The Journal

of the

British Astronomical Association.

VOL. XIX. SESSION 1908–1909. No. 10.

REPORT OF THE COUNCIL ON THE WORK OF THE SESSION, OCTOBER 1, 1908, TO SEPTEMBER 30, 1909, TO BE PRESENTED TO THE MEMBERS OF THE ASSOCIATION AT THE ANNUAL GENERAL MEETING, OCTOBER 27, 1909.

I.—Progress of the Association.

(1) *Membership.*—The British Astronomical Association entered on its Nineteenth Session on October 1, 1908, and on Wednesday, October 28, 1908, the Eighteenth Annual General Meeting was held at Sion College, Victoria Embankment, E.C. The Annual Report of the Council was then presented.

The following Table shows the state of Membership on September 30, 1909, as compared with that at the close of the previous Session :—

Locality.	Membership, Oct. 1, 1908.	Elected.	Resigned.	Deceased.	Struck off.	Membership, Sept. 30, 1909.
England	609	40	31	7	5	606
Wales	5	—	—	—	—	5
Scotland	70	2	3	3	—	66
Ireland	27	3	—	—	—	30
Continental Europe	58	4	1	—	—	61
North America	29	—	2	1	1	25
South America	5	—	—	—	—	5
India	13	—	—	1	—	12
Australasia	90	13	6	1	1	95
Africa	22	2	—	—	—	24
Total	928	64	43	13	7	929

The Council record with regret the deaths of the following Members during the Session :—W. Bergius, W. D. Boger, Major J. Cassells, B. Cookson, C. G. J. Dolmage, R. Garrow, T. Gordon, Prof. G. W. Hough, Prof. W. C. Kernot, Major P. B. Molesworth, F. Shervill, J. P. Smith, and H. Sugg.

(2) *Publications.*—During the Session 1908–9, besides the regular issue of the Journal, Vol. XVI., Part 2, of the Memoirs, containing the Thirteenth Report of the Section for the Observation of Jupiter, has been distributed. The suggestion made last October by the outgoing President as to the advisability of publishing at a low price a General Index to the first 15 volumes of the Journal was favourably received. The plan was, however, extended by the inclusion of the three later volumes completed up to that date, and was further modified through the generosity of Mr. Charles L. Brook, who most kindly offered to provide the funds for enabling all Members of the Association who so wished to be presented with a copy on application before a certain date. Numerous requests having been received, the work was forthwith put in hand, and will shortly be published.

The Editor desires to thank the following Members of the Association for their kind assistance in the preparation of abstracts, &c. :—The Astronomer Royal of Ireland, Rev. A. L. Cortie, Rev. T. E. R. Phillips, Major Grant, Messrs. A. C. D. Crommelin, H. Ellis, E. W. Johnson, W. T. Lynn, W. E. Plummer, S. A. Saunder, and Mrs. Maunder.

Mr. Bryan Cookson, M.A., F.R.A.S.

It is with very great regret that we have to include in the list of those Members whose removal by death has occurred during the Session the name of Mr. Bryan Cookson. Barely thirty-six years of age, he had given indications of a scientific career of no mean order. Educated at Harrow and Oxford he proceeded to Cambridge, studying in a post-graduate course his favourite science of astronomy. While there he designed a new form of floating photographic zenith-telescope, constructed with a view to undertaking a determination of the constant of aberration and of change of latitude. A description of the instrument and of some results obtained with it will be found in the Monthly Notices, Vol. LXI., p. 315. Among other papers contributed by him to the same publication is one on the Mass of Jupiter and corrections to the elements of the orbits of the satellites from heliometer observations made at the Cape Observatory, whither he had gone at the invitation of Sir David Gill. It was only about a year ago that he was appointed Assistant at the Cambridge Observatory, and much was expected from him in the line of astrophysical and spectroscopic research, in which he would doubtless have distinguished himself had not his career been cut short by his early death on September 13. He joined the British Astronomical Association on April 27, 1892, and the Royal Astronomical Society on December 14, 1894.

Major John Cassells, V.D., J.P., F.R.A.S.

We regret to announce the death of Major John Cassells, which occurred on 16th July last, by which the West of Scotland Branch has lost its most valued and respected Member. His connection with the Association dates from November 1897. A few months later he became a Member of Committee of the Branch, and gave continuous service in various capacities as an office-bearer up to the time of his death. During the Session 1908–09 he was President of the West of Scotland Branch, and had he been spared he would have held this office throughout the Session 1909–10. Major Cassells contributed on many occasions to the discussions at the Meetings, and his contributions were always such as not only to elucidate the subject under consideration, but to enhance its interest and attractiveness. As President he discharged the duties of the Chair in a manner which greatly conduced to the success and pleasure of the Meetings. He gave his time and energies freely to the service of the public in many different spheres of action. For five years he was a Member of the Town Council of Glasgow, during which time he took a particular interest in the work of the Parks Committee. He had also a long connection with the Volunteer movement, holding the rank of Major in the 3rd Lanark Rifle Volunteers. At the inauguration of the Loch Katrine Water Supply for the City of Glasgow, 50 years ago, he formed one of Queen Victoria's bodyguard. His zeal in the cause of education was also well known. For six years he was Chairman of the Board of Governors of the Glasgow Athenæum, while he also served for many years as a Member of Govan School Board. He was an active member of many scientific societies, but among the different branches of science he always gave the foremost place to astronomy, and it was his constant endeavour to promote its study and to diffuse a knowledge of it as widely as possible. In 1896 he took part in the Association's Solar Eclipse Expedition to Vadsö, in Norway, and in the Association's collection of lantern slides is a series of landscape views taken by him during the eclipse. To the Govan School Board he presented a fine 4-in. refractor for their Albert Road Academy. On three successive occasions he acted as host to the West of Scotland Branch at conversaziones. His genial personality and lovable disposition, no less than his ability and enthusiasm, gained for him the respect and affection of his fellow-Members, and his death comes as a loss to the Branch which will long be keenly felt.

Mr. Walter C. Bergius.

On the same day as the death of Major Cassells there occurred that of Mr. Walter C. Bergius, Member since 1894 of the West of Scotland Branch, and its first President. Mr. Bergius was a native of Breslau, but became a naturalised British subject, and spent most of his life in Glasgow. An enthusiastic observer, he possessed an intimate knowledge of astronomy, and had an excellent style in expounding the subject to others. He delivered numerous lectures on astronomy in

Glasgow and Edinburgh. The West of Scotland Branch owes much to Mr. Bergius for the valuable assistance and advice he gave to it in its earlier years, which largely contributed to laying the foundation for its subsequent progress.

Mr. W. F. Stanley, F.R.A.S.

Mr. W. F. Stanley, the well-known head of the optical firm of that name, was for some years a member of our Association, and up to the time of his death, on the 14th of August, in the eighty-first year of his age, a Fellow of the Royal Astronomical Society. Though a man of varied scientific attainments, his original contributions were rather in the region of geology and general physics than of astronomy. But the work "Notes on "the Nebular Theory in relation to Stellar, Solar, Planetary, "Cometary, and Geological Phenomena," which he published in 1895, merits the most careful study by all students of our science. Mr. Stanley fully grasped the necessity of a greatly extended subdivision of the particles of matter, for which he proposed the name pneumites (perhaps in allusion to Sir John Herschel's expression "almost spiritual" in referring to comets), whereas they are now usually called electrons. It is not necessary here to refer to his eminence in the practical matters connected with his own line. He was a man of great philanthropic instincts, and set an example, which it is to be hoped will be largely followed, of establishing technical schools in his own neighbourhood. Stanley Halls, too, and the many institutions connected therewith, will form a lasting memorial in South Norwood to the beneficence of the founder in that locality, where they were much appreciated. At the present time it is interesting to recall the fact, which he often mentioned to the writer, that he well remembered seeing Halley's comet at its last appearance in 1835. He leaves a widow, but no children. His golden wedding was celebrated not long before his death.

W. T. L.

II.—The Observing Sections.

The Solar Section.

The revival of solar activity in 1907, as compared with the previous year, to which attention was called in the last annual report, was not maintained during 1908. The statistics for the years, since the maximum of 1905, taken from the Stonyhurst results of observations, are set forth in the following table :—

Year.	Mean Daily Disc-Area of Spots.	Mean Daily Range of Declination.
1905	6·88	14·9
1906	4·79	14·2
1907	5·75	14·7
1908	4·55	14·5

The mean daily range of the declination magnet has varied but little during the four years, the unit being a minute of arc. The unit of disc area of the Sun-spots is $\frac{1}{5000}$ of the visible disc, or projected hemisphere. Three Interim Reports of the Section have been furnished during the past Session, two dealing with Sun-spots and allied phenomena, and one with solar prominences. The reports on Sun-spots have epitomised the observations of the Director of the Section, Mr. Hadden, of Alta, Iowa, U.S.A.; Mr. Barnett, of Rosario; Mr. Badcock, of Pretoria; Mr. Hitchings, of Sydenham, New Zealand; Prof. Moye, of Montpellier; and Dr. Givin, of Sydney, New South Wales, a special characteristic of the work of this observer being the record of Sun-spots visible to the naked eye. Among the other active Members of the Section have been Mr. Strachan and Father Morford. The spectroscopic work is mainly in the hands of Mr. Buss, Mr. Newbegin, and Capt. Daunt, D.S.O. Capt. Daunt's observations of the reversal of D_3 in the neighbourhood of Sun-spots for 1908 showed that the absorption line was seen in 33·3 per cent. of all the groups observed. In the preceding year the number was 38 per cent., so that in the two years one-third of all Sun-spot groups examined exhibited the phenomenon. These reversals are generally observed in the area included by the leader and following spot of the two main spots of a typical Sun-spot group in its active stages, represented by types II. and III., as also, when the following spot has disappeared, in the faculous region which replaces the spot. Mr. Buss has also observed numerous and interesting reversals of the same line, and in a recent letter to the Observatory, No. 412, August, 1909, he states that he has found such reversals "almost equally certain " over mere faculic areas, without any spots whatever." He omits, however, to state whether such regions were in any way connected with previous appearances of spots. Independent faculous regions are very rare, except for belts, which occur sometimes at times of minimum in high latitudes. A faculous region, especially if of considerable area, generally indicates that a spot-group has previously existed in conjunction with it. A very important series of observations is that in which Mr. Buss has been able to detect "dark hydrogen clouds pro- " jected on the dark background of the Sun's surroundings," a phenomenon attributed to the "slight luminosity of that general " background—in other words, to a slight direct visibility " without an eclipse of the Sun's hydrogen-corona" (*loc. cit.*). Mr. Newbegin's and Capt. Daunt's valuable observations of solar prominences are still continued. Some beautiful photographs of the Sun's granulated surface and of Sun-spot groups have been sent by the Rev. Dr. Kennedy. They were taken with a 9-in. photo-visual equatorial by Messrs. Cooke & Son, at the Meeanee Observatory, Napier, New Zealand.

Stonyhurst College,
Lancashire.
1909, August 31.

A. L. CORTIE, S.J.,
Director.

[Corrigenda.—"Journal," Vol. XIX., No. 7, p. 282, line 23, for March 9 until April 14, read March 19 until April 4. Page 283, under Fig. 2, for August 15, $10^h\ 50^m$, read $3^h\ 10^m$ to $3^h\ 50^m$.]

Lunar Section.

Valuable and systematic work on selected formations is being carried on by several Members of the Section, and reports have been received from Mr. Ellison Hawks, Mr. R. Hodge, Mr. A. Noël Neate, F.R.A.S., Mr. A. W. Parr, and Mr. H. Tomkins, F.R.A.S. References to these have already appeared in recent numbers of the Journal.

