The Journal

of the

British Astronomical Association.

VOL. XII. SESSION 1901–2. No. 8.

REPORT OF THE MEETING OF THE ASSOCIATION HELD ON MAY 28, 1902, AT SION COLLEGE, VICTORIA EMBANKMENT.

G. M. SEABROKE, F.R.A.S., *President*, in the Chair.

A. C. D. CROMMELIN, F.R.A.S., } *Secretaries.*
J. G. PETRIE, F.R.A.S., }

The Minutes of the last Ordinary Meeting were read and confirmed.

Mr. Crommelin read the list of presents received, among which were 125 negatives for Lantern Slides, presented by the Rev. E. Ledger, M.A.; some photographs of the Annular Eclipse of the Sun of November 11, 1901, presented by Capt. P. B. Molesworth, R.E.; a large photograph on glass of the Moon (supposed to have been taken by Dr. Henry Draper), presented by Mr. H. O. Barnard, and three lantern slides of his Observatory, presented by Mr. W. Goodacre. The thanks of the Association were accorded to their respective donors.

The election by the Council of two new Members was unanimously confirmed.

Capt. P. B. Molesworth, R.E., read a paper on "The Annular "Eclipse of the Sun, November 11, 1901, observed at Trincomali, "Ceylon."

At the conclusion of the paper, three slides, made by *Mr. E. Walter Maunder*, were shown by him on the screen, the first representing the annular phase from a negative taken with the 12½-in., the other two showing the eclipse party at work, from photographs taken by Lieut. Crawford, R.N.

Mr. Maunder felt sure they all sympathised with Capt. Molesworth in the difficulties which he had experienced in observing the annular eclipse of last November. At the very best, eclipse work was extremely trying, even when the circumstances were altogether favourable. The next best thing to very good conditions for an eclipse was when the conditions were extremely bad, and they could see nothing at all; or perhaps it ought to be said that such a case was the most fortunate of all, because then the observer's mind was perfectly at rest. But he thought the worst they could conceive of was when they could see something of the eclipse, but all the conditions were adverse to successful work, and Capt. Molesworth seems to have had this extremely bad fortune. He (the speaker) had been on five eclipse expeditions, and he thought the feeling experienced on each occasion was one of wonder that anybody who could stop quietly at home should, of his own free will, go through all the worry which eclipse work involved.

Mr. A. C. D. Crommelin thought the fact that Capt. Molesworth had obtained traces of the corona, even on the occasion under notice, which was as wide an annulus as they could have—indeed, it was a record eclipse practically for width of annulus—made it quite hopeful that in some annular eclipses, when the annulus was narrow, a good deal might be done on the corona. More especially they might call the eclipse of 1912 an annular eclipse, because, although there would be two or three seconds of totality in Portugal, that, he thought, would not be long enough to do much work in; but the eclipse should be worth going to see, because there was reason to hope that, even for the few seconds before and after totality, a good deal of work might be done on the corona—in the flash, and so on. Capt. Molesworth was particularly to be condoled with on the loss of the flash spectrum, because that was really the hopeful thing, and the thing which it would seem might be obtained at an annular eclipse, and, but for the misfortune of the slit having been slightly misplaced, he would probably have been quite successful in that direction.

The President thought Capt. Molesworth hardly did himself justice when he described his paper as a record of failures. From failures a good deal had been learned for guidance in future work. He remembered that at school he was taught physics by two gentlemen. One, a very careful man whose experiments always succeeded, and the other a man whose experiments seldom succeeded; but the latter always said he could make more out of his failures than the other could out of his successes.

Mr. G. F. Chambers said that many years ago he was a subscriber to a well-known periodical, "Notes and Queries," prefixed to which was the statement, by way of motto, "When found, make a note of.—Capt. Cuttle." He did not know who the original Capt. Cuttle was, but his moral reflection had always left a very strong impression on his (the speaker's) mind, that nothing was too small to be worth making a note of. It was on this principle that he ventured to rise on the present occasion—not so much to say something by way of affirmation, as to ask a question. Did any Member of the Association see anything

