to a chamber in which eight Martians awaited us. I was the first "victim" and was led to an antechamber, in the center of which was a small circular platform. I was directed to stand on this platform, facing a tall white screen. Behind me and to either side of me were circular batteries of lenses, above and below which were arranged long narrow tubes of a transparent medium in front of highly polished reflectors of some greenish material. On a table to the right of the screen were numerous instruments whose use I could not begin to guess, and a piece of apparatus I *did* recognize—a simple conical pendulum.

Directing me to remain motionless, one of the committee took his stand at the table, while the others crowded around the screen. I was suddenly bathed in a greenish glow and on the screen before me there appeared an image of my figure as seen from the front. Suddenly, the chest of my protecting suit seemed to be sliced away in the figure, then the flesh appeared, just as though a vertical slice had been made through my clothing. Gradually, the section plane cut deeper and deeper into my body until the lungs, heart and stomach were shown in section. It was a weird feeling to see oneself portrayed thus, and it was all I could do to remain

motionless. I could feel nothing, no more than one feels the "X-ray," of which this was evidently a glorified example. In a few minutes the plane had passed completely through me, exposing every fiber and nerve of my body in its progress to the scrutiny of the watchers. At the end I was asked to step down and the operator went to the rear of the screen, reappearing with a number of sheets on which I caught a glimpse of my figure as it had appeared on the screen. For a few moments some of these, which had been singled out by the group, were subjected to a careful scrutiny and discussion, then one of them turned to me and asked if I would like to have corrected the various parts of my body which were not functioning properly. I finally understood his suggestion after several repetitions. On ascertaining that it would not take very long, I assented and was then put into the hands of two others who entered at some signal. The sheets were given them and, after a brief discussion of my case, I was led away into an adjoining room. Here I was laid on a long white table, whose surface was covered with some soft smooth material and a metal clamp was attached to each ankle and wrist. All at once there seemed to be a snap in my brain and my consciousness reeled for a moment—at least so it seemed—the bands were removed and I was directed to arise. As I did so, I was astonished to find that my leg, which had troubled me ever since I was unfortunate enough to run foul of a "five-nine" at Vimy Ridge, was as well as the other, and at the same time I realized that my glasses had been removed and that I could see far better than I ever could see with them. I was conducted back to where Smythe and my wife were waiting.

"I thought you were never coming," said my wife. "What have they been doing with you?" I told her, adding that I had not been gone for more than ten minutes.

"Ten minutes! Look at your watch!" she retorted. I looked at my wrist watch, which I had strapped outside the suit I wore. I had been gone nearly an hour and a half! That night, in our own apartments, I found several marks that looked like old scratches on my body. Yet I had never felt the slightest sensation of the operations that had been performed on me. But from that time on, several distressing symptoms that I had had for some time before, never bothered me again. What surgery! I had been stripped, operated upon in no less than six places and dressed, all in the short time that I had been on the table.

After a few minutes Hargraves appeared and was equally surprised to find how long he had been under that wonderful anesthetic. He, too, had "undergone repairs," as he called it.

We now returned to the flyer, to find that it was under the control of another pilot, the President having had an important call during our visit to the laboratories. Our new pilot was one of the many who had volunteered to instruct and entertain us during our visit. We were more than an hour in returning, for our guide took us all over the city, explaining and pointing things out to us. On the morrow, he promised us, he would show us something of the great Martian irrigation system; he, having been a high official in the engineering department, was assigned as our instructor in that subject.

That evening we watched the sunset from our aerie and watched the rising of Phobos, the inner moon of Mars. To an observer from the earth, the moons of Mars present surprising sights, for, poets and non-scientific authors to the contrary, no heavenly bodies rise in the west to the inhabitants of the earth. Yet here on Mars we watched the rising of Phobos in the west, for, moving around its primary as it does, in about 7h. 39m., it moves faster around the planet than the planet turns on its axis. Rising in the *west,* it remains above the horizon for about five and one-half hours; setting in the *east* to reappear in a like interval in the west, running through all its phases in eleven hours. Deimos, the outer moon, was overhead at sundown. Here is another strange sight. The period of Deimos is 30h. 18m., hence *he* rises in the east, but remains above the horizon for over two days. Phobos, the larger of the two moons, appears to have but one-fifth of the diameter of the moon as seen from the earth, while Deimos appears to be but one-twentieth.