Several lists of lunar formations for observations have been published in the Journal, and it is proposed to continue the issue of these from time to time with the hope that they may be of assistance to those who are desirous of doing useful lunar work. The Director has recently completed a large map of the Moon, 77 ins. in diameter, and hopes to exhibit at an early meeting during the coming Session of the Association.

Waratah, Holden Road,
North Finchley, N.
1909, September 23.

W. GOODACRE,
Director.

Mercury and Venus Section.

Mercury.—This planet was well placed for observation last May. On four evenings two faint streaks, one near the south cusp and the other just north of the centre of the half-disc not far from the terminator, were easily seen during intervals of steady images. A faint dark area was apparently visible situated between the bright streaks; probably the darkness of this area was intensified by its situation between them. It is worth noting that the south streak gradually approached the illuminated limb while the streak near the centre maintained the same relative position to the terminator, notwithstanding the curving of the latter during an interval of 10 days. An hour and a quarter's continuous scrutiny in steady air by the Director revealed to him no relative shifting of these markings to the terminator, which would be expected if this planet had a short rotation period, say, of 24 hours' duration.

Venus.—A number of morning observations were made on this planet in October and November of 1908. Unfortunately the definition was never really good except on two mornings, when the air was perfectly steady and clear. Nothing, however, could be detected on the planet except the beautifully shaded terminator and the intensely bright bordering of the limb, revealing the shaded part of the planet on its inner curve.

No further observations of Venus have been recorded since November, 1908, the planet being in superior conjunction in 1909.

5, Cathkin Terrace,
Mount Florida,
Glasgow.
1909, September 23.

HENRY MCEWEN.

Mars Section.

First Interim Report on the Observations of 1909.

The present apparition of Mars is the most favourable we have had for many years, for, unlike what occurred in 1892 and 1907, the very large disc now subtended by the planet is raised for European observers above the tremors and chromatic dispersion of the southern horizon.

Now, it so happened that the great interest attaching to this opposition was further enhanced by Mars itself, the planet having displayed lately phenomena altogether without a parallel in the records of the past; and, while vast changes had transformed here and there the appearance of its dusky areas, a gloomy, yellow veil, obliterating the markings, enshrouded immense tracts of the Martian surface.

The Members of the Section have sent as yet no observations. This Report therefore deals only with the Director's work.

A courteous invitation from M. Flammarion has resulted in the provisional location at Juvisy of the Director's $8\frac{1}{2}$-in. Calver mirror; and the observations with this fine instrument began on August 14. Early in August the Director's attention was called by M. Jarry-Desloges to the great faintness of the markings—a statement which was confirmed at the first glance cast on the planet at Juvisy.

The observations may be summarised as follows :—

(1) The South Polar Cap.—The snows subtended an arc of some 25° on August 14. On the following night, at a little before 2^h G.C.M.T., the Director, having attacked the cap with the highest powers* of the reflector, detected at once a protuberance towards $\Omega = 310°$, preceded by a dark gulf, while a few moments later the prominence in question appeared severed from the snow mass of the cap by a narrow, dusky rift. This latter marking became more apparent as the rotation of the planet increased its visible breadth, so that at $4^h\,6^m$ the cap, with the dark rift and the beautifully detached mass of snow, was seen as in the subjoined Fig. 1.

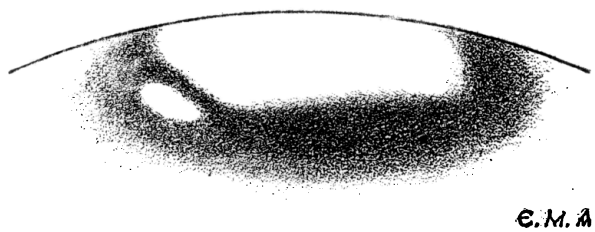

Fig. 1.—The South Polar Cap of Mars, as seen on 1909, August $15^d\,4^h\,6^m$ G.C.M.T.

* As is well known, the polar caps of Mars stand magnifying vastly better than the dark spots. The Martian student should thus never miss the opportunity of a steady image in order to scrutinise the snows with the highest powers of his telescope.

A few days later M. Jarry-Desloges expressed to the Director his belief that the isolated snows covered the region of *Novissima Thyle*,* and this is unquestionable. On August 16 the same phenomena were observed, though much more vaguely; and the detached snow was seen for the last time on August 23, $3^h\ 20^m$, $\Omega = 255°$, as a dull white glimmer to the right of the polar cap. Since then the snows have diminished very quickly indeed, and at present (September 3) their diameter does not seem to exceed 20°.

---

* The remarkable appearances observed on the south polar cap have prompted the Director to consider carefully all the facts revealed by observations of the past on the melting of these snows. It is fair to credit Prof. Campbell with the idea of identifying, 14 years ago, the isolated snow mass towards $\Omega = 310°$ with *Novissima Thyle* (*Publ. Astr. Soc. Pacific*, Vol. VII., 1895, p. 40, *sqq.*), and of adding that the melting of the cap seemed retarded also on *Argyre II.* and *Thyle I.* and *II.* Terrestrial analogies lead us to consider these lands as mountainous, and in fact they have been represented thus on the annexed new chart of the south polar regions of Mars.

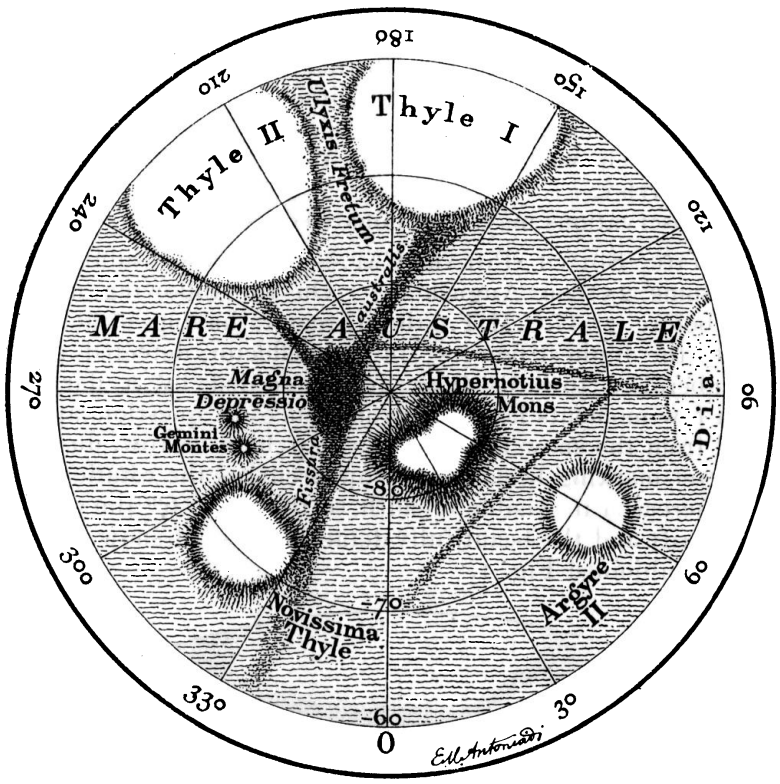

FIG. 2.—Map of the South Polar Regions of the Planet Mars, prepared after an analysis of the observations made by Schiaparelli, Green, Barnard, Campbell, Keeler, Schæberle, W. H. Pickering, C. A. Young, Lowell, Holden, Jarry-Desloges, Fournier, and the Director.

Novissima Thyle is shown protuberant, or more or less detached from the cap, on drawings by Barnard, Keeler, Campbell, and Schæberle in 1892 (Flammarion. *Mars*, Vol. II., p. 51, Fig. 83, and p. 181; p. 71, Fig. 96, and p. 181; p. 182; and p. 188, Fig. 138–140); also on drawings made by

(2) THE DUSKY AREAS.—*Sinus Sabæus*, often the darkest area on Mars, was exceedingly pale in August 1909. The E. part of *Mare Icarium* was somewhat less faint than the W. one, especially from *Hammonis Cornu* to *Portus Sigeus*, all along the coast of *Aeria* (Fig. 3). *Deucalionis Regio* narrower than usual ; *Pandoræ Fretum* and *Hellespontus* distinct.

Margaritifer Sinus was very pale in August ; so also *Auroræ Sinus* on September 2 and 3. *Lunæ Lacus* obvious.

Solis Lacus very faint, with *Tithonius Lacus* and with the outline of *Thaumasia ;* but *Phœnicis* and *Ascræus Laci* appeared much darker.

Mare Sirenum, and especially its *Titanum Sinus*, was by far the darkest of the grey areas from August 14 to September 3. *Phaethontis* and *Electris* appeared dusky on the central meridian, but brightening near the limb. The lakes of Gale and Lowell on *Eumenides-Orcus* were very frequently glimpsed. *Amazonis*

Barnard, Campbell, and Lowell in 1894 (*Ibid.*, p. 191, Fig. 153, July 8, and August 12 and 13 ; p. 182 ; and Mr. Lowell's *Mars*, ed. 1906, pl. II.).

Green's " Mitchell Mountains " (*Gemini Montes* of the above map) were only a little eastward of *Novissima Thyle* (*Mem. R.A.S.*, Vol. XLIX., p. 123, *sqq.*).

From these various sources we may consider the melting of the south polar cap to proceed as follows :—

After extending in some places down to 55° of S. latitude in winter, the snows recede on the approach of spring, with a tendency to melt slowly over the islands of *Thyle I.* and *II.* (Campbell).

Sooner or later rifts and a black oval spot are seen in the cap towards $\Omega = 270°$ and $\Phi = -85°$. This remarkable feature (*Magna Depressio* of Fig. 2) measures some 180 miles in length and 100 miles in breadth. It is vaguely recognisable on a drawing taken by Prof. Barnard on 1894, May 21 (Flammarion, *Mars*, Vol. II., p. 191, Fig. 153), but the credit of showing it quite clearly in 1894 belongs to Mr. Lowell (*Mars*, 1896, pl. II.). This spot was seen beautifully during the present opposition by M. G. Fournier, of the Jarry-Desloges Observatory of Mont Revard, on 1909, July 10 (*Bulletin S.A.F.*, 1909, p. 348).

The apparition of *Magna Depressio* is thus closely connected with the visibility of dark rifts in the cap. Traces of such markings are already distinguishable on Green's map (*Mem. R.A.S.*, Vol. XLIX.), but the Great Rift near the pole (*Fissura Australis*) was discovered by Prof. W. H. Pickering in 1892 (Flammarion, *Mars*, Vol. II., p. 64, Figs. 88, 90, 92) ; it is also shown by C. A. Young and Schæberle in 1892 (*Ibid*, p. 66, Fig. 93, and p. 188, Fig. 138–140) ; it was re-observed in 1894 by Prof. Pickering (Lowell's *Mars*, 1896, p. 85), by Lowell (*Ibid.*, pp. 85, 86), and by Holden (Flammarion, *Mars*, Vol. II., p. 185, Fig. 136) ; and it was once more seen this year by M. Fournier (*Bulletin S.A.F.*, 1909, p. 348).

The main rift shows a branch trending towards $\Omega = 240°$. The chief minor rifts are also shown on Fig. 2.

Meantime the snows recede from *Argyre II.*, where they melt slowly (Campbell) and last several weeks, particularly isolated on *Novissima Thyle*, as represented on Fig. 1.

Brighter regions are then observable on them. Campbell and Lowell in 1894 have both seen brilliant spots (Flammarion, *Mars*, Vol. II., p. 144, Fig. 134 ; Lowell's *Mars*, 1896, p. 86–87), while something similar was also noticed at M. Jarry-Desloges' Observatory in 1909 (*Bulletin S.A.F.*, 1909, p. 348-349).

