Mr. Goodacre remarked that, in connexion with this interesting subject it was to be noticed that the progressive darkening increased until the lunar midday, after which there was a gradual brightening. Anyone who was at all familiar with telescopic appearance of Atlas would know that its interior was covered with mounds, ridges, and hills, and intersected with numerous rills or clefts, and was totally different in this respect to the floor of Plato. Without pledging himself to any definite theory, it occurred to him that the difference in tint before and after full might be accounted for by the different angle at which the incident light from the interior of Atlas was reflected to us. There was one significant feature in connexion with these two dark areas—namely, that each appeared to be the source from which a system of rills emanated. That there was some connexion between the two was obvious, but it was impossible at present to say what the relationship was. It would be remembered that there was a similar dark marking at the S.W. end of the western portion of the Great Hyginus Cleft.

The Meeting adjourned about 7 p.m.

Reports of the Branches.

NORTH-WESTERN BRANCH (MANCHESTER).

The fifth Meeting of the Session was held on February 2, when, in the absence of the President, the chair was occupied by Mr. Brothers, F.R.A.S.

Following the preliminary business, and in the interval devoted to scientific conversation, Mr. Brothers exhibited a new instrument—the photochromoscope—in which stereoscopic transparencies having no apparent colour in themselves, when viewed through screens of coloured glass exhibit the natural colours of the objects that had been photographed.

Mr. R. Wilding, F.R.A.S., of Bartle, near Preston, exhibited a number of very fine stellar photographic prints, examples of his work. They comprised constellations, star clusters, and nebulæ, and the excellence of the photographs more than justifies the choice of the Council in appointing Mr. Wilding active Director of this Section of the Association's work. Mr. Wilding uses a 19-inch reflector, on which is mounted a 6-inch refractor as guiding telescope, with 5-inch lens. The Rev. Mr. Killip, F.R.A.S., also showed by aid of the lantern, and at the same time described, a number of the latest astronomical slides he has added to his collection.

WEST OF SCOTLAND BRANCH (GLASGOW).

The Fifth Meeting of the Session was held on February 18, the chair being occupied by the President, Mr. John Dansken, F.R.A.S. After the election of one new Member, the Members of Council read a series of abstracts of the most interesting articles in the current astronomical periodicals.

Mr. Frank L. Grant, M.A., F.R.A.S., then delivered the second of a series of lectures on "Time." After pointing out how the different systems of co-ordinates—zenith distance and azimuth, polar distance and hour angle, right ascension and declination—were obtained, the lecturer showed where the advantages and disadvantages belonging to each system occurred. It was necessary to have a system which gave the same results for every place on the earth, but as the vernal point of reference for right ascension appeared to rotate with the celestial sphere, it was necessary to refer it to the meridian. Time observations were made on the meridian, but the star used was always calculated by its declination and right ascension. An interesting part of the lecture was the determination of the "south point." Two of the methods mentioned were the ancient method of the gnomon and observation of the pole. In the former case, the bisector of the angle between the positions of equal shadows cast by the gnomon gives the north and south line; in the latter the line is obtained by the projection of a line from the observer to a pole star. It was then pointed out that exact Greenwich time is easily obtained from Glasgow time by making the necessary correction for longitude, which is known within a small fraction of a second of time, and it is not at all necessary to have the time telegraphed from Greenwich. The lecture was concluded by a description of the method of calculating sidereal time and of its divisions. A blackened globe and a blackboard were used to illustrate the different systems of reference and the determination of the distances. A short discussion followed, and a vote of thanks was returned to Mr. Grant.

NEW SOUTH WALES BRANCH (SYDNEY).

The Third Annual Meeting of the Branch was held on 21st December 1897, when there was a good attendance of members and friends, and the President occupied the Chair. The ballot for the new Council resulted as follows:—

President	-	Mr. G. H. Knibbs, F.R.A.S., Lecturer in the University of Sydney, re-elected.
Vice-Presidents	-	Rev. Thos. Roseby, M.A., LL.D., F.R.A.S. Mr. T. F. Furber, F.R.A.S.
Hon. Treasurer	-	Mr. C. P. Bartholomew.
Hon. Secretaries	-	Mr. Hugh Wright. Mr. Thos. H. Close.
Other Members of Council	-	Mr. J. Tebbutt, F.R.A.S. Mr. W. F. Gale, F.R.A.S. Mr. Cecil W. Darley, M.Inst. C.E. Mr. John H. Bedford. Mr. W. J. Macdonnell, F.R.A.S. Rev. Thos. Porter, M.D. Mr. Jas. Bell.

