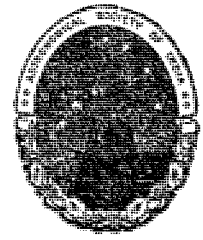

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Report of the Meeting of the Society held on Tuesday, the 26th March 1912.

MR. W. J. SIMMONS, *Chairman.*

MR. P. N. MUKERJEE, M.A., F.S.S. } *Secretaries.*

DR. E. P. HARRISON, PH.D. }

On the assembling of the meeting Mr. Simmons said that owing to the absence of Mr. Tomkins, the President, and the Vice-President (Colonel Burrard) on tour, it devolved on him to take the Chair that evening according to the rules of the Society. He then asked the Secretary to read the Minutes of the last meeting, which were then read and confirmed. The following presents to the Society were then announced by the Secretary, and a vote of thanks was accorded to the donors :—

1. Monthly Notices of the Royal Astronomical Society, Volume LXXII, No. 3.
2. Journal of the British Astronomical Association, Volume XXII, No. 4.
3. Memoirs of the British Astronomical Association, Volume XVIII.

4. Bulletin of the Astronomical Society of Barcelona for January and February 1912.
5. Journal and Transactions of the Leeds Astronomical Society for 1909 and 1910.
6. Revista Di Astronomia for February 1912, Anno. VI, No. 2.
7. Monthly Weather Review of the Alipore Observatory for October and November 1911.
8. The Observer's Hand-Book for 1912, published by the Royal Astronomical Society of Canada.
9. Les Progres Recents De L'Astronomie (IV—Annee. 1910).
10. The Collegian, No. 2.
11. "Bijnan," Volume I, No. 2.

The election of the following members at the last meeting of the Council was then confirmed :—

1. The Hon'ble Sir Frederick William Duke, K.C.I.E., C.S.I., I.C.S.
2. Lady Duke.
3. The Hon'ble Mr. Justice H. L. Stephen, C.V.O.
4. Mr. H. C. Greenwood.
5. ,, G. W. C. Brady.
6. ,, Evan A. Evans.
7. ,, George Pires, M.R.C.S., L.R.C.P. (London), D.P.H.
8. ,, Kumud Nath Mukerji, M.A.
9. ,, Jasoda Nanda Sen, M.A.
10. ,, C. V. Raman, M.A.
11. Dr. Birendra Nath Ghosh, L.M.S.

The Chairman next invited those of the newly-elected members who were present to come up and sign the Roll, which they did and they were then formally admitted to the Society.

The Chairman.—We make a slight change in the order of the items of business. First will be the reading of a short note prepared by Mr. Ghosh on the Measurement of the Lunar Mountains with reference to certain questions raised by Colonel Burrard at the last meeting.

In the absence of Mr. Ghosh the paper was read by Mr. C. V. Raman, M.A.

The Chairman.—The paper which has just been read is now open to discussion, and we shall be very glad if there are any questions which members present may put or ask.

As no remarks are forthcoming, I would ask you, Ladies and Gentlemen, to thank Mr. Ghosh for these notes and Mr. Raman for having kindly read them.

A vote of thanks was then accorded.

The next item taken up was a paper by Mr. Banerjee on the Habitability of the Planets.

In calling on Mr. U. L. Banerjee to read his paper on the Habitability of the Planets, the Chairman observed that the subject possessed great interest for many people. There had been numerous writers on this topic, many of whom were divines. He would name Kepler, Huygens, Bishop Wilkins, Arago, Tom Paine (who touched on it in his Age of Reason), Andrew Fuller, a Baptist theologian, and one of the founders of the Baptist Missionary Society, which had a branch in Calcutta, Dr. Chalmers, a leader in the Free Church Movement of 1843, Chambers in his Vestiges of the Natural History of Creation, Professor Whewell, Dr. Brewster, Professor Lowell and Alfred Russel Wallace. With these remarks as an introduction he would ask Mr. Banerjee to read his paper.