The last remnant of the snows then clings over a probable mountain (*Hypernotius Mons* of the above chart), situated, according to Schiaparelli's great work of 1877, excentrically to the pole of rotation, towards $\Omega = 30°$ and $\Phi = -84°$ (*Memoria Prima*, Rome, 1878). Here the snow has often been lost sight of in our most powerful refractors, so that it might occasionally melt entirely after the summer solstice of the planet's southern hemisphere.

shaded. There was a big lake in the latter country, whose location was difficult to decide.

FIG. 3.—Mars on 1909, August 15, $\omega = 336°$.

Cimmerium Mare, paler than *Sirenum Mare*, was the theatre of vast changes; for two weird, dusky nuclei, the S. one *p* the N. one, marked the estuaries of *Scamander* and *Læstrygon*. *Eridania* bright always, and rose-coloured; *Ausonia* dusky and confused. *Mare Chronium* easy, but *Thyle I.* and *II.* remained invisible. *Hesperia*, heavily shaded on central meridian, brighter on limb; *Mare Tyrrhenum* faint. The region N. of *Mare Cimmerium* was yellow and virtually destitute of all markings.

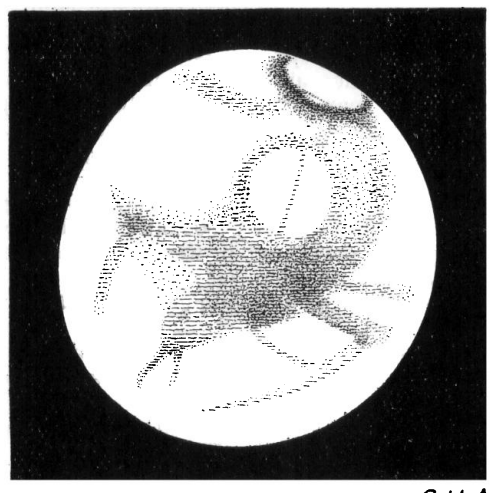

FIG. 4.—Mars on 1909, August 16, $\omega = 290°$.

Syrtis Parva, faint, with a circular dusky condensation. *Syrtis Major* almost invisible. Its surface appeared very uneven in tint; *Deltoton Sinus* darkish; so also N. end of *Hellespontus*. *Hellas* very red. *Libya* shaded. (Fig. 4.)

Glimpses of the following 32 canals have been obtained :—

Æthiops, narrow, very faint.
Agathodæmon, very faint.
Alpheus, very faint and narrow.
Amenthes, faint and broad.
Anubis, narrow, faint.
Araxes, very faint and narrow.
Astusapes, fairly easy.
Chrysorrhoas, not very difficult ; moderately wide.
Cyclops, tremendously faint and diffuse.
Eumenides, comparatively easy ; edge of shade to N.
Euphrates, very pale, broad, appearing double.
Ganges, easy and wide.
Gehon, narrow and very faint.
Gigas, crooked and not very difficult.
Gorgon, rather easy, narrow.
Herculis Columnæ, broad and faint.
Hiddekel, very narrow, very faint.
Indus, the darkest canal of all now.
Læstrygon, exceedingly pale, almost invisible.
Lethes, narrow and very faint..
Nilosyrtis, rather easy, narrow, and faintish.
Orcus, easy ; edge of shade to N.
Orontes, broad (double ?), very faint.
Pallas, faint ; edge of shaded *Libya ?*
Phison, faint, but broad ; might appear double.
Pyriphlegethon, faint and broadish.
Scamander, easy edge of shade to E.
Simois, curved, faint, and narrow.
Sirenius, curved, fairly easy, broadish.
Titan, dark, very easy, broadish.
Typhonius, very faint and broadish.
Xanthus, easy ; edge of shade to W.

All these were glimpsed by fractions of a second. But *Indus* and *Titan* were seen very easily indeed.

(3) The Great Faintness of the Markings and the Yellowness of the Planet.—As already stated, the most characteristic feature of the present apparition was, and still is to a large extent, the extreme faintness of the great majority of the dusky areas, which made *Mare Sirenum*, for instance, appear immensely darker than such markings as the *Syrtis Major* and *Sinus Sabæus* (*see* Fig. 5). Nothing similar had, of course, ever been seen during the past apparitions of the planet. What, however, struck the Director, at the first glance thrown on Mars in August, was also the fact that *the planet did not appear with its usual ruddy colour, but was pale yellow ;* and this yellowness was immediately considered as intimately associated with, or an agent of, the faintness of the *Maria*. That this view was correct became evident between August 23 and 27. On those nights Mars presented to us the *Maria Sirenum* and *Cimmerium* regions, and the contrast between the normal ruddy ground in which the details were swarming N. of *Mare Sirenum* and the dull yellowness N. of *Mare Cimmerium*, where such dark spots

as *Cyclops*, *Cerberus*, and *Trivium Charontis* were virtually invisible (Fig. 6), was too obvious to be missed by an observer who had closely studied Mars for 10 successive apparitions.

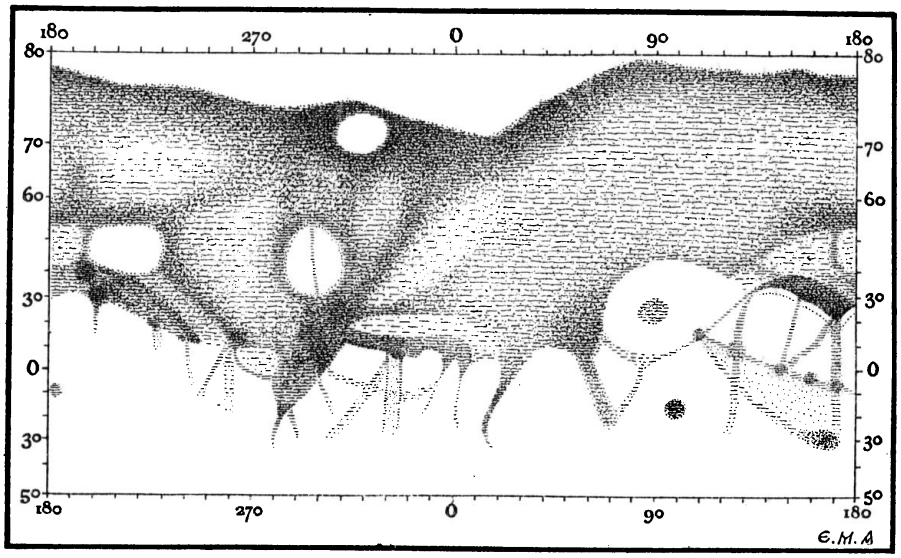

FIG. 5.—Chart of Mars on Mercator's projection, embodying all the observations made by the Director from 1909, August 14 to September 3, and showing the vast alterations in the intensity of the dusky areas.

With regard to the nature of these abnormal appearances two theories force themselves upon us: either (*a*) that the *Maria* were discoloured, or (*b*) that the markings were obliterated

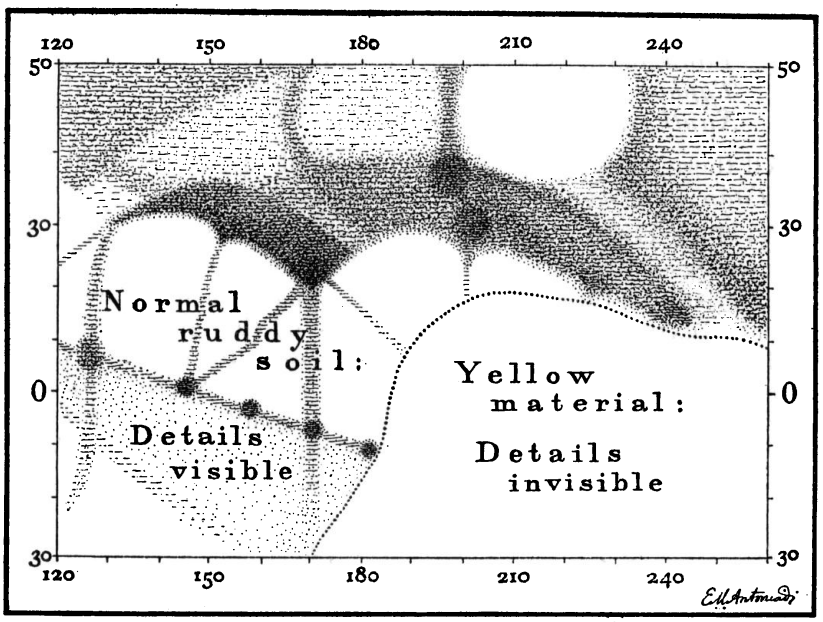

FIG. 6.—Appearance of the Martian country to the N. of *Maria Sirenum* and *Cimmerium* between 1909, August 23 and 27.

by cloud. Now, the former assumption is hampered by the necessity of supposing that at the same time when the dusky parts

were being modified in tint (and seasonal change is rather unlikely in the tropical zone), a similar process of discoloration had also attacked the continental regions, which is scarcely likely. But the cloud theory is capable of explaining all the above facts in the simplest possible manner. However, by the word "cloud" the Director would imagine only the lightest possible cirrus formation, or the thinnest conceivable haze, the diffusive effect of these condensations scarcely equalling the glare of our cloudless blue skies. Such a screen would render paler the dark spots, and it would appear of a light yellow*—just as has been observed—over the continental regions, as transmitting and blurring the colour of the ochre surface beyond, while the shadow it would cast on the planet would certainly interfere with its appearing too bright near the limb.

74, Rue Jouffroy, E. M. ANTONIADI,
Paris, 1909, September 3. Director.

P.S.—The Report for 1903 is completed, and will soon appear; those for 1905 and 1907 are now in preparation.

Saturn Section.

There is nothing special to report relating to observations by this Section. During the disappearance of the rings the larger telescopes of the world were requisitioned for this planet, and although the rings were continually seen by one or more Members of this Section, their observations were only secondary to others possessing greater optical power.

Rugby. G. M. SEABROKE,
1909, September 23. Director.

Double Star Section.

The Director is glad to report that there is an appearance of more life in this Section. The Rev. T. E. R. Phillips has contributed a number of measures, which have been published, and it is hoped that this interesting branch of astronomy will not be allowed to drop into abeyance.

Rugby. G. M. SEABROKE,
1909, September 23. Director.

Comet Section.

Only one comet of sufficient brightness to be observed with ordinary telescopes has been visible during the past year—the famous Morehouse comet, which was very well observed by our Members last autumn; observations in the southern hemisphere were continued into the spring of this year, our Members in South Africa, Australia, and New Zealand all contributing their share. The comet was better adapted for photographic than visual observation, its spectrum being strongest in the ultra-violet

* With remarkable acuteness, Prof. W. H. Pickering came to the conclusion, in 1905, that the clouds of Mars would be yellow (Flammarion, *Mars*, Vol. II., p. 491).

region, so that, even when at its brightest, it was only faintly visible to the naked eye. Photographically it was of extraordinary interest, from the very complicated detail visible in the tail, and the rapid changes, indicating the action of powerful forces; it is hoped that the full discussion of the photographs will add considerably to our knowledge of the nature and intensity of these forces. Mr. Hardcastle and Mr. G. Burns have contributed papers on the theory of comets' tails, and there have been several discussions on the subject at our meetings.

The subject of engrossing interest in the cometary world is the expected return of Halley's comet. Search was made last winter, but without success—a result that is not surprising, as Dr. Holetschek calculates that its magnitude was then only about 18·5. It is now about two magnitudes brighter, so its discovery during this autumn may be confidently expected.* The most probable time of the next perihelion passage appears to be the middle of April 1910, though some computers give dates as much as two months later. Dr. Smart has constructed an ephemeris based on the earlier date, which appeared in the Journal, Vol. XIX., No. 2, p. 99. This shows that the comet will be an evening star in Pisces next January and February, a fairly bright morning star in April, and at its greatest splendour in the evening after the middle of May. It will then be much better placed for observers in the southern hemisphere than for us, and we may rely on our southern Members making the most of their opportunities.

