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"*Coming Next Month*" *appears on page 43*

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(*sun becoming a nova*)

Joseph W. Ferman, PUBLISHER *Anthony Boucher*, EDITOR

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On April 25, 1955, the USSR announced that its scientists were at work on plans for a space station, and on July 29 the United States revealed its project for MOUSEs (Minimal Orbital Unmanned Satellites of Earth) — all of which came as no surprise to science fiction readers who have carefully noted the occasional security slips during the past decade. It's a good time now for those readers to switch their minds off of hypergalactic subspatial overdrive and return to the immediacies of practical space travel, the ABC's that we can so easily forget while contemplating the x^n's. Dr. Robert S. Richardson of Mount Wilson Observatory, well known to s. f. enthusiasts for his many articles in Astounding *and his fiction under the pseudonym of Philip Latham, here presents — in an article originally commissioned by the* Saturday Review *and now expanded for F&SF — an admirable brief refresher course on the probable first steps of interplanetary travel, which leads, with deceptive simplicity, to certain highly provocative new conclusions.*

The Day After We Land on Mars

by ROBERT S. RICHARDSON

MARS IS THE ONLY BODY ASIDE from the Earth itself on which we have been able to detect evidence of life. The stars and nebulae present us with problems which in many respects make them more interesting objects for study than Mars, particularly in nuclear physics and related fields. A special interest attaches to Mars, however, owing to the fact that it may be the abode of life. There may be myriads of other stars besides our sun with planets revolving around them on which life has developed. We do not know. At present it seems unlikely that we will ever know. So far as life in the universe is concerned we are alone with Mars.

Doubtless men have always dreamed of traveling to far off worlds more wonderful and (presumably) happier than their own. Until very recently the idea of travel beyond the Earth has hardly been more than a vague dream. Indeed few ever contended it could be anything else. Now suddenly the spectacular advances in rocketry and electronics have made space travel a possibility

within our lifetime — within the next ten years, according to some. The prospect that unfolds before us is dazzling. The opportunities for discovery seem unlimited. And our enthusiasm for exploration in space unbounded.

In the excitement of the hunt we have paid little attention to the object of the chase. We have not bothered to question if the game is worth the candle. Or whether colonization of another world might lead to repercussions of a highly disturbing character. If we succeed in reaching Mars the total cost will run into the billions. It will be the biggest real-estate deal in history. What can we expect for our money? What kind of a world is Mars?

In appearance, at least, Mars is not so different from the Earth. Many regions of the Earth must resemble Mars so closely that you could not tell which was which from a photograph. An artist friend of mine who has made a name for himself depicting planetary scenes tells me that Mars is his hardest subject. Editors balk at paying for a picture supposedly representing Mars when their readers are likely to mistake it for the country around Reno or Las Vegas. For Mars is practically all dry land and most of that land is desert. Mars is often referred to as a small planet, and it is true that its diameter is only about half that of the Earth's. But we must remember that three-quarters of the Earth is covered by water and uninhabitable. When we compare the two globes on a dry-land basis Mars is almost exactly the same size as the Earth.

On the Earth we immediately associate the word "desert" with "heat." On Mars, however, the situation is reversed. Over most of the planet the climate is similar to that of a cold high-altitude desert, such as the plateau of Tibet. Since Mars on the average is fifty million miles farther from the sun than the Earth we would naturally expect it to be considerably colder there, and actual measures with sensitive heat-detecting instruments confirm this. At noon in the tropics the average temperature is about 40° F. The atmosphere is so thin and dry that it has very little blanketing effect. Thus, the highest temperature comes near noon instead of about three o'clock in the afternoon as on the Earth. The temperature falls rapidly until at sunset it is 10° F. Since the unilluminated side of Mars is never turned directly toward the Earth we cannot measure the temperature at midnight, but it must be very low, say — 20° F. A temperature of — 90° F has been measured at the poles, and during the long polar night it may drop to — 150° F. On the other hand, a temperature as high as 85° F was once recorded at a dark spot near the equator when Mars was close to the sun. For comparison, the highest and lowest temperatures ever recorded on Earth are 136° F in Tripoli and — 90° F in Siberia.

Mars undoubtedly has a thin atmosphere of some kind as the familiar markings on the disc are often obscured by haze and clouds. On photographs taken in blue light which show only the outer atmospheric shell of the planet bright clouds often appear on the late afternoon side. In 1954 such a cloud formation was observed several times which bore a startling resemblance to the letter "W." The effect was the same as if someone had scrawled the letter on the side of the disc with a piece of chalk. (This is one of those "now it can be told" items. If astronomers had released this information last year when Mars was closest there is no telling what the result might have been. Of course, if you turn the planet upside down the marking becomes an "M.")

