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Report of the Meeting of the Society held on Tuesday the 30th May 1911.

H. G. TOMKINS., F.R.A.S., *President*, in the Chair.

The usual Monthly Meeting of the Astronomical Society of India was held, in the Imperial Secretariat Buildings (ground floor), on Tuesday the 30th May 1911.

The Minutes of the previous meeting were read and confirmed.

The President then announced that six presents had been received by the Society, including a valuable addition of six works to the library from Sree Rajah A. V. Jugga Rao, Bahadur Garu, F.R.A.S., &c.

The thanks of the Society were accorded to the donors.

The election of the following members by the Council was then confirmed :—

1. MR. S. C. GHOSE, M.A.
2. MR. C. T. LETTON.
3. MR. B. N. MITRA, ESQ., B.A.
4. NAWAB WAHIDUDDIN, KHAN BAHADUR.

It was then announced that the Royal Astronomical Society of Canada had placed the Astronomical Society of India on its list of Exchanges, and a congratulatory letter from that society was read. A hearty vote of thanks was accorded to the Royal Astronomical Society of Canada for their letter and good wishes.

The first paper of the evening, on the Grinding of a Glass Specula, by Mr. Dhar, was read by the President, while Mr. Rakshit took the Chair, owing to the absence of Mr. Dhar, who however attended late and took over the reading of his paper from the President.

Mr. Woodhouse.—What is the object of the iron squares instead of the glass tool ?

Mr. Dhar.—With a marble slab and the squares, it is not necessary to grind the slab to the curve of the mirror, and so the slab can be used more than once and the arrangement is economical.

Mr. Woodhouse.—Is it possible to get a true curve in this way ?

Mr. Dhar.—I think that it is possible, yes. The marble slab can be utilized by merely placing a small bit of iron or glass carefully on it with pitch. Of course you must be careful so to place the pieces of glass that they take the curvature.

The President.—I suppose you have to work those pieces down to the curvature of the mirror after pressing them to the shape of the mirror ?

Mr. Dhar.—When the grinding is done I make, first of all, a slab with the grooves and I square it out by lines. I put square bits of glass or iron on this and as soon as the mirror is worked upon those pieces, they take the concavity.

Mr. Dhar then explained his meaning by drawings on the blackboard.

The President.—Would you not find it much easier to just take two pieces of plane glass and then grind them one over the other until they became concave and convex ?

Mr. Dhar.—If I press down the pieces they will take the shape of the convex tool; they then have to be ground with a shaper till the approximate curve is reached and after that the mirror is put on.

The President.—Do you let your square of iron or glass rest in the pitch itself ?

Mr. Dhar.—Yes.

The President.—You do not press them down to the iron or marble disc ?

Mr. Dhar.—No.

The President.—With the square resting in the pitch is the arrangement not liable to destroy the curvature of your mirror owing to the squares getting out of position ?

Mr Dhar.—Of course it has to be carefully looked after.

The President.—Then it is not a permanent tool, and I take it that it is liable to get out of shape ?

Mr. Dhar.—Of course it may get out of shape. Now and then that has happened; but this is purely for grindding purposes. When the fine grinding is done, of course, if too long intervals are allowed to pass between one grinding and another, that result may take place. The plan is an alternative to avoid making a convex tool for each mirror, and so is economical.

The President.—Now that we are on the subject I should like to give you an outline briefly of a simple way of making a glass specula. About 15 years ago I made a reflecting telescope myself. Now I will just show the drawing on the board. (Drew a sketch on the blackboard.) You just simply obtain two pieces of glass 6" in diameter and cut into circular discs ; then edge them. Mr. Dhar used a lathe. Without a lathe you get the discs and stick two pieces of wood on each face of the disc with pitch, fix it up between two supports, get a piece of string and wind it round, so as to spin it between the supports. Now with a piece of curved iron, grind the edge with a rough grade emery or carborundum and water, and then when you have finished with that, you use the finer grade. Then just bevel the edge of the mirror. Next, having got your two pieces of glass the same size, fix one to the top of a tube or post. The mirror can be stuck down with pitch. To warm the mirror for the pitch, boil it. Do not heat it with a lamp unless you wish to crack it. In the same way stick a piece of wood on the other glass for a handle, and all you have to do then is with long strides to grind one of your discs over the other with carborundum, and water, and walk round your post all the time that you are grinding. As you get away round just give the mirror a spin round at the same time. You will find that the piece underneath will become convex and the piece on top concave. The latter will be the mirror. Then you have got to fine-grind it in the same way as described by Mr. Dhar. If you wet the surface of the mirror and flash the image of the sun on a wall, then measure the distance from the mirror to the wall, you can obtain roughly the length of the focus. If it is too long you can go on again, but it is better to keep on the long side in the early stages and shorten as you fine-grind. With a 6″ mirror I should make the telescope about 5 or 6 feet long. As soon as you have done that, do away with your coarse emery and use a finer emery, and then use flour emery as described by Mr. Dhar. When you think you are through with that you will find that your mirror is so fine ground that you will be able to see anything on the other side. Then the polishing. The simple way with a small mirror of this kind is to get a piece of nice paper and stick it evenly over the face of the tool. See that it is without any crease and with the stem of a wine-glass rub it well down all over. Then you must wash the rouge and brush over the paper with a brush; then rub in again with your wine-glass stem till you get it nice and smooth. On this a polish will come on the mirror in about two hours. Now test it. The method, you will remember, was fully described by Dr. Harrison in his paper in a recent number of the JOURNAL. If any one would like to send me a mirror which they have made I would be glad to test it for them.