Dr. Smart and Mr. Cripps have continued their computations on the perturbations of Halley's comet in ancient times, but the results are not yet arranged for publication.

55, Ulundi Road,
Blackheath, S.E.
1909, Sept. 2.

ANDREW C. D. CROMMELIN,
Director.

Variable Star Section.

The work of the Section is being continued on the same lines as heretofore. It is early yet to say definitely what the output for 1909, as a whole, will be; but inquiries made from the chief workers of the Section indicate that the combined work on the Long-Period Variables will at least equal, and probably surpass, that done in 1908. So far as the month of May is concerned, our experience is that it was unusually favourable for evening work, while June was quite the reverse.

The number of observations made by the Section on the Long-Periods for the past five years is as follows:—

1904	954
1905	925
1906	2,865
1907	4,168
1908	4,220

* The comet has since been found by Dr. Wolf at Heidelberg, on the morning of September 12, being of the 16th magnitude. The position given indicates about April 20 next for the perihelion passage. (*See also* p. 456.)

This indicates a fine development of concentrated observation, and this is due, not so much to a large increase in membership, as to the praiseworthy industry of a very small group of observers, among whom, in this country, Mr. A. N. Brown occupies a prominent position.

During the year Interim Reports Nos. 24, 25, and 26 have appeared, dealing with SS Cygni, the Long-Period and the Irregular Variables, observed in 1908.

The following have joined the Section :—

M. G. A. Quignon - -	Mons.
Mr. Sydney Manning -	S. Australia.
Capt. H. N. Kempthorne -	Northern Nigeria.
Señor N. V. Ginori - -	Buenos Ayres.

It is suggested that the three last-named Members might combine in an attack on some of the southern variables ; or, perhaps, examine the sky with a binocular in conjunction with the splendid maps of the *Uranometria Argentina*, with a special view to the discovery of some new Short-Period or Algol-type variables.

Mr. T. H. Astbury, working much in this way in the N. hemisphere, has discovered another variable—No. 13.1909, Vulpeculæ (*see* Journal, Vol. XIX., pp. 314, 364). This, we believe, makes the fourth discovery by this keen observer.

Mr. A. N. Brown has published in M.N., R.A.S., Vol. LXIX., p. 585, an excellent light-curve of the Long-Period variable RT Cygni in 1908, deduced from his own observations.

One of our Members is desirous of recording his appreciation of the kindness of Prof. H. H. Turner, F.R.S., in placing the Oxford University Observatory at his disposal at certain times, and of Mr. F. A. Bellamy for affording him every facility therein.

The present Director, having now held the post for nearly 10 years, is desirous of resigning it at the end of the current year, and has tendered his resignation to the Council. The labour of dealing annually with the large number of observations which are now made is considerable, and although it has been a "labour of love" in the past, and most generous help has been given by his colleagues, the time has now come when he wishes to be free from the work. After the end of the year there will still remain a considerable amount to be done in preparing a Memoir, discussing those observations which have not yet been dealt with, and preparing MS. lists of those which cannot be printed, which it is proposed to deposit in the library. This rounding off of 10 years' work will, it is considered, occupy at least one, if not two years.

Next year it is hoped to publish a short statement of the work done by the Section in the years 1900–1909.

E. E. MARKWICK, Col.,
Director.

Innisfallen, Boscombe,
Hants.
1909, September 10.

Auroræ, Meteors, and Zodiacal Light Section.

It is much regretted that, owing to unavoidable circumstances, the business of "directing" the work of these Sections of research has been entirely neglected during the past year. Thus, the hoped-for co-operation, for the purpose of securing simultaneous observations of Meteors at places of known distance apart, has not yet been set on foot; nor has there been any attempt made to inaugurate systematic observations either of Auroræ or of the Zodiacal Light.

Nevertheless, signs are not wanting of an awakening activity in the Meteoric Section, as the Memoir dealing with the work of the past three Sessions, and shortly to be laid before the Council, will testify. There are symptoms, too, that in the other Sections above mentioned, observers are beginning to come forward with a more lively appreciation of the real value and interest attaching to the naked-eye scrutiny of phenomena of which the nature is not yet entirely to be explained. But it is obvious that a prompt recording and communication of observations is especially needful in the case of such intermittent phenomena as the three dealt with in this Report—Meteors, Auroræ, and Zodiacal Light; the two latter, especially, are so occasional as almost to prohibit anything like organized work in sectional style, at all events, until some further ideas in respect of them shall have elicited some more definite suggestions as to appropriate lines of study and research. A set of B.A. maps for use in recording meteor tracks has been presented to the Section.

CATHARINE O. STEVENS,
Director.

11, Woodstock Road,
Oxford.
1909, August 25.

Photographic Section.

The above Section has had a slightly more useful Session, due partly to clearer skies, but largely to an increased interest in celestial photography, both at home and in the Colonies.

Inquiries for information have been above the average, and have all been promptly attended to. Prints and plates have been exchanged and compared, and lantern slides have been distributed where desired. Perhaps the appearance of Comet Morehouse was the greatest stimulus of the season, and in view of the expected return of Halley's, photographic possibilities have been closely studied.

It became at once apparent that only short and frequent exposures could keep pace with the extremely rapid changes which 1908 *c* was undergoing, and a series of 15-minute exposures was attempted. For this purpose the reflecting telescope has the advantage, the loss of the more active light in the refractor, and especially in the "Doublet" form, being great, A well-silvered mirror, though absorbing some violet light, is

better, unless one's aim is to include far outlying parts, and then the "covering power" of the reflector might be too limited. On October 25th, Father Cortie, at Stonyhurst, tried an interesting experiment. He photographed the comet three times with similar exposures (about 60 minutes) on the same evening, using for one of them a panchromatic plate, and for the two others ordinary rapid ones. He found that the special plate gathered much less extension of tail than either of the others, "showing that its "(the tail's) light was chiefly confined to the blue and violet "regions of the spectrum." There is, no doubt, much more to be done in this way. Will workers please note?

Sometimes one is tempted to doubt the value of association in such a scheme as the Photographic Section, but Comet Morehouse furnished a useful corrective to this fear. Take, for instance, only one night—*October 15th*—when the comet passed through what was perhaps its most remarkable phase. The night was cloudy almost over the whole country, with just a few brilliant exceptions. Now, how much valuable information was lost for want of a photographer on each of those favoured spots? The ultimate advance of a science must largely depend upon its individual workers; but they are only human, and undoubtedly they are kept keen, and helped over the "dead-"centres," by association.

On *Nebulæ* some systematic work has been undertaken. The Director went through most of those in Ursa Major with a $12\frac{1}{4}$-in. reflector of very short focus. One object, N.G.C. 5474 = H.I. 214, is worthy of further investigation with an instrument of greater focal length, as it does not quite fit Lord Rosse's description in Trans. Royal Dublin Society, Vol. II., 1879. It is near M. 101, so may have had less attention paid to it because of the greater interest of its neighbour.

For *variable stars* many fields have been photographed, and plates compared, but only well-known variables detected.

Meteors.—Mr. R. C. Johnson and Mr. H. H. Waters have again joined the Director in an endeavour to obtain duplicate photographs of the same meteor, and have worked during several well-marked "showers," but fortune has not favoured them. Mr. H. Ellis reports the capture of one on August 12. They are by no means common on plates.

On the *Sun*, Mr. S. Fellows continues his exposures as occasion arises, and several inquirers seem desirous of entering upon this important branch.

Mr. J. H. Reynolds is the only Member really well equipped for large-scale pictures of the Moon and planets, and his results are well known through his papers in the Royal Astronomical Society's Monthly Notices. His advice and help are always at our service.

Mr. Hardcastle applied for two plates of the region through which Neptune would move during the next year or so, and after much weather hindrance these were supplied (by Mr. Johnson). It is in this way that the Section would welcome increased usefulness, and one may hope that the Members of the Association in general, and of the Sections in particular, will encourage this laudable desire by more frequently asking for prints, &c. It

must be remembered that the Photographic Section is but the handmaiden of the others, and that it exists only as a possible aid to them.

In purely photographic matters Mr. Noël Neate's valuable tests of plates suitable for solar work, and the Director's experiments with plates and developers (time and stand development, &c.), may be mentioned, as the results are available to any Member who cares to apply for them.

Haslemere, Queen's Park, Chester.
1909, September 1.

F. W. LONGBOTTOM, Director.

III.—The Library.

The number of books borrowed shows a steady increase. In the previous Session there were 37 Members who consulted 73 authors in 148 borrowings. This Session 52 readers consulted 90 authors in 205 borrowings. Fully a half of the books were sent by post. Most of our Members are considerate in returning their books promptly, and enable the Librarian to supply others; but, unfortunately, there are a few who wait to be reminded, not realising that our small subscription does not cover the cost of correspondence.

The Librarian will be pleased to meet any Member, by appointment, on Wednesday mornings, from 11 to 1, at Sion College, to give any information.

A list of books added during the year will be found in the present number of the Journal.

Tolland House, Shoot-up Hill, Cricklewood, N.W.
1909, September 10.

G. BRUFORD, Librarian.

IV.—The Lantern Slide Department.

The Curator reports that the Department shows signs of improvement in the number of slides hired during the past year, though the number is still below what it was three years ago. The collection is in good order, and Members may be sure of finding almost anything they want.

It may be pointed out, however, that the planetary sections of the collection seems to be neglected. For instance, the most recent slide of the surface of Jupiter is dated 1903—a considerable period in the life of a planet in a constant state of change. If the observing sections would contribute their results this defect would be remedied. The negatives have been deposited with Messrs. Baker and Co., High Holborn, and the thanks of the Association are due to Mr. W. Goodacre for the temporary care of them.

The number of slides in the collection is 1,422. Of these, 915 were borrowed by 19 Members, 14 of whom borrowed once, 3 twice, 1 four times, and 1 five times—a total of 29 borrowings.

Messrs. Dollond, 11, Kirby Street, Hatton Garden, E.C., are the agents, to whom all communications relating to the hire of

slides should be made, particulars of which will be found in the catalogue, price 1*s*.

The Curator is at all times willing to help Members in any way he can, in selecting slides, or in advising them about the collection.

Lyndale,
Sutton, Surrey.

A. M. NEWBEGIN,
Curator.

V.—The Branches.

WEST OF SCOTLAND BRANCH.

During the Session seven ordinary meetings have been held, all of which have been well attended. Five lectures were delivered, two by Members of the Branch and three by non-members, viz., Prof. J. W. Gregory and Dr. James G. Gray, of Glasgow University, and Mr. G. A. Russell, of Paisley Grammar School. At most of these meetings notes on current astronomical phenomena were also given. The other two meetings were occupied by communications from Members.

Several visits have been made to Observatories, and the attendance has been generally satisfactory, although the Branch has this Session experienced very bad fortune in the important matter of weather. For the privileges accorded on these occasions thanks are due to Prof. Becker, of Glasgow Observatory; Prof. Dyson, of the Royal Observatory; and Mr. Peck, of the City Observatory, Edinburgh. The Branch is also indebted to Prof. Andrew Gray, F.R.S., for kindly giving the Members the opportunity of visiting the Natural Philosophy Institute, Glasgow University, and to Dr. J. T. Bottomley, F.R.S., for according a similar privilege in regard to the Blythswood Laboratory, Renfrew.