The treasurer's balance sheet, showing a surplus of 11*l.* 3*s.* 3*d.*, was unanimously adopted. On behalf of the secretaries, Mr. H. Wright reported that during the past session nine general

meetings had been held, at which the average attendances had been 16 members and three visitors. The business conducted had been of a varied, useful, and instructive character. In addition to 10 addresses delivered and 23 papers read there had been three lantern displays and numerous exhibitions of drawings and photographs. Owing to numerous defaulters and resignations, the session closed with 58 financial members as against 75 nominal ones on the roll at the commencement of the session. It is, however, better to have a small society of individuals who honourably discharge their duty to one another, and to the society as a whole, than to have a large nominal membership including persons who only endanger the financial position of the society.

The director of the local Jupiter Section, Mr. W. F. Gale, reported that during the past session only three members had done any work.

Mr. T. W. Craven had sent in a few isolated observations, Mr. H. Wright had furnished nine drawings, and the director had made 25 drawings and 56 satellite observations, comprising 153 time observations of phases. These observations and some of the drawings had been sent to the Rev. W. R. Waugh, who would probably discuss them in the next memoir of the section. Members were strongly urged to join the section and study the planet during the coming months.

The President, after reviewing the progress of the branch during the session, referred in laudatory terms to the valuable astronomical work achieved during the same period by Mr. J. Tebbutt and Mr. C. J. Merfield, and then delivered an address on the motion of the solar system through space. Pointing out that our conceptions of space and time were greatly developed when the earth ceased to be regarded as the centre of the universe, he remarked that those conceptions had been reinforced in their dignity and extension, when all the glittering stars, our sun included, were recognised to be, not only the seat of energies of appalling magnificence, but also to participate in that unceasing movement which is characteristic of nature.

Halley, in 1717, was the first to notice that there was evidence of change in the relative positions of the so-called fixed stars, and shortly after, in 1747, Bradley, the first astronomer of England who aimed at precision in his work, put the conception into definite shape by pointing out the character which would be given by solar motion to the change of stars' places. Thirteen years later, in 1760, Tobias Mayer read a paper to a Goettingen society, in which he showed, from the changes in the places of 80 stars, that there could be no doubt of both the stars' and of the sun's movement. Passing over Lambert's remarkable speculations in 1761, as to revolution being piled on revolution, Michell, in 1767, indicated that both stellar and solar motions were concerned in the shift of the stars, and that the sun was merely one of a system of stars.

The first definite calculation of the direction of the motion was Pierre Prévost's, published in Berlin, in 1781; the position he assigned for the movement was:—Right Ascension 230°, North Declination 25°; a result nearly identical with that obtained by Herschel two years later. Omitting any reference to the work of

Klugel, Burkhardt, Biot, and Bessel, discussed, however, by Mr. Knibbs, Argelander's deduction, in 1837, of the solar motion from 390 stars, deserves mention.

He obtained Right Ascension 259°·9; North Declination 32°·5. To this list Lundahl added the result from 147 more stars, and Struve, in 1841, from 392. Maedler, in 1846, investigated the motion considered as part of a great dynamical movement of a system of stars. In 1847 Galloway obtained a result from 81 southern stars. 1859 saw the genius of Airy directed to the question, with the result that it was solved more thoroughly than before. Dunkin, in 1863, used no less than 1,167 stars in his determination. Now, however, a new era commenced in the estimation of star movement, through the application of Doppler's principle, that a moving source of light would cause a shift in the lines of the spectrum. The measurements by Huggins of the component of a star's velocity to or from our system; the invention by Zöllner of the reversion spectroscope for more accurately measuring the line displacements upon which estimations of velocity depend; the series of velocity measurements obtained by Huggins, Seabroke, and at Greenwich and Potsdam, and the serious discrepancies between the results, were all referred to, and their bearing upon the question at issue indicated.

The discussions of Maxwell-Hall, Rancken, Plummer, Folie, Homann, Koevesligethy, Ubaghs, Kobold, Stumpe, Vogel, Harzer, Auding, Kistenpart, Boss, Gylden, Radan, and others were alluded to, and the present aspect of the whole question considered. The importance of patiently waiting for the improvement of the astrophysical elements of the question, for the improvement of the conjectural theory of the parallax of the stars, for the better determination of the stars with sensible parallaxes, was remarked. The influence of general drift of systems of stars on the result of the probable general motion of the star cluster, in which our own system is included, and of a proper distribution of the observations, so that the peculiarities of any one part of the celestial sphere upon the general result shall disappear in the mean, was pointed at. The several investigations, although indicating movement towards the same quarter of the heavens, were in no sense in satisfactory agreement, when small quantities were considered. The Right Ascension of the point, towards which the sun's journey is directed, is probably somewhere between 260° and 300°, and the declination between the celestial equator and say 50° north declination.

The opinion was expressed that it was useless to multiply mere calculations of direction; it would be time enough after the revision of the principles underlying the whole question, and of the astronomical constants.

