

Some of the Physical Features of Mars.

By H. G. TOMKINS.

I have written this short paper in order to set before members some little account of the suggestions regarding the planet Mars made by Dr. Lowell of Flagstaff Observatory, America, who has just presented the Society with a set of his unique photographs of that planet which he contends sets at rest once for all the question of the existence of the canals on Mars.

Mars is the planet which is probably better known to us than any other of our system and is, reckoning outwards from the Sun, the next to the Earth. It is much smaller than the Earth, the diameter being only 4,220 miles as compared with the Earth's 7,919 miles. The mass of Mars is much less than that of the Earth, and as a consequence air and water cannot be present there in anything like the same quantities as on the Earth, even if they are there at all.

Since a telescope was first turned on Mars, it has been possible to see certain dusky markings and light patches, notably perhaps the two white patches at the poles of the planet. It was not until 1877, however, that an observer appeared who systematically made this planet a subject of study. In that year Schiaparelli, the great Italian astronomer, in scanning the surface of Mars discovered long narrow markings which had never been seen before, and for want of a better name he called them canals, though he had no thought then of using the term in the present sense of the term. These lines he found to run in various directions all over the planet, and before he died he had discovered 113 canals. Another observer also appeared in the field in the person of Dr. Lowell, who has just presented us with the photographs we have to show this evening. He has been able to increase the number of canals to 437 in number, and to add many other details regarding the features of the planet to our knowledge. In 1894 one of the canals was noticed to be double, and this peculiarity has now been found to belong to others also. Lowell has also noticed that the canals all emerge from the area surrounding the Polar Caps, and that they proceed towards the Equator. Where they cross there is almost invariably what he calls an oasis.

The above is a very brief outline of what Lowell has seen in Mars, and on these data he has built up an exceedingly ingenious theory of the physical condition and life in Mars to

MARS 1909.

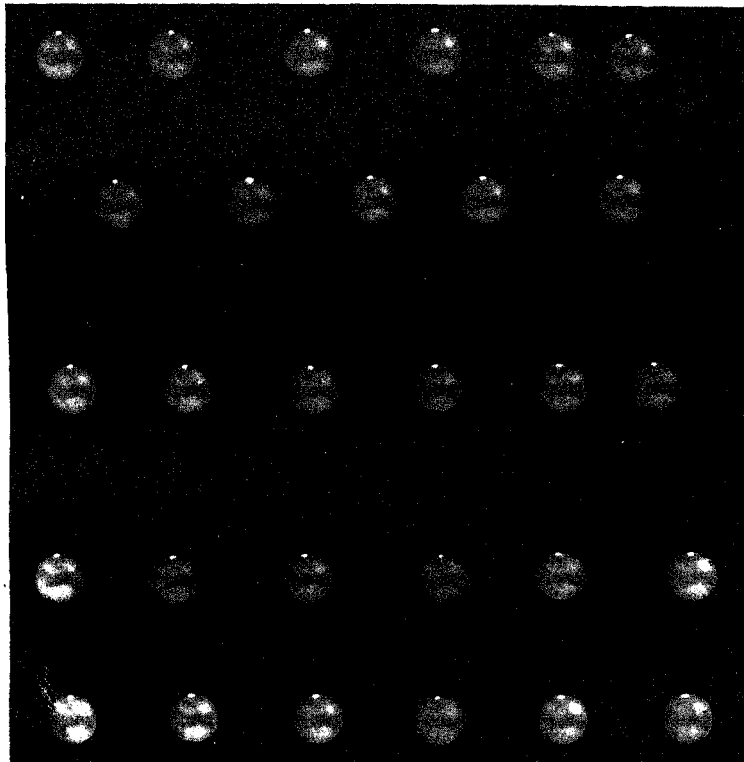


Photo-Engraving printed at the Office of the Survey of India, Calcutta, 1911.

Photographs of the planet Mars taken at Flagstaff Observatory by Mr. E. C. Slipher,
on 30th September 1909, sent to the Society by Dr. Lowell,
Director of the Observatory.