While we sat there watching the shades of evening sweep over the city, there came an alarm from the annunciator and we heard the President's voice asking to see us. He entered through the air-lock a minute later and seated himself at the window where we were grouped. He said:

"I was called away this afternoon to witness a new discovery that has just been made. Discoveries are now few and far between with us, and this latest has been stimulated by the news of your intended visit some weeks ago. It is a medical discovery and the result of it is that we will now be able to visit your earth with impunity. The discoverer has found that we can strengthen our bodies so that they will be able to withstand many times the pull of gravitation to which they are subjected here; moreover the drug so increases the resisting power of the body that no disease will affect it, as has been shown by a subject who volunteered to try it on himself. He has been proved to be immune from the most virulent germs, cultures of which were injected into him long enough ago to show definitely if they affected him or not. We have decided to accompany you back to the earth to assist you in your task of developing a system similar to ours, modified where necessary to conform to your special requirements.

"A report from your examiners this afternoon tells me that you are not adapted to use the chemical foods that we use. As perhaps you have noticed, we eat no foods such as you consume; all our nourishment is taken in the concentrated form, in which there is no waste matter. This is one of the main reasons for our longevity. You will have to make the change gradually.

"From now until the end of your stay, you will be shown all that we can show you of this planet, and ample facilities will be given you for each to study that part which interests him most. On your return, you will be accompanied by four other machines—the vanguard of our second invasion."

The President smiled that friendly smile, typical of all the Martians, as he concluded. I wondered, as I gazed out over the city, which was now lit as brightly as day, how long it would be before we would become as truly great as the Martians had become, how long it would be before we would all be able to treat creatures which were as inferior to us as we must be to the Martians with such kindness and with an apparent lack of condescension and no exhibition of superiority; truly the Martians were great and more than worthy of emulation.

## CHAPTER VI

THE following day, we were conducted on the promised tour of inspection of the "canals." We had arisen early to see the Morning Star of Mars, a brilliant, silvery white point of light in the eastern sky, accompanied by a fainter one close to it. It was hard to realize that this was our home—over seventy million miles away. Our pilot of the preceding afternoon arrived soon after we had finished breakfast and we were whisked away at once, heading towards the northern polar cap. Following the great circle course of the Dis, a broad belt of cultivated territory running due north and south, which is one of the seven larger "canals" which spread fanwise northward from the Trivium, we sped north at the highest speed the machine could attain. Three hours' flight brought us to the edge of the fast melting cap and from aloft we could see the whole countryside inundated with water as far as the eye could reach. We descended to within a few feet of its surface and our guide pointed out the lateral and main ditches, which were fast carrying the precious fluid to the great underground storage basins. Moving further north, we came to the snow cap itself and here the machine settled while we got out and stretched our legs. It was mere slush, and streams of water had in many places washed the snow away, revealing the cap to be quite thin. We were informed that the maximum amount of snow that fell was fifteen feet, while the average was about ten. We returned to our machine and were then taken eastward to where a great rift showed in the cap. This was the line of one of the canals and fresh vegetation was already springing up under the rays of the early summer sun. Now, turning the machine's nose southward, we proceeded towards the Utopia region and towards the "Wedge of Casius," the latter a great angular marking on the maps of the planet.

Here we found a vast area under intensive cultivation; huge machines plowing, fertilizing and seeding the ground. On request, our pilot dropped down until our machine rested on the top of a gigantic cultivator below. We alighted and were conducted into the interior. The whole structure was vibrant with hidden power as it moved forward at a speed of perhaps ten miles per hour. We were shown into the control room, where the operator sat. Of course we were at once recognized and, leaving his seat, he greeted us, then conducted us below, where he explained the operation of the machine. He would leave it to guide itself for hours. The body of the machine was suspended about two feet above the level ground on endless caterpillar treads. The soil was taken in forward by means of rotary scoops after it had been loosened by the ploughshares; it was then carried to "digestors," which pulverized and prepared it. Samples of the soil taken from four points of the machine's seventy foot width were carried to mechanical analyzers which continuously determined the quantity and kind of fertilizer required to bring it up to perfection for the crops raised here, from which were obtained one of the most important elements of their food supply. The analyzers then automatically regulated the supply of the different fertilizers which were supplied to the "digestors."

