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Report of Monthly Meeting of the Astronomical Society of India held on Thursday, the 21st December 1911.

MR. H. G. TOMKINS, C.I.E., F.R.A.S., *President*, in the Chair.

The Monthly Meeting of the Astronomical Society of India was held in the Imperial Secretariat Buildings (ground floor), on Thursday, the 21st December 1911, at 5 P.M.

The Proceedings were opened by the President and the Minutes of the previous Meeting confirmed.

The first paper of the evening was read by Mr. P. C. Bose on Meteors.

The President.—Perhaps it will be convenient, before I open Mr. Bose's paper to discussion, to mention that I notice in the first part of his paper Mr. Bose puts down the origin of meteors to collisions. The next point which struck me in his paper was the destruction of orbits. The third point I noticed was the collision of meteors with comets. I would ask discussion on these points. Professor Bickerton has dealt with collisions of stars, but I do not know that the collision of two meteors would produce a shower of bright meteors. Professor Bickerton thinks that the collision of two stars would produce a third star somewhat in the manner which I will illustrate on the board (drawing on the blackboard). The part in

the middle where they graze, he holds, would liquefy and form a third body, and the parts which do not touch still go on in their course as stars. But the theory is not generally accepted as accounting for the brightening up of the new stars, which we sometimes see in the heavens. I think it more likely that a comet breaking up may account for the meteors, and this has some support from observation. In connection with this I would draw attention to the shower of 23rd November. As regards the Leonid shower, the reason why those meteors have not appeared again is that the orbit has been shifted on to another course, and consequently we do not see the shower. At least many consider this a reasonable explanation. I do not think that it was intended that these meteors should fall into the centre of that. Mr. Bose is in good company, as Dr. Sil, in the book which has just been published, considers bombardments by meteors likely.

A hearty vote of thanks was duly accorded to Mr. Bose.

The next paper was read by Dr. Harrison on "Inorganic Evolution," which he illustrated and explained by several interesting drawings on the blackboard.

The President.—There is one point on which I should like to ask a question, and that is: when you have two stars of the same brightness, how is it possible to know that one is rising and the other falling in temperature?

Mr. Meares.—Is there any relation between colour and temperature? Are the stars which are generally of the higher temperature of the freak class of star, blue or red? And are they rising or falling?

Dr. Harrison.—With regard to the red stars, I am not at all clear as to whether they are equally distributed among the heating or cooling class; my impression is that they are all cooling stars.

Mr. Meares.—This may be just a point of temperature.

The President.—Was there not something published some time ago about four or five red stars in one of the star clusters? I think they were described as hot stars.

Mr. Meares.—Do you mean the Wolfe Rojet stars?

The President.—Yes, I do. My recollection is that they were looked upon as hot and variable stars.

Dr. Harrison.—They might be very hot stars and yet they might be falling in temperature.

Mr. Meares.—Yes, I see your point.

The President.—There are some questions which I should like to ask. We have just had during the last few months a long series of papers and articles from Professor Bickerton. He told us that on grazing collision of two stars, a third body is formed, and it appears as a new star, and I think, if what he states is the case, there should be something to show us whether these stars are rising or falling. Is there anything ?

Dr. Harrison.—I do not think it has ever been observed.

The President.—The new star ought to be a rising-temperature star.

Dr. Harrison.—No, the new one would be a cooling star.

The President.—Yes, when on the wane, but before that a rising one. Is the planet Neptune a rising or a falling star ? Would that give us a spectrum ?

Dr. Harrison.—I do not think it gives a spectrum.

The President.—I am right, am I not, Mr. Meares, that the planet is considered to be still hot ?

Mr. Meares.—I think so. I believe it is rather a difficult proposition.

The President.—I am doubtful also whether there is a spectrum. If there is, it would be very interesting to find out.

Is there any evidence to show that the nebulous state is a cooling one ?

Dr. Harrison.—The nebula is condensing and therefore rising in temperature up to a certain point.

Mr. Meares.—Would not the extreme tenuity of the nebula be against it ?

Dr. Harrison.—No. The absence of evidence would not necessarily be against it.