abnormal last week in the condition of the moon? He was a great deal away from home during that week, and had had no opportunity, except on one night, of scrutinising the moon. On that one night he did see what several members of his family said they had seen on several successive nights—namely, the moon of a very marked ruddy colour, when it was well above the horizon. The statement was made to him by his wife, and confirmed by his daughters, and he was so far able to confirm it himself that, on the single night during the week on which he did see the moon, he noticed that it had a very marked ruddy hue. He wished to follow up the statement by the question, "Could this "have been in any way due to the eruptious in the West "Indies?" That was the question which he put before the Meeting, asking for an answer. Many present could, no doubt, remember the remarkable sunsets of 1883, which were associated, according to a well-accepted belief, with the eruptions of Krakatoa, out in the Far East. Although England was so far off from Sumatra, he believed no doubt existed in the minds of anybody that the volcanic eruptions in 1883 were the cause of what was seen so often during that year. He did not know distinctly whether any abnormal appearances had been seen in the sunsets during the past few weeks; and it might be a matter of interest to hear hereafter whether anything of that character had been noticed either in North, Central, or South America; but it did occur to him, when these remarks were made to him about the moon, persistent as this ruddy hue seemed to be for several days, that it might be a fair matter for inquiry as to whether any similar appearance had been noted by others in other parts of England, and, if so, whether any theory was available for an explanation of it. The observations, he might add, were made in a very clear sky. Eastbourne was rather famous for its clear skies, and there were no local circumstances with regard to the position of the moon—such as any factory chimneys or anything of that sort —to give rise to any special cause of disturbance which might affect the appearance of things. Therefore, the moon seemed to have been observed under ordinary conditions, but to have been very much tinged with a ruddy hue. It might be a trifling matter, but he thought it not out of place to mention it to the Association.

Mr. W. Goodacre said he did not observe the moon telescopically during the last apparition, but he observed it on several occasions visually in a casual sort of way, and there certainly was an amount of ruddiness about it such as Mr. Chambers mentioned. At the same time it did not occur to him to connect this at all with the volcanic eruptions in Martinique or St. Vincent. He rather put it down to the great southern declination which the moon had about this time of year, and the obscuration by London smoke in which it was immersed by reason of its low altitude.

Mr. Crommelin said he remembered noting the moon on that day week. It was a day that cleared rather late; the night was thick until about 11 o'clock, and then the moon was getting up, though it was not very high. But it struck him that it had a

distinctly greenish tinge that night, as seen from Blackheath. He remembered wondering whether that rather sickly appearance had anything to do with the eruptions, but it seemed to him it was a little too soon to expect the dust by that time. In the case of Krakatoa, it was, he thought, two months after the eruption that the abnormal sunsets began in England. Of course, Martinique was a good deal nearer, but he hardly expected a week or a fortnight was enough for the dust to have come such a distance. As regarded these eruptions, there was one point that might be of a little astronomical interest, and that was that the cataclysm that overwhelmed the town of St. Pierre happened exactly at new moon. Moreover, the moon was in perigee at the time, and an unusually near perigee. That might have been the reason for the cataclysm coming at that moment; they might well imagine that the tidal action of the moon did not affect the ocean only, but also the liquid matter in the interior of the earth; and, if so, that the tidal action would be at a maximum at that time—more especially as the sun and moon were roughly in the same North Declination as the parallel of Martinique, so that they would pass practically overhead, and on all these accounts the tidal action would be at a maximum at the time at Martinique.

Mr. W. T. Lynn asked whether the moon was in perigee at the time of the Krakatoa eruption.

Mr. Crommelin replied that he had not looked up the point.

[*Note.*—On examination he found that the great convulsion at Krakatoa, August 26, 1883, was 5 days before new moon, and 6 days after perigee, so that this did not lend much support to the idea of connection with the moon.]

Mr. S. A. Saunder said he had not been fortunate enough to observe the moon during the past week, owing to the persistent clouds; but his recollection of the appearance of the moon after the Krakatoa eruption was that it was distinctly blue or green for a good many nights. He did not remember any ruddy appearance then.

The President:—The sunset was red.

Mr. Saunder:—Yes, but the moon was blue or green.

Mr. G. J. Newbegin remarked that Mr. Chambers had asked a very important question, and, having had their attention called to it, the Members should all be on the watch for any effects that might be visible, either in the moon or in the sunsets. It might be early yet to expect any effects, because, although, as Mr. Crommelin remarked, the West Indies were nearer than Krakatoa, they might in another sense be further from us, because we might possibly suspect that the winds would have to carry all the volcanic dust right round the earth before it reached us. Then he supposed the volume of eruption had not been anything to compare with that of Krakatoa; though it had, to his mind, been big enough for us to suspect some sunset effects and some lunar effects also.

Mr. W. London said that from a point about 80 miles from London, where he lived, he had for the last few evenings been looking out to see the planet Mercury, and had been very much disappointed because of a peculiarity which he had never noticed before. The sun, especially on the last two nights, set in a clear and beautiful sky; but after it had set, without any apparent reason right in the west was a golden colour tinged with red, extending some distance up. It ascended from all along the horizon near the setting sun. That morning again there was a similar appearance; the sun rose with a peculiar golden colour and with a slight tinge of red, but after it had got well up, all this disappeared. There was no trace left of any cloud to indicate a reason for it. Whether this appearance had anything to do with the dust from the West Indies or not, he could not say; he thought it might possibly have.