On leaving the machine, the soil was spread in the broad furrow from which it had been taken and the process was completed by seeding and rolling.

The work was carried on day and night at the rate of over three square miles a day for each machine, thousands of machines being engaged in the task.

Leaving the cultivator, we headed towards the Trivium once more, following a new "canal," the Eunostos, from the point where it leaves the wedge at the Aquae Calidae, for several hundred miles, crossing Elysium and arriving "home" as the sun was setting, tired and hungry, for we had eaten nothing since breakfast.

The land is cultivated for widths from a few hundred yards to ten miles on either side of the great arteries of the planet, depending upon the size of the subterranean aqueduct. In the case of the larger arteries, lateral pipelines convey the precious fluid to the area under cultivation and the growth that follows makes their course visible to the trained eye at the other end of a good instrument under the best observing conditions on the earth.

The next day we were shown the great underground storage basins, hundreds of square miles in extent, where the precious fluid was sealed to prevent loss by evaporation. With each of these vast reservoirs were associated the pumping machinery of the system. We stood in awe under the shadow of the gigantic machines which would dwarf any earthly construction into insignificance, watching the whirling metal shafts and the glittering piston rods as they rose and fell, thudding out the heart beats of the planet which sent its life blood coursing through its artfiicial veins.

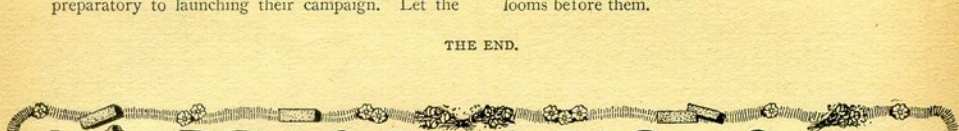
Day after day, during our twenty-seven day stay on the planet, we were kept busily employed. I, of course, took the greatest interest in the astronomical work of the planet and, with a machine that was placed at my disposal, I visited the principal observatories of that world. How tiny even our huge reflectors were, compared with the instruments I saw there. Imagine how I felt when I took my place at the eyepiece of the giant of the giant reflectors, with a mirror more than seven hundred feet across, more than seven thousand times the light-grasping power of the great Mt. Wilson reflector. With the thin Martian air and its exceptional clarity and steadiness, it was possible to make observations with undreamed of powers, powers so great that for the first time I saw stars as disks, tiny disks, it is true, but nevertheless, disks large enough in some cases to see their photospheric disturbances. It is impossible for us on the earth to see any *star*, other than the sun, as a disk, due to the nature of light, until the diameters, and hence the "resolving power," of our instruments are greatly increased.

As the time for our departure drew near, a deep regret was felt by all of us, so much had the inward beauty of the Martians taken hold of us, and we felt that we were leaving a paradise. The one consoling thought was, that we were not returning alone, but with friends who, we felt sure, would soon be able to organize our woefully muddled world into a world that would begin to approach the ideal we had witnessed.

There seems no need for me to go into the details of our return voyage or the surprise of the world by the return of the Martians. The press has blazed with headlines, capping articles that in many cases contained not a grain of truth, and it has only been with difficulty that the little community we have built up has been kept aloof from foolish egotists,

who think they can match their minute brains against the magnificent knowledge of the Martians. We have had to lay down an impregnable barrier devised by our friends around our camp in order that we might not be disturbed while the builders of the new world are studying our planet at every angle, preparatory to launching their campaign. Let the world rest assured; there will be no sudden upheaval, but a gradual change in which the whole of humanity will benefit in a way the idealists have never dreamed of. Even some of my friends, economists and idealists, who thought that they had developed the ideal system, stand in awe of the millenium that looms before them.

THE END.




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 nominal fee of 25c to cover time and postage is required.

### A NUMBER OF FAVORABLE COMMENTS

*Editor,* AMAZING STORIES:

I just wish to comment upon a few of the more recent stories of your worthy publication.