The chief event of the Session was the Conversazione, to which Major Cassells invited Members and their friends, on 31st March. This function was largely attended and greatly enjoyed. Both in respect of the musical programme and of the exhibition of articles of astronomical interest it was an unqualified success, and it may be hoped that its beneficial effect will be evident in the future of the Branch.

Seven Committee meetings were held during the year.

It is gratifying to state that the large membership reported last Session has been exceeded. The roll then numbered 182, made up of 40 Members and 142 Associates. This year the numbers are 38 and 154, giving a total of 192, an increase of 10.

The following office-bearers have been elected for the Session 1909–10 : — *President:* Bailie Archibald Campbell, F.S.A. (Scot.); *Vice-Presidents:* Prof. Ludwig Becker, Ph.D., F.R.A.S., Alexander D. Ross, M.A., B.Sc., F.R.S.E., Archibald A. Young; *Secretary and Treasurer:* John J. Ross, B.A.; *Assistant Secretary:* Adam A. Rankin; *other Members of Committee:* Capt. Arthur W. Jeffery, F.R.M.S., Rev. E. Bruce Kirk, William A. Lindsay, M.A., B.Sc., Henry MacEwen, John Main, F.G.S., Percy R. Stevenson, A.M.I.E.E., Frank Cecil Thomson, James Waddell, M.Inst.C.E. (*One vacancy.*)

NEW SOUTH WALES BRANCH.

The fifth monthly meeting of the current Session was held at the house of the Royal Society of New South Wales, on Wednesday, 16th June 1909. The President, Mr. H. Wright, occupied the chair. In reply to inquiries put to him from the Branch, Mr. James Dear, of Hobart, Tasmania (a member of the Branch), wrote giving local particulars in connection with the total eclipse of the Sun, 8th May 1910, visible in Tasmania. Mr. Dear mentioned three sites where the eclipse could be observed: (1) Port Davey; (2) Maatsuyker Island Lighthouse; (3) Woody Island, in D'Entrecasteaux Channel. Nos. 1 and 2 are on the south-west corner of the island, and No. 3 is on the south-east. Woody Island was the most accessible—about 35 miles south of Hobart by steamer, in smooth water all the way.

Access.—There are no roads to any of these localities, but they can all be easily reached by steamer. If observing parties were to jointly charter a steamer on behalf of all, the individual cost would not be much.

Accommodation.—There is no accommodation to be had. Parties must make their own arrangements for accommodation on board the steamer, or else camp ashore, in the latter case taking their own provisions.

Weather.—May being at the end of autumn or the beginning of winter, the conditions for a clear day are generally favourable.

Mr. Dear thought that Woody Island would prove to be the best site, as it was more readily accessible and afforded an uninterrupted view to the north-west, up the valley of the Huon River.

Dr. Downing, F.R.S., gives the duration of totality at Hobart as $3^m\ 30^s$, and about half a minute longer at Port Davey.

It was decided that Mr. Dear's report be published for the use of intending observers, and that a vote of thanks be accorded to him for his most valuable information.

Dr. R. D. Givin read his notes on the Sun for April and May 1909. He also showed two fine pencil drawings of a large group of Sun-spots, seen on 5th and 6th June 1909.

The President announced that it had been arranged to have an exhibition of micrometers owned and in use by Members of the Branch, and that several fine instruments had been sent in. The Meeting then proceeded to examine the various micrometers on view; these were exhibited by Messrs. E. W. Esdaile, G. D. Hirst, F.R.A.S., G. H. Hoskins, W. J. MacDonnell, E. R. Morris, and J. Nangle, F.R.A.S. Every instrument was fitted with electric illumination, in most cases giving bright and dark wires at will. It was found that the new form of Hellesden dry batteries was the most effective for the illumination for the micrometer. The merits and points of the respective apparatus were fully explained by their owners.

Mr. J. Nangle, F.R.A.S., had prepared a wooden model, on a large scale, of the micrometer screw and its recording head, and showed experimentally how distances were measured.

Mr. J. Short (Sydney Observatory, Redhill Astrophotographic Branch) criticised the impact theory and formation of a

third body of Prof. A. W. Bickerton. He contended that the theory was not supported by the great laws of nature. In reply Prof. Bickerton gave some instances of variable double stars in which the observed phenomena were in close accord with his theory.

The Hon. Secretary announced that the charts of Crux and Musca, together with lists of objects in the two constellations, had been issued to Members taking part in the examination of the southern circumpolar sky. Results were returnable to the Hon. Secretary by 30th September 1909.

The sixth meeting of the Session was held at the house of the Royal Society of New South Wales, on Friday, 16th July 1909, the President, Mr. H. Wright, being in the chair. A further letter, dated 21st June 1909, was read from Mr. J. Dear, of Hobart, Tasmania, enclosing a report on Mill's Reef, Bruni Island, as a position suitable for observation of the solar eclipse of May 1910. Mr. E. W. Esdaile had some very interesting exhibits, two of Pilkington's heliochronometers, a horizontal sundial made by his firm for Quirindi, New South Wales (S. Lat. 31° 24′), and an empire clock designed to show the local time at any moment all over the globe. Mr. Esdaile explained the construction, adjustment, and method of use of the heliochronometer, an instrument specially adapted for use in country places where it is difficult to get true time.

Mr. W. J. MacDonnell showed a Zöllner star spectroscope by Messrs. Cooke, of York, fitted with three cylindrical lenses of varying powers. This spectroscope is particularly suited for small telescopes, giving a very bright stellar spectrum; it is easy to use, and brings out many of the beautiful phenomena of stellar spectra.

Mr. J. Nangle, F.R.A.S., read a paper on the double star Lacaille 2145. His chart of the orbit showed that it was apparently very elliptical (the true orbit being nearly circular), period about 210 years. In computing the orbit he found that observations of Jacob, in India, 1854–55, and those of Hargrave (1882) and Sellors, of Sydney (1892), were discordant, and would not fit in with those of all the other observers. Mr. Tebbutt, of Windsor, New South Wales, had attributed variability to each of the components of the pair, and had noticed at times the stars hazy, as if surrounded with nebulous matter. In the discussion which followed, Mr. W. J. MacDonnell said that Jacob had complained of his Lerebours micrometer (*vide* Royal Astronomical Society's Monthly Notices), used by him in 1854–55, that it was "ricketty" and unreliable; hence possibly the source of his non-agreement with others.

Mr. G. D. Hirst, F.R.A.S., said little reliance could be placed on the Sydney observations, instancing the case of η Lupi, in which, if the observations had been correctly published, both Mr. Hargrave and Mr. Sellors had made grave errors. He thought the Sydney observations should have been rejected by Mr. Nangle in computing his orbit. The President remarked that at next apparition he proposed to examine Lacaille 2145 with his $8\frac{1}{2}$-in. reflector, specially to note any variability and any

haziness. He thought that Sydney Observatory should have examined the star when Mr. Tebbutt had announced the phenomena seen by him. As Jacob's measures of other doubles in the "fifties" were good, he did not see how this set could be rejected, and if retained it was necessary to believe in a perturbing body.

Prof. A. W. Bickerton, of New Zealand, read the following papers :—

1. On Mira Ceti.
2. On the Interpretation of the Spectra of New Stars.
3. On the Dynamical Data of Stellar Collisions.

The seventh meeting of the Session 1908–9 was held at the House of the Royal Society of New South Wales on Friday, 20th August, the President, Mr. H. Wright, in the chair. A communication was received from Dr. A. M. W. Downing, F.R.S., giving particulars of an occultation of Venus visible at Sydney on 17th November 1909. Immersion $1^h\ 45^m$, Emersion $2^h\ 28^m$, local standard time.

Mr. E. W. Esdaile exhibited a fine clockwork movement made by his firm for Mr. G. H. Hoskins's $12\frac{1}{2}$-in. equatorial reflector. The clock was a singularly compact one, and embodied the most modern improvements, including maintaining power on Sir H. Grubb's plan, differential gearing for accelerating or retarding motion in R. A., &c. Mr. Esdaile explained the mechanism of his clock. The President and Mr. J. Nangle, F.R.A.S., spoke in commendation of the exhibit as a beautiful piece of work reflecting credit upon its designer. Mr. W. J. MacDonnell said that Mr. Esdaile had fitted a smaller one to his $4\frac{3}{4}$-in. refractor, which gave the greatest satisfaction in working.

Rev. Dr. Roseby, F.R.A.S., read a paper on the Mystery of α Crucis, one of the most brilliant double stars in the heavens. Although possessing a small common proper motion, yet since its discovery no perceptible change in distance or position-angle had been noticed. He referred to various theories advanced to account for the phenomenon, and instanced the case of some other pairs which seemed to be similarly situated. Dr. R. D. Givin read some interim results of his observations on the objects in Crux and Musca made with his $3\frac{5}{8}$-in. refractor, and handed in his solar notes for June and July, 1909. A general discussion followed on the papers read, in which the President, Messrs. Beattie, Nangle, and others took part. The theory that α Crucis was a slow-moving double with the axis of a very eccentric orbit nearly in the line of sight seemed to be the easiest to understand. The President thought that the long periods of revolution assigned to some doubles by Lewis required more data before they could be relied upon. Mr. J. Nangle gave the result of some of his recent measures of α Centauri, and showed a drawing of Mars as seen with his $6\frac{1}{4}$-in. Cooke equatorial on 18th August 1909. This was the first taken this opposition. Papers were read from Mr. Sydney Manning of South Australia on the Meteors of May 1909, and on Comet Morehouse. The meeting then closed.

The lists which accompany these notes contain a short preliminary descriptive catalogue of celestial objects within the boundaries of the constellations of the Southern Cross and Musca. The double stars are taken from Innes's Reference Catalogue of Southern Double Stars (an invaluable work which should be in the hands of everyone using an astronomical telescope). They should be readily found by an equatorially mounted telescope, or by noting their places on the charts issued to Members. If invisible to the naked eye, an object can be picked up by noting its position relatively to some near star, and then looking for it in the finder or with a very low power eye-piece on the telescope, always bearing in mind the inversion of the field of view in an astronomical eye-piece. When found, higher powers can be applied. A good 3-in. telescope should show stars down to the eleventh magnitude and divide double stars to a little under $1\frac{3}{4}$ seconds of arc. Thus most of the stars in the lists are within the range of such an instrument.

The clusters and nebulæ are taken from Dreyer's New General Catalogue of Nebulæ (N.G.C.), with the places brought up to 1910 approximately, but close enough to be found by an equatorial. To see these to advantage requires an aperture of 8 inches and over, and they are more suitable for reflectors of that size. Most of them have been picked up with a $4\frac{3}{4}$-in. reflector, but were shorn of their glory.

Special attention is directed to the beautiful cluster round κ Crucis, the red star near β Crucis, the double stars α, γ, ι, and μ Crucis, and β and θ Muscæ. However, every star within the boundaries of the constellations should be examined, and those possessing large telescopes, say 5-in. refractors and 8-in. reflectors and over, should sweep for clusters and nebulæ.

Observers should make copious notes of everything seen, giving date, size of object glass or mirror, power used, and a description of the object viewed. Where micrometers are available, measures of the double stars would be useful. These notes are to be sent in to Mr. W. J. MacDonnell, 4, Falmouth Chambers, 117, Pitt Street, Sydney, by 30th September 1909. The compilation of a descriptive catalogue of the southern heavens, the goal to which we are striving, has now commenced, and it is confidently hoped that the work will be carried to completion with zeal and energy.

Sydney, 10th June 1909.

W. J. MacDonnell.
J. Nangle, F.R.A.S.
H. Wright.

Crux.

Double Stars.

1.—*h*. 4475. $11^h\,43^m{\cdot}8$. $61^\circ\,0'{\cdot}71$. 9·2, 9·7. 326°·7. $5''{\cdot}1$. A, yellow; B, blue. Should be easy in a $3\frac{1}{2}$-in. telescope.