The President said it seemed quite conceivable that the dust had arrived here, for he thought a velocity of about twenty miles an hour would have brought it, and that was quite within the limits of the wind in the upper currents.

Mr. W. T. Lynn read a paper on "The Causes of Variability in the Stars."

Mr. E. W. Maunder remarked that the long-period variables were exceedingly difficult to explain. In the first place, there was a large number whose period of variability was very nearly that of a terrestrial year. A period of that length seemed scarcely likely to be one of simple rotation, nor did it seem likely to be analogous to the eleven-year period of sunspots. They had next to bear in mind that the amount of variation was in some cases a very large one. For instance, in o Ceti they had an extreme variation of brightness. Sometimes the star was a thousand times as bright as it was at other times, and that, of course, was a range of variation which was utterly out of comparison with any variation in the light of the sun due to sunspots. Then, again, in not a few of the long-period variables it was found that at maximum they showed the hydrogen lines bright. The difficulty was to collate all those facts, together with those which were supplied by the photometric curve of the variable, and to explain them all by any one theory. He did not think they had at all hit upon the true solution of the difficulty as yet, although they had by this time got together a very considerable amount of facts upon the subject. He did not quite see how the suggestion, which Mr. Lynn had thrown out, would account for so great a variation as they had in the case of o Ceti. In cases where the variation was smaller, however, it might possibly afford a hint of the truth.

Mr. Lynn:—Surely o Ceti is an exceptional case.

Mr. Maunder:—True; but there are some cases where there is an even greater range than that in o Ceti.

The President was afraid he was very ignorant of variable stars, but he believed there were four classes. Firstly, the Algol variables were pretty well accounted for by the eclipse theory; but as

to classes 2 and 3, regular variables of considerable variablity and those of slight variability, perhaps Mr. Lynn's theory might account for the slight variation of class 3, such as a few tenths of a magnitude or something of that order; but as Mr. Maunder had said, the variability of a great many of the stars, especially of the second or o Ceti class, varied to hundreds and even thousands of times in their light. Then, again, he believed he was right in saying that the increase of brightness was generally more rapid than the defect of brightness. The curve of variation seemed to rise abruptly, and then shade off slowly, and that would hardly be accounted for by Mr. Lynn's theory. These facts, coupled with the increase at maxima of brightness of certain lines—hydrogen lines in particular—pointed to a disturbance which was produced comparatively suddenly, and which again gradually subsided. How to account for the cycle of disturbance on physical grounds was, of course, very difficult. Their thanks were due to Mr. Lynn for bringing before them a subject that required considerable thought and ventilation.

Mr. Walter F. Gale (Newcastle, N.S.W.) contributed some notes regarding the planet Jupiter.

A paper by *Major L. A. Eddie*, on "Varying Colours during the Progress of a Lunar Eclipse," was read by Mr. Crommelin.

Captain Molesworth said he also observed the eclipse in the Indian Ocean, about 400 miles west of Colombo, and he could corroborate what Major Eddie said as to the darkness of the eclipsed portion of the moon during the partial phase. Until the moon was nearly half obscured the eclipsed portion was quite invisible. Later it was very dark, indeed of a copper-brown tint, the edge of the shadow being very sharp. Just before totality the general tone was a deep red-brown, changing through a bluish colour to a pale primrose tint at the edge. After totality the eclipsed moon was easily visible—deep bronze on the dark side and pale brownish yellow at the part least obscured.

Mr. Goodacre said that in the few remarks he made concerning the eclipse at the previous meeting he called attention to the fact that those observers who had witnessed it in this country agreed pretty much that it was in the latter part of the eclipse that the moon became entirely invisible, so far as regarded the obscured portion. But he understood, from what Captain Molesworth said, that the invisibility of the shadowed surface was manifested more particularly during the earlier portion of the eclipse, and that in the later portions of it the surface became visible. From what he had gathered from Major Eddie's paper, the experience of the writer was rather that it was during the latter portion of the eclipse that the shadowed surface of the moon was totally obscured. It was a very interesting feature that Major Eddie drew attention to, as regarded the fringes of colour; these had been observed in this country on several occasions, but, so far as he (Mr. Goodacre) knew, had not yet been properly accounted for.

Captain Molesworth said he ought to have stated that he watched the eclipse only up to totality, but did not see the last

part. The eclipse with them kept rather late hours, as it was not total till between 12 and 1.