Unfortunately, our knowledge of the constitution of the Martian atmosphere is mostly negative in character. We can only talk about what the atmosphere is *not*. For example, we know that it does *not* contain any oxygen; or, at most, less than 1 per cent of the amount in our atmosphere. The announcement in 1933 that observations taken with the 100-inch telescope on Mount Wilson had failed to detect oxygen in the atmosphere of Mars came as a blow to those who would like to have the planets inhabited by intelligent beings. Since oxygen is essential to all but the lowest forms of life it seems improbable that we will ever be destroyed by invaders from Mars. At present our best guess is that the atmosphere of Mars is made up of inert gases like those in our own atmosphere, but without oxygen.

Water also is an exceedingly scarce article on Mars. Astronomers took about 75 years to establish the fact that oxygen is absent, but the evidence for water can be obtained almost at a glance. Among the easiest markings to discern on the disc are the white caps at the poles, which expand in winter and shrink with the approach of spring. The most natural explanation is that they consist of a thin deposit of frost and snow. For a while it was thought they might be frozen carbon dioxide or dry ice, but this idea has been abandoned. (The polar caps are too warm!) This deposit of snow at the poles appears to be the only source of water on the entire planet. To us it would seem pitifully inadequate. Long ago Professor H. N. Russell of Princeton illustrated the perpetual drought that prevails on Mars in a striking way when he remarked that all the water on the planet would hardly fill Lake Huron, a statement that has been repeated by practically every author who has written on Mars in the last thirty years.

Although it is hard to make out a case for animal life on Mars, the evidence for plant life is good. There are still a few dissenters, but I believe that most astronomers today are willing to admit the existence of plant life. The distinctive red color of Mars comes from the barren

deserts in the northern hemisphere. But the southern hemisphere up to about latitude 40° is girdled by dark green areas called *maria*. As the name indicates, these areas were once thought to be actual seas, and not so long ago either. It seems incredible today that our grandfathers could have been so wrong. The *maria* show seasonal changes which suggest the growth and decay of vegetation. In winter they are dim and gray or brownish in tint. But as spring comes on and the polar cap begins to melt a "wave of quickening" proceeds toward the equator and the *maria* grow darker and turn to green. It seems almost certain that the *maria* must undergo regeneration each year, as otherwise they would have been obliterated after millions of years by the dust from the deserts.

The chief objection to the vegetation hypothesis is the absence of oxygen and the limited supply of water. Also, the sub-zero cold would rule out most types of plants. It is possible, however, that such extremely hardy plants as the lichens might be able to survive on Mars, as their adaptability seems virtually unlimited. This does not mean that there are lichens growing on Mars. If the green *maria* consist of vegetation it is probably of a different type from ours.

II

Let us look ahead to a time when space travel has become a reality. The journey to Mars is still hazardous and beset with difficulties, but it is no longer a major problem. However, the length of the trip is hard to specify at present; there are many uncertainties involved. One plan which has been worked out in detail puts the round trip at nearly three years. This includes a stay on Mars of 449 days. Even making liberal allowances for technical advances it appears that the time spent on the road will always be considerable. (Unless, of course, atomic fuel becomes available.)

By a stupendous effort a station of several hundred young unmarried men has finally been established on Mars. Needless to say, the personnel was selected with the utmost care to eliminate those with physical defects and undesirable personality traits. Transporting men from the Earth to Mars and back is an exceedingly expensive and difficult proposition. For this reason the men cannot be rotated as rapidly as is desirable. A man who volunteers for Mars must do so with the expectation of remaining a minimum of, say, five years on the planet.

To ensure a permanent supply of water the station should be located at one of the poles. We will put it at the north pole since this one has never been observed to disappear completely in summer. A steady water supply would also solve the oxygen problem, since oxygen could probably be obtained most easily on Mars by decomposing water into

hydrogen and oxygen. Locating the station at the pole has the disadvantage of a long night with its frightfully low temperature. But it is going to be cold wherever you build on Mars. And it is doubtful if the men would be much less miserable at the equator.

If we are able to get to Mars in the first place we should be able to build dwellings where the men can live in reasonable comfort so far as their bodily needs are concerned. But it would be an unnatural artificial existence, as restricted as taking up residence in a submarine. One could never step outdoors without suitable oxygen equipment. Since the atmospheric pressure is probably from 10 to 20 per cent of that at the surface of the Earth an airtight spacesuit would not be necessary. But even short trips would be dangerous owing to accidents to the oxygen equipment, and the chance of being caught outdoors at night without ample protection against the cold. Exploring parties could probably make field trips by airplane despite the low density of the air, since gravity is only 37 per cent of that on the Earth.