The President.—As Mr. Meares says, the tenuity of the nebula might go against it.

Mr. Bose.—I notice that helium has been taken in this case, but do you mean to say that all stars contain helium.

Dr. Harrison.—I think so, all stars probably contain helium, but I do not think that its absence would matter.

The President.—Is the amount of helium in the star any proof of temperature ?

Dr. Harrison.—It would be difficult to get the amount, but the condition of the helium spectrum would be some indication perhaps.

Mr. Meares.—There is no doubt that they have all got it there, but the question is to trace it.

A very cordial vote of thanks was returned to Dr. Harrison for his interesting paper.

The Chair was now kindly taken by Mr. Simmons while the President read the next paper on the Old Delhi Observatory, which he amply explained by a sketch on the blackboard and pictures on the screen, which proved of the greatest interest.

Mr. Simmons.—Ladies and Gentlemen, the time has now come for you to put such questions to our President as may have been suggested by his paper this evening; a most interesting paper to us as bringing up the question as to whether Delhi would be a suitable place for an Observatory.

Dr. Harrison.—What degree of accuracy could they get with their instruments? Could they read to one degree?

Mr. Meares.—I think they got down to about $\frac{1}{4}$ of a degree. Mr. Maunder had a paper either on the Benares or Delhi Observatory, I forget now which. I believe that they got a mean accuracy of two lines of them to $\frac{1}{4}$ of a degree.

The President.—I think that is the way they did it. They depended on mean figures, as Mr. Meares says. They actually had 20 sets to select from.

Mr. Meares.—The Benares Observatory was very good, but in the case of the others I know very little.

The President.—As regards the question as to whether Delhi would be a good place for an Observatory or not, personally I should say it would not, on account of the dust.

Mr. Meares.—What about Calcutta?

The President.—Calcutta certainly has its dust and smoke, but the former is nothing in Calcutta compared to Delhi.

Mr. Meares.—Does not Calcutta suffer from vibration?

Dr. Harrison.—I have never had any dust or vibration troubles at the Observatory, but we have not very large instruments.

Mr. Simmons.—On what are those restorations based, are they based on any records that have come down to us?

The President.—I think they are based on what is left at Benares and Jeypore, as well as old Sanskrit writings.

Mr. Simmons.—It would be interesting to know whether this Observatory was built from the Hindu point of view or from the Arabic point of view.

The President.—I am afraid I cannot say fully, but it was Hindu built and contained modern ideas, if the provision for Greenwich longitude is any criterion.

Mr. Dutt.—Was Greenwich known to the Indian Astronomer in 1770—I mean is that the proper translation of the writings ?

The President.—I do not know, but I think the translations refer to Greenwich, Italy and Japan.

Dr. Harrison.—Has any one taken any observations by these instruments ?

The President.—Yes ; Babu Bhola Nath has tested them and sells an interesting book on them. He has tested some of them but not all ; some are still in course of restoration.

Mr. Simmons.—In returning a hearty vote of thanks to our President for his most interesting paper, which carries us back to the very earliest times when observations were made, I would remark that perhaps a visit to the Old Delhi Observatory would not only be an interesting but a very instructive undertaking to all interested in Astronomy.

The President next exhibited some very interesting photographs on the screen of nebula taken by Dr. Richie of America.

Mr. Meares.—Do you happen to know what exposure these were taken with ?

The President.—Three or four hours I believe.

In adjourning the Meeting the President remarked that the Astronomical Society of Barcelona intended holding an Exhibition next May and June and that this Society hoped to be in a position to forward a few exhibits. He invited help from Members. The Meeting was then adjourned to Tuesday, the 30th January 1912.

Inorganic Evolution.

BY DR. E. P. HARRISON.

Inorganic evolution deals with the changes which have gone on, and the causes that have been at work in building up from much simpler forms, the 70 or 80 so-called chemical elements as we now know them.

Some years ago a most remarkable theory which is nowadays generally accepted, and which has revolutionised modern thought in many directions, was put forward by Charles Darwin. It is known as the theory of organic evolution and it suggests that each species of plant and animal is not the result of special creation ; but has been modified by its surroundings and has become gradually changed by the action