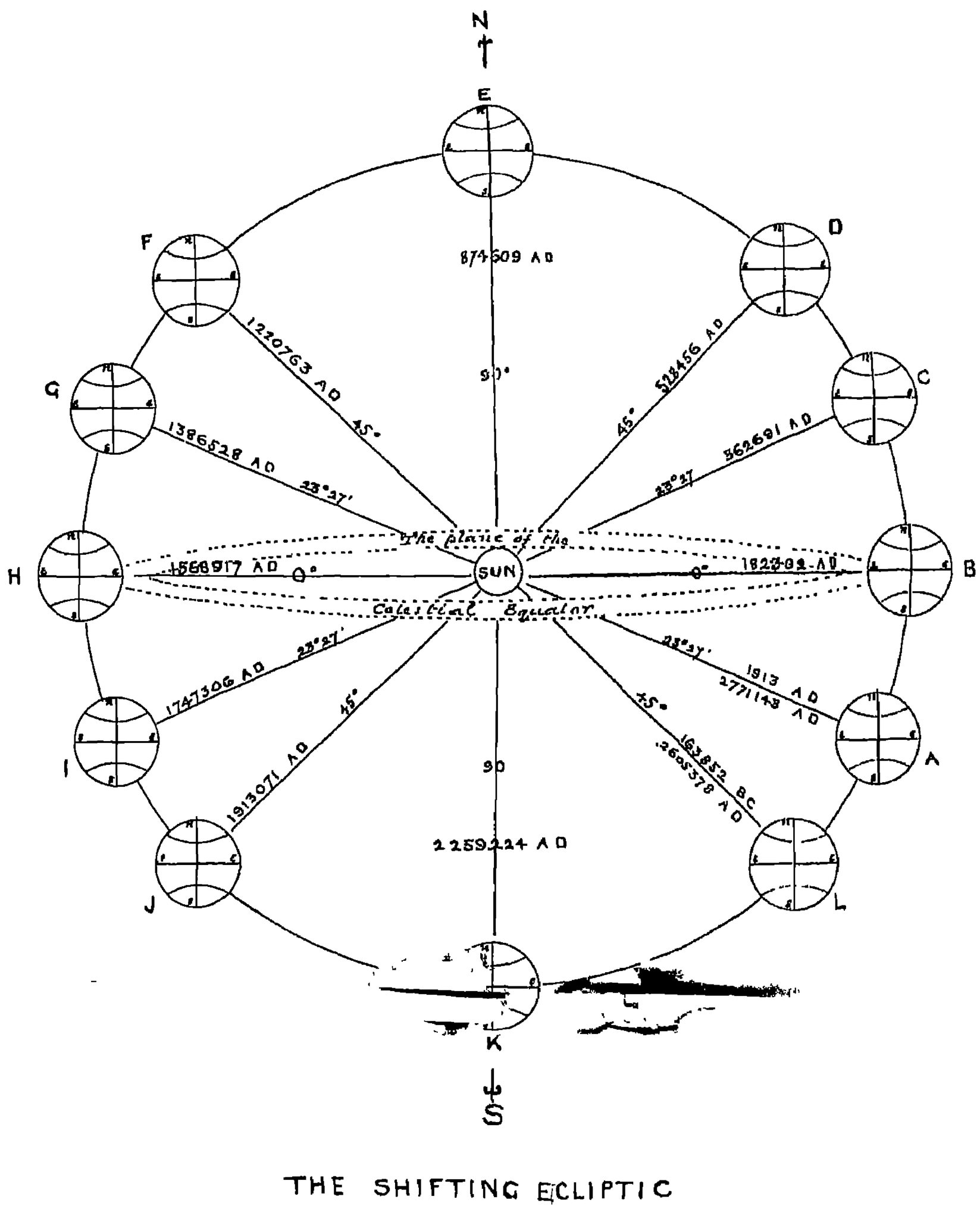
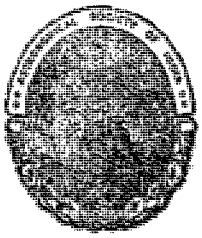


THE SHIFTING ECLIPTIC



The Journal of the Astronomical Society of India.

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Report of the Meeting of the Society held on Tuesday, 23rd December 1913.