account for it, taking his ideas from the Earth and what he considers has happened or is likely to happen in the year. It is admitted that air and water in Mars cannot be anything like so plentiful as in the Earth, and from his calculations and observations he concludes that the equatorial regions of the planet are probably deserts, but that water and snow do exist at the poles, and in fact that the white caps there are snow. He finds that these caps at certain seasons of the year corresponding to the Martian summer decrease in size, and that this decrease is followed by the appearance of a darkening round the caps and from this ring later on the canals appear and extend towards, and some of them over, the Equator. His view is that these lines are in fact connected with canals such as we know them and that they represent a vast irrigation system in Mars. The canals take the water from the melted snows from the Polar regions to the desert areas in the equatorial part of the planet, and on each side of these canals vegetation—perhaps crops spring up, thus causing the dark streaks across the yellow sandy desert which are seen. Where the canals cross, it would be natural to find a patch of the same vegetation. We are of course familiar with this state of affairs in India if for the Polar Caps we substitute the Himalaya mountains, and those who take the trouble to read his book on Mars, which is in our Library, will certainly say that he has made out what looks like a very strong case in support of his theory. The idea of course pre-supposes the existence of intelligent beings on the planet, and these Lowell considers do exist there; indeed if canals do exist there in the manner suggested by him, they must be far more capable engineers than we have here on the Earth.

Such, broadly, is the theory of Dr. Lowell. As members are of course aware, this theory has been, and is likely to be, the subject of very considerable criticism and disagreement among astronomers. For many years it was not admitted that the canals had any existence at all in fact; even now many hold that they are an optical effect produced by a small disc and a tired eye. This having been the case with the canals themselves, it is perhaps hardly necessary to say that it was much more so with the contention of their duplication, and many theories have been brought forward to show that a slight error in focussing would produce the effect. Granting the visibility of the canals, the theory of Dr. Lowell to account for them has been strongly opposed on several grounds, the most important of which are that water does not probably exist on the planet, and if it did, that under the conditions of Mars the

canals would have to be of such immense depth to carry the water to the equatorial regions that it would never reach the surface. This is perhaps the strongest argument of any against the theory, and is one which it is very difficult to get over without supposing the Martians to possess some extraordinary means of pumping or raising water such as we cannot conceive of. This at once takes us into the realms of speculation and beyond the limits which most people are willing to go.

In order to prove the existence of the canals and so put to silence the objections on this ground, Dr. Lowell has resorted to photography, and whatever may be the views of those who consider his theories, it must be admitted at once by everyone that these photographs are of an excellence which has never yet been approached by anyone else. The detail on them and the definition which has been secured are alike wonderful, and they mark a great and important advance in planetary photography. They have been shown recently in England before the Royal Society, the Royal Astronomical Society, as well as the British Astronomical Association. Reports, however, appear to show that although the wealth of detail was recognised, no very decided opinion was expressed in the visibility of the canals; and on carefully examining the photographs sent to us, I must admit that I cannot see any clearly marked streak which would correspond to a canal, though there are certainly one or two broad lines projecting from the dark areas. A transparency, however, is a very difficult thing to produce, and Dr. Lowell assures us that the canals are visible on the photographs, and on a print which he kindly sent me some years ago there certainly were linear markings. Considering the far better seeing conditions at Flagstaff than most places elsewhere, it seems to me going rather far to practically declare Dr. Lowell's observations to be the result of imagination, whatever may be thought of his theory. Consequently, while perhaps keeping an open mind as to the probability of the irrigation system and life on Mars, I think it must be admitted that far more detail has been discovered by Dr. Lowell than some people are willing to accept. As opposed to the canal system, the Director of the Mars Section of the British Astronomical Association declares the lines really to consist of series of dark patches, which, owing to a less powerful instrument than he himself used, appeared to Schiaparelli and Lowell and other observers as lines. The map of the British Association which he has drawn up from the observations of the sections, however, does not seem to me to

support this view. The above is a very brief account of the work in connection with which these wonderful slides sent us by Dr. Lowell were taken, and in setting it forth I have endeavoured to indicate, as far as possible, the present state of opinion regarding the question as to whether the markings on Mars indicate the existence of intelligent beings on the planet, and whether the canals are the work of their hands or not.

Memoranda for Observers.

Standard Time of India is adopted in these Memoranda.

For the month of June 1911.

Siderial time at 8 p.m.

			H.	M.	S.
<i>June 1st</i>	12	35 49
,, 8th	13	3 25
,, 15th	13	31 1
,, 22nd	13	58 37
,, 29th	14	26 13

From this table the constellations visible during the evenings of June can be ascertained by a reference to their position as given in a Star Chart.

Phases of the Moon.

			H.	M.
<i>June 4th</i>	First Quarter	.	3	34 a.m.
,, 12th	Full Moon	.	3	21 a.m.
,, 20th	Last Quarter	.	2	21 a.m.
,, 26th	New Moon	.	6	50 p.m.

Meteors.

		R. A.	Dec.	
May—June	.	235°	+ 9	Rather slow.
May—June	.	280°	+32	Swift,