2.—Gillis 169. $11^h\,46^m{\cdot}9$. $64^\circ\,2'{\cdot}4$. 7·9, 8·8. 230°. $3''{\cdot}2$. A, yellow; B, blue. Should be easy in a $3\frac{1}{2}$-in. telescope.

3.—η Crucis. $12^h\,1^m{\cdot}7$. $64^\circ\,3'{\cdot}0$. Triple. Harvard Circular 18, difficult; suitable for only large apertures.

4.—Hargrave 74. $12^h\ 4^m{\cdot}1$. $63^\circ\ 15'{\cdot}1$. 7·7, 9·0. 165°. 2″·0. Larger one red ; wants about 4 ins. to see it.

5.—Russell 191. $12^h\ 5^m{\cdot}3$. $60^\circ\ 25'$. 9·0, 10·0. 212°. 3″·2. Easy for 3 ins., if found.

6.—α Crucis. $12^h\ 21^m$. $62^\circ\ 32'{\cdot}6$. 1·5, 1·9. 116°. 4″·9. Splendid double ; fixed ; first seen in 1685 by Père Jean de Fontenay.

7.—Cape 12. $12^h\ 22^m{\cdot}7$. $61^\circ\ 12'{\cdot}4$. 7·5, 8·0. 264°. 1″·7. Both yellow ; difficult under 4 ins.

8.—Russell 200. $12^h\ 22^m{\cdot}8$. $60^\circ\ 20'{\cdot}3$. 9·6, 10·6. 135°. 3″·0. Good test for 4-in. refractor.

9.—Innes 36. $12^h\ 23^m{\cdot}3$. $61^\circ\ 19'$. 7·3, 11·0. 330°. 7″·0. Requires fairly large aperture ; discovered by Innes in Sydney.

10.—γ Crucis. $12^h\ 25^m{\cdot}6$. $56^\circ\ 33'$. 2·0, 5·0. 35°. 101″. Wide ; can be seen in a very small telescope.

11.—Washburn 116. $12^h\ 32^m{\cdot}5$. $55^\circ\ 22'{\cdot}8$. 7·5, 9·3. 193°. 1″·9. Difficult ; should be seen with $3\frac{1}{2}$ ins.

12.—ι Crucis. $12^h\ 39^m{\cdot}7$. $60^\circ\ 25'{\cdot}9$. 4·8, 7·8. 37°. 23″. Easy in small telescope ; A, yellow ; B, blue.

13.—μ Crucis. $12^h\ 48^m{\cdot}7$. $56^\circ\ 38'{\cdot}1$. 4·4, 5·5. 17°. 34″. A fine pair for small telescopes.

Coloured Stars.

14.—Red. $12^h\ 47^m{\cdot}7$. $59^\circ\ 48'$. About 1 min. preceding β Crucis ; the most intense blood-red star (J. Herschel).

15.—Red. $12^h\ 3^m$. $60^\circ\ 14'$. Lacaille 5032 ; noted red by Stone.

16.—Orange, ϵ, κ, γ.

Clusters and Nebulæ.

17.—N.G.C. 4184. $12^h\ 9^m$. $62^\circ\ 12'$. Compressed in middle ; small stars.

18.—N.G.C. 4337. $12^h\ 19^m$. $57^\circ\ 37'$. Pretty rich ; little compressed ; all small stars.

19.—N.G.C. 4349. $12^h\ 19^m{\cdot}5$. $61^\circ\ 23'$. Bright, large, little compressed ; small stars. Dunlop 292.

20.—N.G.C. 4439. $12^h\ 23^m{\cdot}5$. $59^\circ\ 35'$. Small ; stars about 11–12 magnitude. Dunlop 300.

21.—N.G.C. 4609. $12^h\ 37^m{\cdot}1$. $62^\circ\ 28'$. Pretty large, compressed ; stars about 10 magnitude.

22.—N.G.C. 4755. $12^h\ 43^m$. $59^\circ\ 46'$. About κ Crucis. One of the most beautiful objects in the heavens ; about 110 stars from 7th magnitude downwards, many of them coloured—red, green, yellow, and blue.

23.—N.G.C. 4852. $12^h\ 54^m$. $59^\circ\ 12'$. About 80 stars of 11th magnitude, loosely scattered over a space of $15' \times 8'$, with stippling of much smaller stars. Dunlop 311.

Musca.

Double Stars.

1.—*h.* 4498. $12^h\ 1^m{\cdot}2$. $65°\ 9'{\cdot}1$. $6{\cdot}1, 8{\cdot}1$. $55°{\cdot}7$. $9''{\cdot}0$. A, orange; B, blue. Easy for a small telescope.

2.—β Muscæ. $12^h\ 40^m{\cdot}1$. $67°\ 33'{\cdot}6$. $3{\cdot}9, 4{\cdot}2$. $345°{\cdot}1$. $1''{\cdot}10$. Mr. Hirst's measures; closing; difficult for 4 ins.

3.—Hargrave 77. $12^h\ 43^m{\cdot}0$. $65°\ 2{\cdot}8'$. $7{\cdot}9, 9{\cdot}3$. $8°{\cdot}7''{\cdot}7$. Easy.

4.—θ Muscæ. $13^h\ 1^m{\cdot}7$. $64°\ 46'$. $5{\cdot}8, 8{\cdot}1$. $185°{\cdot}5''{\cdot}0$. Both white. A fine pair for a small telescope.

5.—*h.* 4579. $13^h\ 14^m{\cdot}8$. $63°\ 31'{\cdot}4$. $8{\cdot}5, 9{\cdot}0$. $99°{\cdot}2{\cdot}4''{\cdot}1$. White. Should be easy in $3\frac{1}{2}$ ins., or a little over.

6.—*h.* 4586. $13^h\ 21^m{\cdot}3$. $67°\ 21'$. $7{\cdot}6, 9{\cdot}4$. $143°{\cdot}3''{\cdot}7$. Not a very difficult double.

7.—*h.* 4596. $13^h\ 30^m{\cdot}4$. $64°\ 25'$. $8{\cdot}5, 8{\cdot}5$. $101°{\cdot}7$. $1''$. Requires about 5 inches.

8.—*h.* 4598. $13^h\ 33^m{\cdot}1$. $74°\ 36'$. $7{\cdot}0, 12{\cdot}0$. $45°{\cdot}4{\cdot}12\frac{1}{2}''$. Large star, yellow. Requires a fairly large aperture.

Coloured Stars.

9.—μ, ϵ, ξ.

10.—Variable, R Muscæ. $12^h\ 38^m$. $69°\ 0'$. To be watched.

Clusters and Nebulæ.

11.—N.G.C. 4071. $12^h\ 01^m$. $66°\ 48'$. Very faint; small; round.

12.—N.G.C. 4372. $12^h\ 20^m{\cdot}7$. $72°\ 10'$. Globular; pretty faint; large and round.

13.—N.G.C. 5189. $13^h\ 27^m{\cdot}1$. $65°\ 31'$. Bright; pretty large and extended. Four stars involved in cluster.

Note.—The epoch of stars is 1900, that of clusters and nebulæ 1910. The Declination throughout is South.

VI.—Instruments belonging to the Association.

The following instruments have been presented to the Association since its foundation :—

1. Speculum metal grating, ruled on Rowland's engine, 14,438 lines to the inch. Presented by Mr. J. A. Brashear.
2. Photographic telescope, 4-in. aperture. Presented by Mr. G. E. Niblett.
3. Silver-on-glass reflector, 18-in. aperture, with stand. Presented by the late Mr. N. E. Green, F.R.A.S.
4. Portable transit instrument, 2-in. aperture, by Dollond. Presented by Mr. Tyson Crawford.

5. Achromatic telescope, 3-in. aperture, with small tripod table stand and wooden tripod garden stand. Presented by Mr. G. T. Davis.
6. Equatorially-mounted achromatic telescope, $3\frac{1}{2}$-in. aperture with driving clock. Bequeathed by the late Miss E. Brown, F.R.Met.S.
7. (*Sold.*)
8. Grating spectroscope for attachment to No. 6. Bequeathed by the late Miss E. Brown.
9. (*Sold.*)
10. Achromatic telescope, $3\frac{1}{2}$-in. aperture, with portable equatorial tripod stand. Presented by the Rev. Canon Edmund Carr, F.R.M.S., F.R.Met.S.
11. Quadrant made by J. and E. Troughton for Sir George Shuckburgh, Bart, F.R.S. (*circa* 1790). Presented by the late Capt. W. Noble, J.P., F.R.A.S., who received it from Sir George's granddaughter, Lady Katherine Harcourt.
12. A 12-in. cœlostat mirror, made and presented by the Rev. C. D. P. Davies, F.R.A.S.
13. Fixed equatorial mount on tripod garden stand, suitable for a 3 or 4 in. telescope. No circles. Presented by the late Miss M. Ashley.
14. Another mount, similar to No. 13. Presented by the late Miss M. Ashley.
15. Browning's Miniature Spectroscope, with comparison prism, photographed scale, and brass rising stand. Bequeathed by the late Miss M. Ashley.
16. Sidereal watch. Bequeathed by the late Miss M. Ashley.
17. Student's achromatic telescope, by Negretti and Zambra, $2\frac{7}{8}$-in. aperture, with brass pillar and claw stand. Presented by the Executrix of the late Mr. F. E. Edmonds.
18. Tripod garden stand, with clip for ditto. Presented by the Executrix of the late Mr. F. E. Edmonds.
19. Equatorially-mounted achromatic telescope, by A. Ross, $4\frac{1}{8}$-in. aperture, with driving clock and iron stand, micrometer, &c. Bequeathed by the late Capt. W. Noble.
20. Achromatic telescope, by Wray, 3-in. aperture, and tripod garden stand. Bequeathed by the late Capt. W. Noble.
21. Student's achromatic telescope, by Bateman, 3-in. aperture, and brass table stand. Bequeathed by the late Capt. W. Noble.
22. 6-in. transit theodolite, by Negretti and Zambra, with case and stand complete. Bequeathed by the late Capt. W. Noble.
23. $2\frac{1}{4}$-in. Gregorian reflector, by James Short. No stand. Presented by Mr. H. R. Hanbidge.
24. 2-in. transit instrument by Troughton and Simms. Presented by Mr. W. Heath.
25. Incomplete telescope, by Steinheil, 1·6-in. O.G. corrected for photography. Presented by Mr. A. E. Mitchell.

The following list shows the loans during the past year :—

No. 3 to the Rev. J. Baikie.
„ 4 to the Rev. T. E. R. Phillips.
„ 5 to Mr. P. M. Ryves.
„ 6 to Capt. Cooke.
„ 8 to Mr. E. Holmes and Mr. A. F. Kitching.
„ 10 to Mr. A. Lobb.
„ 12 to the Rev. A. L. Cortie.
„ 13 to Mr. O'N. Kelly.
„ 15 to the Rev. C. Whyte.
„ 17 to Mr. B. Ronalds.
„ 18 „ „
„ 19 to the Rev. H. P. Slade.
„ 20 to Mr. O'N. Kelly.
„ 21 to Mrs. Bell.
„ 22 to Mr. P. Chapman.
„ 24 to Mr. R. C. Slater.

Reports of work done with the various instruments have been sent in, and the following extracts are each of them of interest in different ways.

Mr. A. Lobb, using a $3\frac{1}{2}$-in., says : I observed Jupiter when it was possible, but did not record what I saw, because I doubted the reality of the markings seen, and thought that it might all have been some result of slight disturbances of the air. For instance, the belts seemed to me much as drawn by Mr. Scriven Bolton and other observers with much larger instruments than mine ; I concluded that what I saw must have been an illusion, for a $3\frac{1}{2}$-in. O.G. could hardly show so much detail.