Only a few of the men would work outdoors. Most of the men's time would be spent inside the walls of the station. The work would be of a monotonous character, analyzing and classifying data secured on field trips, writing up reports, and transmitting the results to Earth. A man would never be alone. Every hour would be closely restricted and regulated. The discipline could never be relaxed; the least slip might result in disaster. A man would lead a precarious life, but it would lack the stimulation that comes from exposure to imminent danger. It would be an endless war without a truce or a victory.

III

Why should we risk lives and spend billions of dollars to reach such a desolate world when there are vast regions so much closer home that are still blank spots on the map? Because we will find new elements or precious mineral deposits? Impossible. Because occupation of the planets will be useful for military purposes? Nonsense. Because we will find a type of intelligence far greater than our own? The odds are overwhelmingly against it. Yet I feel confident in my own mind that if we attain the technical ability to travel to the planets we will do it. Furthermore, we will do it knowing perfectly well what to expect in advance.

Why?

Well . . . for no better reason than man's insatiable and restless curiosity to see what lies beyond his horizon. Because there will never be any peace for us until that challenging gap between the Earth and Mars is bridged. We should quit trying to think up logical, sensible reasons for space travel. *There are no such*

reasons. If we ever reach Mars it will be because we were lured there by that same vague but irresistible urge that led men to make one assault after another on Mt. Everest: "Because it's there."

In my opinion, the only valid reason for journeying to Mars is pure scientific investigation. There is no question that a station on Mars would add to our store of basic scientific knowledge. For instance, we would like very much to know about magnetic conditions on Mars, or any planet for that matter. What is the strength of the magnetic field? How does it vary over the surface and throughout the day and year? There are many other problems that would be crying for study. The difficulty would be in trying to decide which ones to do first. Whether the taxpayers would be willing to foot a bill of $10,000,000,000 to learn that the magnetic axis of Mars is inclined seven degrees to its axis of rotation is a question. My hunch is they would not care particularly. Going to Mars would be a lot of fun and excitement, a trip in which we could all vicariously participate. Go ahead and spend the money.

The biologist would seem to have the biggest stake in such a trip. If the *maria* consist of vegetation he would be in much the same situation as Galileo with his first telescope — wherever he looked he would be sure to make an important discovery. Imagine the delight of a biologist able to study plant life that had originated under extraterrestrial conditions. Biologists like to think of plant succession, photosynthesis, and natural selection as fundamental principles of life. But the fact remains that they have been studied only under the conditions that prevail on the Earth, and their universal nature can only be inferred. It would be a most striking piece of evidence if such fundamental principles were also found to hold true on Mars.

IV

The nearest approximation we have to an outpost such as we have visualized on Mars is the 5,000-man base which the United States Government has established at Thule, Greenland. Apparently it is well equipped so that the men suffer no severe hardship. Yet all reports tell of the boredom and monotony of the life, of the conflicts arising from close contact with the same individuals day after day, as well as a profound sense of depression that comes from existence under such isolated and unnatural conditions.

But how much more intense would these sensations be to a man confined on Mars! Regardless of how carefully the men were screened beforehand, one wonders if any group of individuals could live for long amid such alien surroundings without tensions building up until they became intolerable. The sense of isolation would be overwhelming in

its intensity. The thought that they are the *only* human beings in an entire world might drive men crazy. Worse still would be the utter futility of escape from such surroundings. At Thule the mere knowledge that civilization is always only a few days away by airplane must be comforting even if one is unable to make the trip. But on Mars civilization would be millions of miles distant in space and years away in time. A man could not even stroll outdoors to seek solace in the bosom of nature without first having to don his oxygen equipment, check with the gatekeeper, etc.

In all the articles on space travel which I have read there is one aspect of the subject which has never been discussed or so much as even mentioned. Yet it is a problem that is certain to arise, especially if the planets are going to be inhabited mainly by normal, healthy young men. It strikes me that if we are going to talk about traveling to the planets on a realistic adult level at all we should take the problems out in the open and face them. There is sex.

Judging from what has been written so far for TV scripts men in space are not supposed to have women on their minds. It seems doubtful, however, if men on Mars will be so preoccupied with measuring the horizontal component of the planet's magnetic field, or in setting off artificial earthquakes, that they can be completely oblivious of their bodies. Although examples can be cited where men have lived together alone for long periods, few would contend that such an existence is normal or healthy. I am not a psychiatrist, and hence cannot speak on such matters with authority. But one hardly needs to be an expert to know that men and women were meant to live together, and that when compelled to live alone they undergo personality changes of an undesirable nature. Tensions would develop until they became explosive. Eventually a man would have to find some way to relax — to cut loose — to do something about the impulses and ideas that have been building up inside of him. The situation would not be so serious if the men could be rotated fairly rapidly, but space travel by its very nature makes this impossible.