THE Ordinary Monthly Meeting of the Society was held on Tuesday, the 23rd December 1913, in the Imperial Secretariat (Treasury Buildings), at 5 P.M. Mr. W. J. Simmons, F.R.A.S., one of the Vice-Presidents, was in the chair.

The minutes of the previous meeting held on Wednesday, the 26th November 1913, were read and with one small alteration proposed by Mr. H. G. Tomkins, C.I.E., F.R.A.S., were confirmed.

The following presents received since the date of the last meeting were announced :—

1. Kodai Kanal Observatory—Bulletin No. XXXII.
2. Government of India, Meteorological Department, Monthly Weather Review for July 1913.
3. Sociedad Astronomica De Barcelona for November 1913.
4. South African Journal of Science for September 1913.
5. South African Journal of Science for October 1913.

The Secretary brought to notice that the last two publications had been received for the first time, and read a letter from the South African Association for the Advancement of Science, Cape Town, forwarding them and offering to exchange its journals with those of the Society. This proposal was agreed to and the thanks of the members were accorded to the Association and to the donors of the other publications.

The election by the Council at their meeting of the 18th December 1913 of Mr. Francis Cecil Gray, Calcutta, was confirmed.

A note by Dr. W. A. K. Christie of the Geological Survey of India on the Composition of the Tonk Meteorite was then read.

Mr. Tomkins.—I am much interested to find the elements sodium and potassium among those of which this meteorite consists. This may explain the effluence which appeared on the pieces of the meteorite and the fact that they showed a tendency to disintegrate during the time they were awaiting examination. I am also struck with the large number of elements present. I would suggest that we congratulate His Highness the Maharaj Rana of Jhalawar on the find now that we know its full value, and also accord him our thanks for the way in which he disposed of it. The meteorite now forms part of a very valuable and celebrated collection of meteorites in the possession of the Geological Survey of India and has proved a valuable contribution to science.

In closing the discussion Mr. Simmons said that the Society was deeply indebted to the Maharaj Rana of Jhalawar for having sent fragments of the Tonk meteorite to us. It had furnished the Society with material for discussion at several meetings, and to-night we had considered Dr. Christie's report on his analytical examination of the object. Mr. Tomkins had referred to saline constituents. What Mr. Simmons considered was of more interest was the existence of carbon amongst the elements detected in the analysis. Where there was carbon you had one of the most important elements involved in the constitution of living matter. On the other hand, nitrogen (an essential element where living matter was concerned) was not found amongst the constituents of the Tonk meteorite. So far no meteorite had indicated the existence of living matter coming from outside the Earth. The Chairman said the hearty thanks of the Society should be recorded to Dr. Christie for having taken the trouble to analyse the meteor and to furnish us with a report on the subject.

The next item in the agenda was a paper by Mr. Henry Hart on the Movements of the Planets in 1914. The Chair-

man called on the Secretary to read it. (*Paper by Mr. Henry Hart.*)

Mr. Tomkins.—Mr. Hart has used the terms "superior and inferior conjunction" and "opposition" freely in his paper, and to some of our members present these may be a little puzzling. For their benefit, if the Chairman will allow me, I will very briefly explain them.

Mr. Tomkins then explained the terms with the aid of the blackboard.

In closing the discussion on this item, Mr. Simmons said Mr. Hart's diagram would in due course be reproduced in the JOURNAL, and members would thus have an opportunity of studying it more carefully than was possible when it was handed round as it had been this evening. It would be of great service to those who wished to study the planets most familiar to ordinary observers. Mr. Simmons said he himself had never seen Mercury, but he comforted himself with the thought that the great astronomer Copernicus had never seen that planet. (*Mr. Tomkins.*—I have seen it three times. It is to be seen low down in the sky, etc.) Mr. Simmons said the diagram would help those who wished to study Venus, Mars, Jupiter and Saturn with which all ordinary observers were most familiar. He proposed that a hearty vote of thanks be recorded to Mr. Hart for the diagram.