*"The Machine Man of Ardathia"* is, in my estimation, a marvelous scientifiction story. Mr. Koblischke in the January issue claims that it is ridiculous; that human beings should ever evolute into sexless automatons is biologically improbable, he thinks. The story states to the effect that the Bi-chanics and the Tri-namics propagated their species by fertilizing the female ovum in ecto-genetic incubators till it was past the embryonic stage of development. The young Bi-chanic or Tri-namic was then encased in a transparent cylinder. Finally, this led to the extinction of the female sex because it was no longer necessary, then the whole race began to die off. *"The Machine Man of Ardathia"* created synthetically the equivalent of the female ovum, and in ecto-genetic incubators developed it; the body after passing the embryonic stage was placed in a transparent cylinder, as had done the Bi-chanics and Tri-namics before them, but it was also supplied with tubes furnishing it the necessary energy for rebuilding its body tissues, which was only a matter of affair due to the small amount of muscular activity carried on by the Ardathian. Now, you see, sex was no longer essential. An automaton defined is a machine controlled by some external force having no volition or cognizance of its own. The Ardathians had both these attributes, wherefore call them automatons! They still thought and reasoned somewhat as humans do. They were not human, they were superhuman.

The Ardathian was probably above most emotions, as we know them. Emotions didn't come from the reaction of their viscera, as it does in our case. They were above emotion, as we know it, for this reason: emotions are traits of mammalia which have been developed through ages of maternal protection. The extinction of sex among the Ardathians withdrew the maternal instinct and its influences eventually died out.

Now, I don't see why this story should be regarded as fantastic or inconceivable. With man's present tendency to rely upon machines to do his work and even his thinking in some cases, we see that the human being and machine is rapidly lessening in width. This is a great speculative field. The morbid vein in which the story runs is altogether fitting for the circumstances. This story should set some of your readers thinking of the possibilities of truth that are evidenced in body.

*"The Face in the Abyss,"* by Merritt, in your ANNUAL, certainly was splendid. The weaving of legendary lore and tradition into the text of the story improves it. The description of the "face," of "Yu-Atlanchi," of the "Snake Woman," and of the arts of the inhabitants of "Yu-Atlanchi" was remarkable. The science is altogether original in this story.

*"The Metal Emperor,"* now running in SCIENCE AND INVENTION, is as weird and fascinating a story as I have ever read. Fancy metal given volition and cognizance; it isn't possible. The probability of extroscence is also a strong one—senses that even the Oriental Occultists are unaware of. The story, *"Below the Infra-Red,"* was interesting. It contained a full measure of good, plausible science, but it is altogether too idealistic and the ending too incongruous. Hypnotism is not known to ensue without the aid and co-operation of the recipient; with the hypnotist lure, however, the wills were developed so highly that a strong will could overcome a weaker antagonistic will.

*"The Comet Doom"* certainly provided me with enough thrills and food for speculative thought. Description of the moment when the earth's fate was in balance with the odds altogether against its coming out victorious was a true touch of mastery by the author when he proposed a last-minute rescue.

Cordenas,
Bradley Beach, N. J.

[There's a note of sadness in the story about *"The Machine Man of Ardathia,"* which you put very well in your text. We will agree that man and machine are approaching one another. Sometimes we think that the approach is very close in such establishments as automobile factories. In automatic machinery, there is so much quasi-intelligence, that an automatic man would be a possible concept of the future. Certainly, a man who spends day after day and year after year in putting a minor part on an automobile, that passes slowly by him on a platform, is to all intents and purposes, a machine man as long as he is thus engaged.

But do not imagine that our authors restrict their narratives to absolute possibilities, or rather, probabilities within the range of our judgment and experience. We do not know what the future will bring forth and the world seems ready for any new surprise that may come along. We certainly have had enough wonders to surprise anybody, even in the last five years.—EDITOR.]

### BRICKBATS GALORE—OUR COVER ILLUSTRATIONS THE TARGET

*Editor,* AMAZING STORIES:

In looking over "Discussions," I find that other people have covered my likes and dislikes rather thoroughly, except for one small item; not a large one, and one that may not interest the majority of readers. It is this: Your AMAZING MAGAZINE cover. Outlandish!