If space travel and colonization of the planets eventually become possible on a fairly large scale, it seems probable that we may be forced into first tolerating and finally openly accepting an attitude toward sex that is taboo in our present social framework. Can we expect men to work efficiently on Mars for five years without women? Family life would be impossible under the conditions that prevail. Imagine the result of allowing a few wives to set up housekeeping in the colony! After a few weeks the place would be a shambles. To put it bluntly, may it not be necessary for the success of the project to send some nice girls

to Mars at regular intervals to relieve tensions and promote morale?

We may ask further if men (and women) who travel to other worlds will not eventually develop moral attitudes quite at variance with those generally accepted at present? Our moral attitudes and religious customs are the product of thousands of years of life upon the Earth. They developed out of conditions that prevail upon one planet. Is it not conceivable that in an entirely alien environment survival will produce among other things a sexual culture — shocking on Earth — which would be entirely "moral" judged by extraterrestrial standards?

V

[*What you have just read, Dr. Richardson wrote in April, 1955, and published in the* Saturday Review *for May 28. On July 30 he added the following comments especially for* F&SF.]

THE PRECEDING ARTICLE WAS WRITten some four months before the government announced its Earth-Satellite program. There is still a considerable gap between sending a body the size of a basketball around the Earth and launching a manned rocket for Mars. Nevertheless, the planets today seem definitely nearer. As a result, some of the ideas advanced in the article, especially those at the end dealing with certain problems of a sexual nature that may arise in the future, are now perhaps of more than abstract interest. I have therefore taken the liberty of adding a few remarks clarifying my attitude on this subject.

If we eventually succeed in reaching Mars and establishing a base there, it will be the supreme technical achievement of all time. Yet we may establish a base only to see it destroyed. By super-intelligent Martians? Not at all. We have a much more dangerous foe than any creatures likely to be lurking on Mars. *Ourselves.*

We have emphasized that men will be forced to live on Mars for probably several years in a state of isolation that is dreadful to contemplate. But if this greatest project of all time is to succeed, the men who run it must do more than merely exist on the planet. They must work together efficiently and harmoniously. The question is: can they do so under such prolonged unnatural conditions? Unless we are very careful our Martian base is going to look more like a scene from *White Cargo* or *Mister Roberts* than a smoothly operating scientific laboratory.

Probably the greatest threat to the success of the interplanetary project will be the gnawing absence of the opposite sex. Under such conditions psychiatrists tell us that men (and women) are likely to resort to some substitute such as homosexualism and autoeroticism.

Some people have practically as good as told me that perhaps this will be the solution. Perhaps it will. But to me it represents a most unsatisfactory solution.

My feeling is that space travel may force us to adopt a more realistic attitude toward sex than that which prevails at present. I feel that the men stationed on a planet should be openly accompanied by women to relieve the sexual tensions that develop among healthy normal males. These women would be of the type which we are accustomed to call "nice girls." They would be nice girls *before* they went to live on Mars. They would be nice girls *while* they lived on Mars. And they would still be nice girls *after* they had lived on Mars.

Many will be outraged at the mention of such an idea. They will object that it is shockingly immoral. But it is "immoral" only when viewed from the standpoint of our present social reference system. Transform to another system of coordinates and it becomes entirely proper. For example, it would be regarded as practically unstupendous by a people such as the Masai who live in the Kenya colony of East Africa.

After passing their boyhood the Masai young men go to a kraal or encampment where they live for about ten years learning the arts of warfare. During this time they are not permitted to marry.

But this does not mean that they remain without women. Young unmarried girls also live in the kraal to serve as the warriors' sweethearts and sexual partners, a relationship which is openly approved in the Masai society. Every normal Masai girl has this experience in her youth. Should a girl become pregnant she returns to the village to be married. Having a child out of wedlock stigmatizes neither the girl nor the child. On the contrary, it aids a girl in securing a husband, for the Masai welcome children and regard barrenness as a principal cause of divorce. These matings are transitory and solely for sexual relief.

Perhaps in the conquest of space knowledge learned from primitive people may prove as helpful as the most advanced scientific thought.

In literature, as in science, ideas are apt to occur quite independently to different discoverers. Some months before Dr. Richardson's article first appeared, Paul Carter had finished the first draft of a short novelet exploring in fiction the very conclusions which the astronomer suggests. Our next (January) issue will feature this Carter story; if you remember Mr. Carter's astute time travel episode, Ounce of Prevention *(F&SF, Summer, 1950), you'll be prepared for the logic and insight with which he writes what is possibly the first honest fictional study of human sexual mores on another planet.*