Mr. Dhar.—You said that the paper must be spread all over the whole of the tool uniformly and then used for polishing. I once tried that, but I met with utter failure; perhaps it was not evenly put over the glass.

The President.—Yes, you must be very careful; it takes about two hours to put it on and rub it down.

Mr. Dhar.—Several years ago a paper was published in which I read that some one had tried it but had never met with any success with paper polishing.

The President.—Mr. Woodhouse knows something of paper polishing. Do you use paper polishing?

Mr. Woodhouse.—Paper is used to bring up a polish, but the work is usually finished off with pitch.

A hearty vote of thanks was returned to Mr. Dhar for his interesting paper.

The next paper of the evening was read by Mr. Bannerjee on the Lunar View of the Apennines. He explained his remarks by some very interesting lantern pictures. A vote of thanks was duly returned to Mr. Bannerjee.

Mr. Rakshit then read a paper by Mr. Ashutosh Mitra on the Solar eclipse of October 1911 and explained his figures on the blackboard.

The President.—Does that shade show the magnitude of the eclipse? I thought it would be more.

Mr. Rakshit.—Yes.

The President then drew a sketch on the blackboard illustrating a simple way to see this eclipse.

The President.—The magnitude of the eclipse is about ·64. Mr. Rakshit's figures are just a rough sketch of what we are to have, but members are working on it and will submit their results later on.

The President next showed a few photographs of the moon which he had taken during an investigation two or three years ago and which brought into prominence some interesting facts regarding the moon.

The President.—The part of the moon which I wish to draw your attention to in this first photograph are these bright rays, running from Copernicus and Tycho. These slides bring out clearly to you the fact that the same rays do not appear the same on them all, but vary very much on the different slides. The slides represent the moon at different ages, and so we see that the prominence of the rays varies with the time that part of the moon has been under the sun's rays. The problem which is before us is whether the variation in the rays is due to some physical cause in the rays themselves or whether it is merely a matter of illumination. I think the question is pretty well settled. The portion of the moon's surface in which I have chiefly investigated the subject is Copernicus, and you see no rays at all in the earlier stages of the illumination. For a space of 1½ to 2½ days you do not see rays at all, and the same thing occurs just before sunset again. Observations show that these are surface markings; there are no high ridges; there are ridges but not very high ones; the brightness is due to surface conditions. Now the question is whether these surface markings vary owing to some physical cause or owing simply to difference of illumination. I think that there is no doubt at all that it is a cause of light and not a question of physical change. The experiment which I first made was to make a model of a ray system very roughly on a board, and then with the aid of a magic lantern and a bright aceteline lamp I threw a strong light on the model so as to reproduce the conditions of the rising sun on the moon. I then photographed the rays at the various angles, and the results I got, as you see from the slides, were to show that as the illumination became vertical the rays appeared clearly, but as it became oblique they died away. You will notice that the model rays are practically invisible when the angle from the model is 9·5°. This agrees with the usual angle (10°) at which the sun's altitude usually stands when the rays become visible on the moon; and this is the point which I wished to bring forward this evening. I have 3 records of the rays having been seen even at the dark part of the moon, and that goes to show that these rays do not change physically, but that the variation is merely a question of waxing or waning light. The rays have also been seen by me in the Earth-light as well as on occasions of a total eclipse of the moon.

Mr. Simmons.—Do you think this explanation applies to the white spots also?

The President.—There is a probability that it does. The only thing about a white spot is, as a rule, that it is an elevation, but taking this into account the same thing ought to apply to a mountain range or a slope.

The President.—Before we close our meeting this evening I would mention that we have a rule about the election of the Council, and names proposed by members will have to be sent in by the next meeting, which will end the present session. A list of members will be sent to members with the next number of the JOURNAL.

The President then adjourned the Meeting to Tuesday the 27th June 1911 at 5 p.m.

On the Construction of Glass Specula for Reflecting Telescopes.

BY N. N. DHAR.

Reflecting telescopes have been popular with amateurs and are likely to be so, I may say, always. The reason is that they are easier to make; I mean the principal part of them, namely, the object mirror or speculum. Besides, as the object mirror forms the image by reflection, there is no colour trouble due to what is called "chromatic aberration," which is a source of annoyance with refracting instruments.* Another great advantage with reflectors is (in the case of their most popular form, the Newtonian) that the observer is always comfortable in his position, as he has never to look up but always looks down or straight forwards. In these few introductory remarks, I do not

* Reflectors are not, however, altogether free from chromatism, which is introduced more or less by the lenses in the eye-piece.