Mr. Banerjee then read his paper.

The Chairman announced that the paper was now open to discussion and he hoped that as many of the members as could do so would join in the discussion.

The Chairman.—Perhaps Dr. Harrison will favour us with his views on this very interesting subject, especially as he is quite fresh from his lecture at the Town Hall.

Dr. Harrison said he had made a slight mistake in the course of his public lecture in the Town Hall the other day in speaking of some pumping arrangements to force the water from the poles through the canals. But this is not necessary, as the propelling force is derived from the rotatory force of the planet.

Mr. Lee.—I would like to ask a question which arises about the position of the canal on the planet. It seems an extraordinary thing to allow a canal to run from the South Pole to the North Pole and from thence back to the Equator.

Mr. Banerjee.—The markings on the surface of the planet show that the canals run from one pole to another through the Equator.

Mr. Raman.—I do not quite understand how a current can be running in one direction and another under it in another direction.

Mr. Banerjee.—This is possible if the width and depth of the canals be large enough to allow of convection currents to set in, as is the case with the gulf streams on the surface of the Earth.

Mr. Raman.—What about the depth ?

Mr. Banerjee.—We have not sufficient information, but as the canals could be seen by the telescope we may guess that it is not inconsiderable.

Mr. Raman.—If you had a canal as wide and as deep as you suppose, you would never be able to fill it.

Mr. Banerjee.—There is no difficulty in filling up the canals with water considering the quantity of water on the surface of the planet.

Mr. Raman.—Is there any vegetation on the planet ?

Mr. Banerjee.—The change of colour on the surface of the planet along with the development of the body of the canals with the melting of polar caps leads the astronomer to think that there is vegetation on the planet, which flourishes with the advent of the summer.

Mr. Lee.—What is the thickness of the polar cap ?

Dr. Harrison.—40 degrees in summer and 4·5 in winter.

The Chairman.—Are there any further remarks to be put ?

Mr. Raman.—If it is a fact that the planet is inhabited, what kind of life exists on it ?

Mr. Banerjee.—We cannot actually define what kind of life exists, but it is certain that the planet is not barren like the Moon. When the physical conditions of the planet are similar to those of the Earth, we may expect some sort of life like ours existing on the planet. Dr. Harrison admits the life of vegetation on a planet.

The Chairman.—Is there anyone who would like to say anything further ? It is a fact that where there is light there must be eyes to see it. We find certain signs on the Earth to convince us that there is life on it, and if we find the same signs on the planets, they tell us there is life on a planet.

Mr. Raman.—What do you mean by habitability of a planet ?

Mr. Banerjee.—When we talk of the habitability of a planet we mean that there is life on it. It may not be habited by human beings like us for the present, but the physical conditions are such that it may be suitable to human habitation in time.

Before proposing a vote of thanks to Mr. Banerjee, the Chairman said that he would like to make a few remarks himself. He had at the outset referred to the large number of writers who had dealt with the question of the habitability of other planets. As might have been expected under the circumstances, numerous opinions and arguments had been advanced by these writers. He thought, however, that their arguments could be classed under three or four heads. Some had dealt with the subject on the *a priori* method. With regard to these he said all *a priori* arguments had to be used with caution and viewed with suspicion. Others again had adopted what might be termed the metaphysical argument. He would mention as a concrete example of this class of argument that it was used by those who argued that where there were objects of sense there must be sentient beings, or where there was light there must be eyes to see it. These writers assumed much and often argued in a circle. Then came a third class who adopted the analogical argument, which might also in this discussion be termed the astronomical argument. These writers had a wide range of analogical cases furnished by our Earth, and he himself considered the analogical argument was the strongest that could be used. He would mention some of the analogies he had in view. They were practically the cases employed by Mr. Banerjee in his paper. There was first the analogy that all the planets derive their light and heat as we do from the Sun. Then they all had an annual revolution which involved changes of seasons, such as we have on this Earth. Next there was the diurnal revolution which gave other planets the same phenomena of day and night which we enjoy. Some of the planets had clouds, which obviously indicated the existence of aqueous vapour, and therefore of water. Dr. Harrison had referred to one of Professor Lowell's observations of Mars when he detected clouds of what Lowell considered to be not aqueous vapour, but dust floating in the Martian atmosphere. It was now, the Chairman believed, widely accepted that dust must exist in an atmosphere before aqueous clouds would be formed, but in Mars a huge mass of dust had been detected floating in the air, but without having condensed into aqueous vapour. Finally, we now know that the same elements with which we were familiar on this Earth exist in other planetary bodies.