Mr. Petrie read a paper by *Mr. G. J. Burns, B.Sc.*, on the "Origin of Lunar Formations."

Mr. Goodacre thought such papers as that of Mr. Burns possessed a great amount of interest. It was, no doubt, within the recollection of many present that during the past few years there had been several papers brought before the Association, in which more or less complete theories as to the formation of lunar objects had been advanced. It might be remembered that they had photographs passed round on one occasion of an armoured plate, which had been pierced by projectiles, and certainly the holes bore a distinct resemblance to lunar craters. The unfortunate part of the theory was that the craters were more life-like on the back side of the plate where the shell had issued, so that, if it were brought forward as an illustration of the meteoric theory, it would be necessary to see the other side of the moon, and view the apertures where the projectiles entered: they could judge better of the results on this side. He did not think that any of these experiments were at all an improvement on the generally-accepted theory, which accounted for the formation of these lunar craters as being the result of volcanic energy. When they bore in mind the small amount of gravity on the surface of the moon as compared with that on the surface of the earth—about one sixth—and also the further fact that the material of which the moon is composed is, in the aggregate, much lighter than that of the earth, they had, he thought, sufficiently safe ground to go upon in assuming that the present appearance of the lunar surface was simply the result of volcanic energy, and the difficulty that had been raised that the largeness of some of the formations was against this theory was, he thought, explained by the small gravity and the lightness of the material of which the moon was composed.

Mr. Maunder showed some lantern slides, two representing the private observatory of Mr. Macdonnell, an Australian Member of the Association, and a third showing the spectro-heliograph of Prof. G. E. Hale, which he had had in use at the Kenwood Observatory.

Mr. Goodacre showed several lantern slides illustrating the details of a simple and inexpensive wooden observatory with a sliding canvass roof, which he had erected to cover his 12-in. reflecting telescope, and which he had found very satisfactory in use.

The President announced that as the next Meeting would, in the ordinary course, fall to be held on the afternoon preceding Coronation Day, the Council had altered the date to Wednesday, July 9.

The Meeting stood adjourned at 7 p.m.

Members of the Saturn Section.

BOLTON, SCRIVEN, Leeds. 4⅛-in. refractor.
BULLOCK, J., M.A., Chiswick Mall. 3-in. refractor.
ESSAM, E. I., Billingborough, Lincolnshire. 12-in. reflector, 3-in. refractor.
FOULKES, Rev. T. H., M.A., Malta. 10½-in. reflector.
GARRARD, F. J., Louth, Lincolnshire. 5¼-in. refractor.
GRIFFITHS, H. F., Streatham. 6-in. reflector.
MEE, A. B. P., F.R.A.S., Cardiff. 8½-in. reflector.
SMART, D., M.R.C.S., L.R.C.P., F.R.A.S., London, S.E. 10-in. reflector.
TOWNSHEND, H. J., Leeds. 10-in. reflector.
WHITMELL, C. T., M.A., B.Sc., F.R.A.S., Leeds.
SEABROKE, G. M., Rugby. (Director of Section.) 8¼-in. refractor.

Reports of the Branches.

NEW SOUTH WALES BRANCH (SYDNEY).

At the invitation of the Government Astronomer (Mr. H. C. Russell, F.R.S.), a goodly number of Members of the Branch visited the Sydney Observatory on 13th March, to inspect an improved instrument intended to measure the rectangular co-ordinates of stars on the astrographic plates taken at Sydney and Melbourne. In the improvement designed by Mr. Russell the usual micrometer screw is superseded by an arrangement of two pulleys working at right angles; the axes of the pulleys carry brass discs, about four inches in diameter. An arc of 90° of each is finely divided, and, by means of a micrometer scale in the eye-piece it is possible to read to tenths of a second of arc, and estimates may be made to the fortieth of a second. Each Member present had an opportunity to personally test the working of the instrument on a negative showing good star discs. Mr. Russell is devising a further improvement by which a type-writer will be attached in a convenient position, so that the assistant may register the co-ordinates without turning away from the instrument. As soon as the instrument is complete the designer intends sending a full account of it to the Royal Astronomical Society. The Members were then shown some enlarged photographs of the moon, the nebula round η Argus, &c., and, after spending a pleasant hour-and-a-half at the observatory, a hearty vote of thanks was accorded to Mr. Russell.

On the 18th March the Monthly Meeting was held at the Royal Society's House, Elizabeth Street. Mr. G. H. Knibbs, F.R.A.S., occupied the chair. A paper by Mr. A. B. Cobham on "Recent Fire-balls" gave rise to a discussion, during which opinions were exchanged on the best method of estimating the