Mrs. Bell, with a $2\frac{7}{8}$-in., reports that she followed the path of Neptune as long as the planet remained visible. She cannot see the companion of Polaris, nor divide ϵ Bootis, nor subdivide ϵ Lyræ, nor see Titan, although she has seen the latter with another instrument of the same aperture.

Mr. Whyte says : During the first week of June we had two very fine evenings, and I took the opportunity of examining Spica with the miniature spectroscope at a very low altitude, and I observed distinctly dark shadows chasing one another up and down the spectrum. When I put the instrument on to Arcturus, Vega, and Altair, which were fairly high in the sky, the spectrum was quite steady.

Mr. Kitching reports that he can see prominences with No. 8 instrument.

Father Cortie says : The 12-in. mirror continues to be used as part of an equipment in connection with a large spectrometer in an investigation on the spectra of sun-spots. Several successful photographs have been obtained during the past year.

Applications for the loan of instruments must be made in writing to the Secretary, Mr. J. A. Hardcastle, The Dial House, Crowthorne, Berks.

The Instrument Fund.

In Vol. IX., p. 76, of the Journal appeared a letter from Dr. Whichells, urging the advisability of forming an Instrument Loan Fund, and outlining the manner in which it could be worked successfully. The proposal, however, does not appear to have been favourably received or any further notice to have been taken of it. In the course of his Presidential Address in 1908, Mr. Levander mentioned that we had as yet no micrometer. At the following Meeting of the Council the new President, Mr. H. P. Hollis, was able to announce that he had received a donation of 25*l.* from Mr. H. W. Smithers for the purchase of such an instrument. It was, however, determined, with Mr. Smithers's consent, that this sum should be put aside to form a nucleus of a fund to be known as the Instrument Fund. This has since been increased by a donation of 25*l.* from Mr. G. J. Newbegin.

Short Titles of Books added to the Library from October 1, 1908, to September 30, 1909.

(*An asterisk denotes an excerpt.*)

Abbot, C. G., and F. E. Fowle, Jun.: The Reflecting Power of Clouds - - - - - 8vo.
Allegheny Observatory: Publications. I., vii., viii., ix. - - - - - - - Fol.
Andoyer, H.: Cours d'Astronomie, Partie II. - - 8vo.
Archenold, Dr. F. S.: Das Weltall - - - 4to.
Arrhenius, S.: Worlds in the Making - - - 8vo.
Astronomische Nachrichten. CLXXVIII.–CLXXX. - 4to.
—— Rundschau, X. - - - - - 8vo.
Astrophysical Journal. XXVII., XXVIII. - - 8vo.
—— General Index to I.–XXV. - - - 8vo.
Barcelona: Observacions Meteorologia de Sant Feliu de Guixols, per Rafel Patxot y Jubert. 1896–1905 - Fol.
Berberich, A.: Astronomischer Jahresbericht. X. - 8vo.
Boèkhoven, J. Van: Recherches astronomiques. III. - 4to.
Boquet, F.: Les Observations méridiennes. 2 vols. Sm. 8vo.
Brussels: Annales de l'Observatoire royal. IV., i.; XI., ii. - - - - - - - Fol.
—— Annuaire astronomique - - - - 8vo.
—— Société belge d'Astronomie: Annuaire - - 8vo.
—— —— Bulletin. XIII. - - - - 8vo.
Bytel, C. H.: The Precession of the Equinoxes. 2nd edition - - - - - - - 8vo.
Cambridge Observatory: Annual Report - - - 4to.
Cape of Good Hope Observatory: Annual Report, 1906–1907 - - - - - Fol.
—— Independent Day Numbers for 1910–1911 - 8vo.
Ciel et Terre. XXIX. - - - - 8vo.
Dolmage, C. G. J.: Astronomy of To-day - - 8vo.
Downing, A. M. W.: Total Solar Eclipse, April 28, 1911 - - - - - - - 8vo.

Dublin : Royal Irish Academy, Proceedings. XXVII., Section A., Nos. 10–12 - - - - - 8vo.
English Mechanic. LXXXVII., LXXXVIII. - - Fol.
Farman et Touchet : L'Activité comparée des Essaims des Leonides et des Geminides, 14th November 1907 4to.
Flammarion, C. : La Planète Mars. II. - - - 8vo.
*Frost, E. B. : Spectrum of Comet Morehouse - - 8vo.
Godlee Observatory : Third and Fourth Annual Reports 8vo.
Greenwich, Royal Observatory : Astronomical Results. 1906 - - - - - - 4to.
—— Report of the Astronomer Royal - - - 4to.
Hagen, J. G. : Atlas Stellarum Variabilium, Series 6 - 4to.
—— Catalogus, Series 6 - - - - - 4to.
Hale, G. E. : Astronomical Work with Inexpensive Apparatus. 1908 - - - - - 8vo.
Harvard College Observatory : Annals. LIV. ; LVI., iv. ; LVII., ii. ; LVIII., i., iii. ; LIX., ii., iii., iv. ; LX., ix. ; LXI., ii. ; LXIV., i., ii., iii. ; LXVIII., i. 4to.
—— 63rd Annual Report - - - - 4to.
—— Circulars 101–150 - - - - 4to.
Himmel und Erde. XX. - - - - 8vo.
Horner, D. W. : Forecasting the Weather - - 8vo.
Internationales Archiv für Photogrammetrie. I. - - 4to.
Kasan : Publications, Nos. 19, 20, 21 - - - 8vo
Keeler, J. E. : Photographs of Nebulæ and Clusters, Lick Observatory Publications. VIII. 1898–1900 - 4to.
Knowledge. V. - - - - - - Fol.
Kodaikánal Observatory : Bulletins, I. - - - Fol.
Kristiania : Beobachtungen Veränderlicher Sterne. II. 8vo.
Leipzig : Astronomische Gesellschaft, Vierteljahrschrift. XLIII. - - - - - - 8vo.
Lewis, T. : Double Star Astronomy - - - 8vo.
*—— and H. H. Turner. The Inclinations of Binary Star Orbits to the Galaxy. 1907 - - - 8vo.
Libert, L. : L'Éclipse partielle de Soleil du 28 juin 1908 - - - - - - - 8vo.
Lick Observatory : Bulletins. IV. - - - 4to.
Liverpool Astronomical Society : Report. 1908 - 8vo.
*Lockyer, J. N. : Observations of Stars made in some of the British Stone Circles - - - - 8vo.
London : British Astronomical Association, Journal. XVIII. - - - - - - 8vo.
—— Royal Astronomical Society, Memoirs. LVII., App. ii. ; LVII., iii., iv. ; LVIII. ; LIX., i.,ii., iii. - 4to.
—— —— Monthly Notices. LXVIII. - - - 8vo.
—— Royal Institution, Proceedings. XVIII., iii. - 8vo.
—— —— Society, Proceedings. LXXX., LXXXI. - 8vo.
Marcuse, A. : Astronomische Ortsbestimmung im Ballon. Berlin - - - - - 8vo.
Maunder, A. S. D. and E. W. : The Heavens and their Story - - - - - - - 8vo.
Mee, A. : Story of the Telescope - - - 8vo.
Milham, W. I. : How to Identify the Stars - - 8vo.
Morehouse Comet, par Baldet et Quennissey - - 4to.

Mount Wilson Solar Observatory : Contributions, Nos. 27–36, 38, 39 - - - - - 8vo.
Müller, A. : Der Galilei-Prozess - - - 8vo.
Observatory, The. XXXI. - - - - 8vo.
Paris : Annuaire. 1909 - - - - 8vo.
—— Observatoire : Annual Report. 1909 - - 4to.
—— Société astronomique de France, Bulletin. XXII. 1908 - - - - - 8vo.
*Parkhurst, J. A. : Photographic Light-Curve of the Variable Star SU Cassiopeiæ - - - 8vo.
Pepper, J. C. O. : Gravitation *v.* Light - - - 8vo.
Perth (W.A.) Observatory : Statistical Register. 1906–7 - - - - - - Fol.
Philadelphia : American Philosophical Society, Proceedings. XLVI., XLVII., XLVIII., No. 191 - 8vo.
Pickering, E. C. : Foreign Associates of National Societies - - - - - - 8vo.
—— W. H. : The Chance of a Collision with a Comet 8vo.
—— —— The Origin of Meteorites - - - 8vo.
*—— —— Stationary Meteoric Radiants - - - 8vo.
*Plummer, H. C. : The Effects of Radiation on the Motion of Comets. Note on a Mechanical Solution of Kepler's Equation - - - - 8vo.
Popular Astronomy. XVI. - - - - 8vo.
*Quignon, G. A. : Maximum de Mira Ceti en 1908 - 8vo.
—— Pouvons nous affirmer qu'il y a des Canaux sur Mars ? - - - - - - - - 8vo.
*Russell, S. M. : Ancient Chinese Books. 1895 - 8vo.
Salet, P. : Spectroscopie astronomique - - Sm. 8vo.
San Francisco : Society of the Pacific, Proceedings. XX. - - - - - - 8vo.
*Schaeberle, J. M. : Origin of Sedimentary Rocks - 4to.
*See, T. J. J. : The Cause of Circularity of the Orbits of the Planets, and the Origin of the Planetary System 4to.
*——, Researches on the Physics of the Earth - - 8vo.
Sidgreaves, Rev. W. : Stonyhurst College Observations. Results. 1908 - - - - - 8vo.
Solar Research, International Union for : Transactions. II. Sherratt and Hughes - - - - 8vo.
Sparkes, W. E. : The Peak of Teneriffe - - 8vo.
Stars of the Year (Charts). 1909 - - - 8vo.
*Stein, Rev. J. : Corrections to Prof. Turner's paper "On the Classification of Long-period Variable Stars, and a possible Physical Interpretation" - - 8vo.
Stoney, G. Johnstone : Telescopic Vision - - 8vo.
Strassburg : Kaiserlichen Universitäts - Sternwarte. Annalen. IV. - - - - - Fol.
Stroobant, P. : Diamètre de Mercure - - - 4to.
—— Les Progrès récents de l'Astronomie - - Sm. 8vo.
—— Note sur le nombre . . . d'étoiles . . . type d'Algol 8vo.
Tebbutt, J. : Astronomical Memoirs - - - 8vo.
Tokyo : Annales de l'Observatoire. III., v. ; IV., i. - 4to.
Torino : Annuario Astronomico. 1909 - - 8vo.
—— Clausen, C. Observazione Meteorologiche. 1909 4to.
—— Boccardi, G. „ Ascensioni Rette. 1908 Fol.