The Chairman.—I will now call upon Captain Urquhart to read his paper on the Moon. (*Paper by Captain Urquhart.*)

Mr. Tomkins.—I do not think the mere question of distance of the Moon from the Earth is an insuperable objection to Captain Urquhart's theory that meteorites were shot out by the Earth to the Moon, because he refers to remote periods of time, and at one time it is highly probable that the Moon was much nearer the Earth than she is now, and in fact was probably a part of it. I was not aware that we had among our members a supporter of the meteoric impact theory. I confess I am myself opposed to it, and on several grounds. First of all, taking the slides we have just seen on the screen, it will have been noticed how much the seas for the most part resemble large flat-bottom craters. Captain Urquhart has suggested a different origin, but I find it difficult to regard the seas otherwise than large formations of a kind similar to some of the crater formations, such as Ptolemous. Except that one is smaller than the other they are similar in almost every respect. I should, therefore, put the seas at the top of the scale, and supporters of the meteoric theory, I think, usually admit this. Now some of these seas are found 400 to 500

miles across, and this seems to me to be against any meteoric impact origin on account of the enormous size of the meteorite required, and the fact that such impacts would probably cause far more serious effects on the Moon than the mere formation of the seas. Again, the central peaks in the craters are many of them very large—there is Copernicus, one about 7,000 feet in altitude. This means a mass of stuff which I am doubtful if the Earth could ever have thrown out. Most supporters of the meteoric theory go outside the Earth to the solar system for their meteorites which seems to me more likely than that the Earth shot them out, but personally I doubt both.

Again with the smaller crater pits, Captain Urquhart puts them down to small bodies which accompanied the larger one and fell round it. To this I think a serious objection exists in the fact that we find in several instances chains of three small craters in a line touching one another, and in some cases arranged with the largest at one end of the chain and the smallest at the other in descending magnitude. Such an arrangement seems impossible to the meteoric theory and to suggest rather lines of weakness and a volcanic origin.

I notice, however, that Captain Urquhart does not altogether deny volcanic forces on the Moon.

Generally speaking, however, it has always seemed to me that the meteoric theory requires such enormous forces, such terrific impacts and the presence of such a large number of foreign bodies of such gigantic size as to put the theory itself out of count. Our experience shows that nature, as a rule, works much more quietly and smoothly than this, and in the absence of some sort of indication that impacts of the kind have really occurred, I prefer to attribute the features of the Moon to some form of volcanic agency, as we do know that this agency exists in nature and we have some clear evidence of its effects.

Revd. Mr. Ridsdale.—Whilst thanking Captain Urquhart for his very interesting and instructive paper, I doubt whether the Earth's volcanic forces could ever have been sufficiently strong to have ejected such vast masses of matter, as must be supposed on the bombardment theory. I also think that the difference of character of the lunar crater from the terrestrial one could be quite satisfactorily accounted for by the vast difference of lunar from terrestrial gravitation. Speaking of the bolide theory, would it not be the case that missiles thrown out away from the line of centres of the Earth and Moon would fall on the latter at a considerable angle ?

Captain Urquhart.—No, most of those thrown out away from the line of centres would fall back on the Earth again, while the remaining velocity of those which came within the sphere of influence of the Moon would not be sufficient to affect materially the ultimate result at the surface of the Moon. As the hour is late, I must postpone my replies to the criticisms till a future meeting.

Mr. Raman.—I would ask what it is on Captain Urquhart's theory that produced the expulsion of the bolides from the Earth ? If it was some kind of volcanic action, surely the very necessity for the theory disappears, since the Moon (being an offspring of the Earth as shown by Prof. Darwin) would partake of such volcanic nature and this would sufficiently explain the formations on it.

The hour being late, Mr. Simmons, in closing the discussion for the evening, briefly said there were two or three points on which he would like further information. He illustrated by diagrams on the blackboard the theory held by competent geologists with regard to the mode of formation of volcanoes. He also pointed out that while Captain Urquhart based his analogies on results obtained by firing bullets into vessels of molten lead, he himself preferred to look to the surface of the Earth itself for his analogies. In Nasenyth and Carpenter's work on the Moon there was a picture showing the configuration of the district around Naples. It closely resembled what we saw on the Moon's surface, and therefore suggested (he thought conclusively) that the structure of the Moon's surface could be better explained by reference to the known results of volcanic activity on the Earth than by the meteoric theory. Mr. Simmons added that the fragments of a bolide distributed themselves on the Earth in an ellipse, and by an illustration of the blackboard explained why this must be the case. The craters on the Moon, however, were circular, not ellipsoidal.

The meeting was then adjourned.

The Composition of the Tonk Meteorite.

By Dr. W. A. K. Christie.

The meteorite presented to the Astronomical Society of India by His Highness the Maharaj Rana of Jhalawar has been

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