A tribute of admiration was paid to the astonishing assiduity and thoroughness of the continental contributors to this and other difficult branches of astronomy, and the hope expressed that the democratic spirit of our community would not prevent us recognising how little had yet been done by us here in the cause of science; science which, during the century now drawing to a close, has conferred so much material as well as intellectual advantage.

It were a dishonour not to worthily do our part in the study of nature, one of the noblest elements of which was mechanism and architecture of the universe.

On the motion of the Rev. Dr. Roseby, a hearty vote of thanks was passed to the President for his address.

The meeting was concluded by a paper contributed by Mr. R. T. A. Innes, F.R.A.S., on "Observations of Variable and "other Stars."

VICTORIA BRANCH (MELBOURNE).

Shortly after the receipt of the warrant authorising the formation of this branch an inaugural meeting was held at 31, Queen Street, City, on December 16th, which was well attended, notwithstanding that it was the hottest day of the year

Mr. C. E. Olliver, C.E., Melbourne and Metropolitan Board of Works, was voted to the Chair in the interim.

The report of the provisional Committee having been read, also, the Warrant and correspondence relating thereto, the meeting proceeded to the election of office bearers, when the following were duly elected:—

President	-	R. L. J. Ellery, C.M.G., F.R.S., F.R.A.S., the late Government Astronomer.
Vice-Presidents	{	P. Baracchi, F.R.A.S., acting Government Astronomer.
	{	Pro. Viernot, M.A., M.C.E., Melbourne University.
Committee	-	E. F. J. Love, M.A.
		C. E. Olliver, C.E.
		Thos. W. Fowler, M.C.E.
		David Ross.
		Rich. Schäfer.
Treasurer	-	A. C. Macdonald.
Secretary	-	Robert W. Wigmore.

The Chairman then vacated the chair in favour of the President, who, on taking his seat, was received with applause. He congratulated the meeting on the founding of the Branch, 50 members having already been elected, and reminded them that a large field lay open to their exploration in the southern heavens.

Mr. Baracchi sketched the objects of the Association, and gave valuable suggestions to members for their future guidance, strongly urging each to devote himself to systematic and original effort in some one line of research, rather than expend his energy on too wide a field. Pro. Viernot referred in very complimentary terms to the services of the provisional Committee, Messrs. Macdonald, Smale, Ross, and Wigmore in organising the Branch, and moved a cordial vote of thanks to them, which was carried unanimously.

The several office bearers having suitably acknowledged election, some discussion took place, when it was resolved that future meetings of the Branch be held on the first Thursday in each of the months of March to November inclusive, at 8 o'clock p.m.

A vote of thanks having been passed to the President, the members devoted some time to inspecting numerous astronomical instruments exhibited on the table, an album of original drawings presented by Mr. G. T. Davis, some enlargements of lunar photographs presented by Mr. W. Rose, and other objects of interest. Several promises were made of donations of books, and four nominations of new members were handed to the Secretary.

Papers communicated to the Association.

Arcturan Stars and Stellar Evolution.

By W. H. S. Monck, M.A., F.R.A.S.

One of the most interesting questions in connexion with the stellar spectra is this: Do they represent different stages of star-life, being convertible into each other by the gain or loss of heat, or do they indicate stars of different composition and different origin?

I am not a practical spectroscopist, but that the various kinds of spectra (except a few peculiar ones) slide into each other by almost imperceptible degrees, seems to be generally admitted. If we adopt the letters in the "Draper Catalogue," there seems to be a continuous gradation from A to M, except perhaps that B should precede A. In the later notation, which Prof. Pickering has adopted, we find many stars intermediate between A and F, between F and G, between G and K, and between K and M, but such a combination as A5K or F5M is never met with. As we may expect to find stars with every possible temperature, this is just what might be expected on the theory of development or evolution. But I think we might equally expect it on the supposition that these differences of spectra turned on differences of chemical composition. If we take any two stars with different chemical ingredients we might naturally expect to find a third star of intermediate composition. The difference between stars, indeed, would probably arise not from the presence of totally different elements but from an admixture of the same elements in different proportions.

On the theory of evolution or development, the Sirian stars represent the hottest and brightest stage. These, when cooled, become Capellan stars; when further cooled, they become Arcturan stars; and, with still more cooling, Antarian stars, or stars of the third type. The results which I arrived at with regard to the brilliancy of binary stars in a recent paper seem (at least at first sight) to confirm this result. No Capellan star attains the average brilliancy of a Sirian. No Arcturan or Antaran star attains the average brilliancy of a Capellan. But the three (or four) classes are not separated from each other by any impassable dyke. They glide into each other insensibly.

Nevertheless, a fuller consideration of the Arcturan stars leads me to think that they do not represent a later or colder period of