Turner, H. H.: 32nd and 33rd Annual Reports of the University Observatory - - - - - 8vo.
*—— Abstract of a lecture delivered at the Meeting of the British Astronomical Association on Variable Stars - - - - - - - - 8vo.
*—— The Facility of Harmonic Analysis - - 8vo.
*—— An Empirical Law of Astronomical Refraction. 1908 - - - - - - - 8vo.
*—— Baxendell's Observations of U Geminorum. Edited by H. H. Turner. 1907 - - - 8vo.
*—— The Classification of Long-period Variable Stars, and a possible Physical Interpretation. 1907 - - 8vo.
*—— The Range in Brightness at Maximum of Long-period Variables. 1907 - - - - 8vo.
*—— The Condition for the Passage of the Earth through the Plane of Saturn's Ring. 1908 - - 8vo.
*—— The Effects of Tremors on Astronomical Observations - - - - - - - 8vo.
*—— The Measurement of a Meteor-Trail on a Photographic Plate. 1907 - - - - - 8vo.
*——The Period of the Variation of Barnard's Variable Nebula in Andromeda - - - - 8vo.
*——The Position of the Sun's Axis of Rotation as deduced from Greenwich Sun-spot Measures. 1886–1901 - - - - - - - 8vo.
*—— Relative Number of Star Images photographed in different parts of the Plates for the Oxford Portion of the Astrographic Catalogue. Second Paper. 1908 8vo.
*—— The Possibility of Improving the Places of the Reference Stars for the Astrographical Catalogue from the Photographic Measures. 1906 - - 8vo.
*—— Pogson's Observations of U Geminorum. Edited by H. H. Turner. 1906 - - - - 8vo.
Upsala: Recherches . . . . couleurs des Étoiles Fixes, par Osten Bergstrand - - - - - 4to.
—— Photographic Observation of Fixed Stars. Osten Bergstrand - - - - - - - 4to.
Upsala and Stockholm: Arkiv for Matematik Astronomi och Fysik. V., i., ii. 1909 - - - 8vo.
—— Analytische Merkmale des Dreikorper-Problems Astronomiske och Undersökmingar ä Stockholms Observatorium, IX, i. - - - - - Fol.
—— Intergral-entwickelungen des Dreikorper Problems. IX., ii. - - - - - - - Fol.
Verde, F.: Una Funzione Pluviometrica - - 8vo.
Wanganui Astronomical Society: Report. 1908 - 8vo.
Washburn Observatory of the University of Wisconsin; Publications. XII. - - - - - - 4to.
Washington: U.S. Naval Observatory. Synopsis of the Report. 1908 - - - - - - 8vo.
*Weiler, Dr. A.: Die Grundlagen für die Neugestaltung der Astronomischen Zeitmessung. 1909 - - 8vo.
Williams, A. Stanley: Zenographical Fragments. II. 1909 - - - - - - 8vo.

THE BRITISH ASTRONOMICAL ASSOCIATION.

DR. REVENUE ACCOUNT FOR THE SESSION

	£ s. d.	£ s. d.
To the Association's Journal and Memoirs Expenses :—		
Printing and posting No. 10, Vol. XVIII., and Nos. 1 to 9, Vol. XIX. of the Journal; Part 2, Vol. XVI. of the Memoirs; and List of Members for the Session 1907-8, &c.	327 13 3	
Ditto, estimated and owing for No. 10, Vol. XIX., of the Journal, List of Members for Session 1908-9, &c.	60 0 0	
	387 13 3	
Less amount reserved in Account for Session 1907-8	50 0 0	
		337 13 3
„ Rent of Rooms for Meetings, and expenses connected therewith	—	56 17 6
„ Stationery and miscellaneous printing	—	9 0 3
„ Postages other than those connected with issuing the Journal and Memoirs	—	15 3 4
„ Salary of Assistant Secretary	—	60 0 0
„ Insurance of stock of publications at Printers', and of books, instruments, &c., at Sion College	—	3 13 0
„ Library Account :— Purchase of books, binding, &c.	—	12 2 5
„ Cheque book	—	0 2 0
„ Proportion of interest on deposit added to Observatory Fund	—	1 16 3
„ Lantern Slide Department :— Carriage of negatives, &c.	—	0 9 2
„ Expenses in connection with exhibits at the Franco-British Exhibition	—	1 5 0
„ Repairs, inspection, and storage of instruments	—	7 19 9
„ Sundry petty expenses	—	1 15 8
„ Allowance for depreciation written off Stock of Publications Account	—	25 0 0
„ Amount placed to the credit of the Instrument Fund	—	50 0 0
„ Balance down to Revenue Account :— Excess of Revenue over Expenditure this Session	—	12 18 9
	£	595 16 4

This Revenue Account has been compared with the books and vouchers in the hands of the Treasurer, and is in accordance with them.

THE BRITISH ASTRONOMICAL ASSOCIATION.

October 1st, 1908, to September 30th, 1909. Cr.

	£ s. d.	£ s. d.
By Sundry Subscriptions as under :—		
99 Life Members (133 elected, less 33 deceased and 1 resigned) elected during previous Sessions	—	
2 new Life Members at 6*l.* 6*s.*	12 12 0	
719 Ordinary Members at 10*s.* 6*d.*	377 9 6	
48 Ordinary Members paid in advance (amount brought forward from previous Session)	25 4 0	
68 Ordinary Members in arrear	35 14 0	
		450 19 6
936—5 deceased = 931 Members as in printed list	—	
By arrear of subscription for 1903-1904, paid up	0 10 6	
„ arrear of subscription for 1904-1905, paid up	0 10 6	
„ arrears of subscription for 1905-1906, paid up	1 1 0	
„ arrears of subscription for 1906-1907, paid up	5 15 6	
„ arrears of subscription for 1907-1908, paid up	29 8 0	
	37 5 6	
Less amounts credited in previous Sessions	37 5 6	
„ 62 Entrance Fees, at 5*s.*	15 10 0	
„ 2 Entrance Fees, in arrear	0 10 0	
		16 0 0
By Entrance Fee in arrear, paid up	0 5 0	
Less amount credited in previous Session	0 5 0	
„ Sales of Journals, Memoirs, and reprints	32 15 6	
„ Sales of Journals, Memoirs, and reprints due	14 14 6	
	47 10 0	
Less amount credited in previous Session	11 17 0	
		35 13 0
„ Donations to General Fund	—	1 5 0
„ Donations to Instrument Fund	—	50 0 0
„ Lantern Slide Department :—		
Hire of slides, postage, &c.	7 17 0	
Sale of catalogues by Messrs. Dollond	0 17 5	
	8 14 5	
Less paid for postage and Messrs. Dollond's charges	4 15 7	
		3 18 10
„ Sale of Library Catalogues, &c.	—	0 15 8
„ Interest on deposit at bank	—	17 13 5
„ Amount on trust brought into account	—	0 4 3
„ Payment for repairs to instrument	—	0 3 6
„ Repayment of cost of framing exhibited drawings	—	0 2 6
„ Subscriptions for Session 1909-1910 paid in advance	23 12 6	
„ Subscription for Session 1910-1911	0 10 6	
	24 3 0	
Less amount carried forward to next account	24 3 0	
„ Balance down :—		
36,238 copies of the Journal, and 11,190 copies of Memoirs, and Report of the Solar Eclipse Expedition, 1905, valued at cost of paper and printing	583 18 11	
Less depreciation written off during previous Sessions	394 18 3	
	189 0 8	
Less value of Stock, September 30, 1908	170 0 0	
		19 0 8
	£	595 16 4

(Signed) HUGH JAMES
WILLIAM SCHOOLING } *Auditors.*

October 11th, 1909.

P 1574.

C

THE BRITISH ASTRONOMICAL ASSOCIATION.

DR. GENERAL REVENUE

1908.		£ s. d.	£ s. d.
	To Sundry Arrears of Subscription written off :—		
	For Session 1905-6 - -	—	1 11 6
	„ „ 1906-7 - -	—	2 2 0
	„ „ 1907-8 - -	—	3 3 0
	„ Balance down - -	—	182 5 3
			189 1 9

DR. BALANCE SHEET,

	£ s. d.	£ s. d.
To Sundry Subscriptions received in advance :— Ordinary Subscriptions for 1909-10 - -	24 13 6	
„ „ „ 1910-11 - -	0 10 6	
		25 4 0
„ Estimated cost of printing No. 10, Vol. XIX. of Journal, List of Members for Session 1908-1909, &c. - - - - -	—	60 0 0
„ Observatory Fund as per last Balance Sheet -	169 0 0	
Interest on deposit, Session 1908-1909 -	1 16 3	
		170 16 3
„ Amounts held in trust :— Instrument Fund - - - - -	50 0 0	
Eclipse Committee : Balance of account, Spanish Solar Eclipse Expedition, 1905 -	0 6 9	
		50 6 9
„ Reserve Account (contingent liability to Life Members) - - - -	—	1,600 0 0
„ General Revenue Account :— Balance down, September 30th, 1909 -	—	182 5 3
	£	2,088 12 3

This Balance Sheet has been compared with the books and documents in the hands of the Treasurer, and is in accordance with them.

THE BRITISH ASTRONOMICAL ASSOCIATION.

ACCOUNT. CR.

		£ s. d.	£ s. d.
1908. Sept. 30	By Balance down - - -	—	176 3 0
1909. Sept. 30	„ Balance from Revenue Account to this date.	—	12 18 9
		£	189 1 9

SEPTEMBER 30TH, 1909. CR.

	£ s. d.	£ s. d.
By Sundry Subscriptions in arrear :— For Session 1902–3 - - - -	0 10 6	
„ „ 1903–4 - - -	0 10 6	
„ „ 1904–5 - - - -	2 2 0	
„ „ 1905–6 - - -	2 12 6	
„ „ 1906–7 - - - -	7 7 0	
„ „ 1907–8 - - -	11 0 6	
„ „ 1908–9 - - -	35 14 0	
		59 17 0
„ Entrance Fees in arrear - - -	—	0 10 0
„ Messrs. Eyre & Spottiswoode, Ltd. : Amount due for Journals and Memoirs sold - -	—	14 14 6
„ Stock of Journals and Memoirs in hand, taken at cost of paper and printing, less previous allowances for depreciation -	189 0 8	
Less allowance for depreciation this Session as per Revenue Account -	25 0 0	
		164 0 8
„ Bookcases, Sundry Books, Photographs, and Instruments (including optical lantern, slides and accessories), &c., unvalued -	—	
„ Cash at Bankers' : Deposit Account - -	1,700 0 0	
„ Cash at Bankers' : Current Account - -	146 15 8	
„ Cash in hands of Treasurer - -	2 8 9	
„ Stamps in hands of Treasurer - - -	0 5 8	
		1,849 10 1
	£	2,088 12 3

(Signed) HUGH JAMES
WILLIAM SCHOOLING } *Auditors.*

October 11th, 1909.

Halley's Comet.

We offer our hearty congratulations to Messrs Cowell and Crommelin, who computed the orbit bearing the motto "Isti "mirantur stellam," which gives the place of this comet very closely approximate to the truth.

Plates were taken at Greenwich on September 9, with exposures limited to 25 and 30 minutes owing to the presence of the Moon. After the news of the discovery of the comet at Heidelberg had been received, these plates were examined, and faint indications of the comet were found. We learn from **The Observatory** that observations show that the ephemeri published in A.N., No. 4330, require corrections of $+ 24^s$ in R.A. and $- 4'$ in Decl. Assuming that only the time of perihelion is in error and that the other elements of "Isti mirantur stellam," on which the ephemeris is based, are correct, T requires a correction of $+3^d{\cdot}4$, which would make it 1910, April 20·0 G.M.T. This is a month earlier than de Pontécoulant's date and two months earlier than that of "Quod potui feci, faciant meliora "potentes."

It is calculated that the apparent magnitude of the comet will be 11·7 at the end of the year.

Elements.

Time of perihelion passage	-	1910, April 20·0
Longitude of ascending node	-	57° 16′ 12″
Node to perihelion	-	111 42 16
Inclination of orbit	-	162 12 42
Semi-major axis of ellipse	-	17·94527
Eccentricity	-	0·967281

An Explanation.

Happening to look through M. Faye's Cours d'Astronomie, Vol. II., I found three diagrams which I have recently contributed or helped to contribute to our Journal, doing so in the ignorance that they were in so well known a book.

On page 19 there is a hanging dial which M. Faye calls *montre des bergers.*

On pages 192, 193 are diagrams of the formation of comets' tails, and I find that this passage is also quoted in the Meteoritic Hypothesis, page 166.

On page 60 there is shown a graduation shaped in a figure of 8 for use on a mean-time dial.

J. A. HARDCASTLE.