Can you imagine a staid business man, middle-aged, with a leaning toward the glamour of science, furtively going up to the newsstand, looking over the magazines till no one is watching, then quickly snatching a copy of AMAZING STORIES, tuck it under his coat, pay the girl and slink away with dread, lest some business acquaintance might see him and think he is reading "Nick Carter," and thereby doubt his business sagacity? Well, my dear editor, that is just my predicament. Do you wonder that I am becoming a nervous wreck? I do not know where you procure the girls that you put into the magazine, nor the terrible colors and illustrations on the outside, but frankly, they are both quite passé, don't you know? Sincerely,

R. F. DeBritt,
(Address not given.)

[We claim that we publish unfavorable as well as favorable criticisms, and we think that this letter, attacking the cover illustrations, proves our claim first stated. There's so much in the illustrations, and the blend of personality and science is so well carried out in them, that we can perfectly well imagine a staid business man buying a copy without being furtive in any way and without being ashamed of himself. So, if the writer is only picturing himself as a purchaser, let him think it over and see whether he is not needlessly disturbed. If he will study the cover illustrations attentively, he will see that sometimes they are very remarkable productions in the line of mechanical detail. The artist, Paul, who does many of them, has a very special ability in the line of producing this class of work, which most artists would find difficult or impossible. Then, too, Mr. DeBritt might subscribe to the magazine. It comes fully wrapped that way!—EDITOR.]

### TRAVELING INTO THE FUTURE, AND TIME TRAVELING

*Editor,* AMAZING STORIES:

I have just been re-reading the *Discussion Columns* in the December issue of your magazine and I notice in it a letter from I. M. Lichtigman of Brooklyn. In it he speaks at length on the Fourth Dimension and brings in an excellent theory about duration of light waves. But does he know why time is considered the Fourth Dimension? If not, I suggest that he take a pencil and draws a line with it on a sheet of paper. Now, if that line is to exist at all it must have length, breadth and time, for, without this, it could not have been drawn.

As it is possible to travel in the three dimensions that we know of, is there any plausible reason why we should not be able to travel in Time? Mr. Lichtigman speaks of a theory of Duration of Light Waves, but this may have nothing whatever to do with it. The idea about time is that, once you have done something, it stays forever in a plane in time. This plane can be traveled in just as any other plane.

As for the writer's few words on traveling into the future, they carry no weight at all. He says that, if nothing exists its picture cannot be made. Quite so, but how does he know that things in the future do not already exist? When a blind man looks into a mirror he does not see his image, nor can he feel, hear, or smell it. Therefore, I suppose, it does not exist. This is all his reasoning comes to.

My theory is, Time-traveling is, that if you can Time-travel, you are invisible and have no influence. What would happen if you had? Take one example. Suppose that 30 years ago, when a young man, you had been the owner of a large house and you were debating as to whether you should add an extension to your house or not. You wrote a letter to the builders but threw it away, thinking better of your idea. Then you went to the Continent for a year.

Now, if you can travel through Time and have influence in the past, you could go into the house in safety and re-write the letter, and send it to the builders. The extension is then built.

In the present time, then, a building will suddenly arise out of the ground. But this is obviously ridiculous.

Concerning the illustrations: Paul may be a good artist, but I am very glad that people do not have faces like those of some of the people in his pictures. They are just as bad in *The Metal Emperor* in SCIENCE AND INVENTION. More illustrations, by all means, but less of these faces.

One word in conclusion, do **not** make AMAZING STORIES semi-monthly. It would be too much of a good thing.

Also let us have another Cover Contest.

Wishing AMAZING STORIES a long and prosperous life. Malcolm E. Humphery,
Norfolk, England.

[Referring to the last clause of your letter first, you will find that there is another cover contest, this time, of a very original kind, and one which we think will excite considerable interest and elicit material perhaps even better than or as good as we secured by our last one. The cover contests are absolutely for the benefit of our readers, to give them fresh literature to read, and to open the door for new authors to try their hand at writing scientific fiction and to bring out new ideas artistic and scientific.

Of course, traveling through time is quite theoretical and it is, as far as we **now** know, quite impossible, but the beauty of the subject is that it brings up an interesting quantity of discussions; opens up an attractive field of suggestion, and certainly makes people think. Your interesting letter is due precisely to such causes.—EDITOR.]

(Continued on page 86)