He, however, held that analogous cases must not be selected on only one side of the question. There were other analogies which he submitted should not be ignored. We had extremes of heat and of cold on our planet. In the cold of the Arctic zones and the wide regions around Siberia we met with life, but it was almost confined to mosses and stunted plants. In deserts like Sahara we had extremes of heat; the day temperature of the sand in Sahara rose to 150° F., and it fell at night to below freezing-point. The life forms of these deserts were limited to euphorbias, acacias, and cacti. An occasional camel trotted across the scene, but it was under human guidance, and, unless the desert killed it, did not stop there. He is of opinion such analogies should not be neglected. What he felt was that perhaps unconsciously those who argued for life forms in other planets really had the higher types of animal life in view; their arguments almost suggested that there was a Public Works Department in Mars. He would remind the members that Professor Lowell's views were not universally accepted, though we could not lose sight of the fact that Lowell had made a special study of Mars through many years of close and strenuous work. Then again the argument from analogy itself must be kept in view. It did not establish more than a probability. It might be a strong one, but it did not amount to an absolute demonstration. Bishop Butler, the Great Master of this class of argument, had laid down that probability was the very guide of life, and therefore when we considered these analogical arguments we must not pass them by lightly nor ignore their force. Finally he held the view that the problem of the habitability of the other planets could not be settled by mere argument. We must have direct observation, and he believed instruments and methods of research would be improved and we would eventually secure evidence stronger than the straightness and length of the Martian Canals; what had to be established was the existence of something artificial, something which could not be accounted for by the operation of natural processes. We had fairly straight lines in the rayed craters of the Moon, but we endeavoured to account for these as they exist in Tycho by ascribing them to natural as distinguished from artificial causes. These were points which he thought should be kept in view. There were others, and if the President approved of it, he would at some future meeting read a note on the other side of the question. Meanwhile he would ask them all to join in a hearty vote of thanks to Mr. Banerjee.

A hearty vote of thanks was then offered to Mr. Banerjee for his interesting paper.

The Chairman then asked Dr. Harrison to read some notes made by Mr. Tomkins on Craterlets, and show some photographs of the same on the screen.

The Chairman.—Would members make any observations on this paper and put any questions ? It is suggested that the best information to be gained on Craterlets can be got by having reference to as many photographs as you can get of them. There are also many books on this subject in the Library which may be accepted as a safe authority. A suggestion of Mr. Tomkins to get a proper knowledge of Craterlets is to get the photographs and then measure the distance on the screen.

The Chairman then asked the members to accord their hearty thanks to Mr. Tomkins for his very interesting paper, which was done.

The meeting was then adjourned to the 30th April 1912.

Additional Note on the Measurement of Lunar Mountains.

BY S. C. GHOSH.

In connection with the paper read at the Society's meeting on the 27th February 1912, Col. Burrard has observed that as the height is calculated with reference to the surface on which the shadow falls, the height thus calculated would not give us such an accurate idea as it would be if the height could be reduced to some standard level, such as the sea-level on the Earth. Taking the case of Kinchingjunga, Col. Burrard has pointed out that the Sun is always south of it. The shadow of the mountain must therefore always fall to the north—