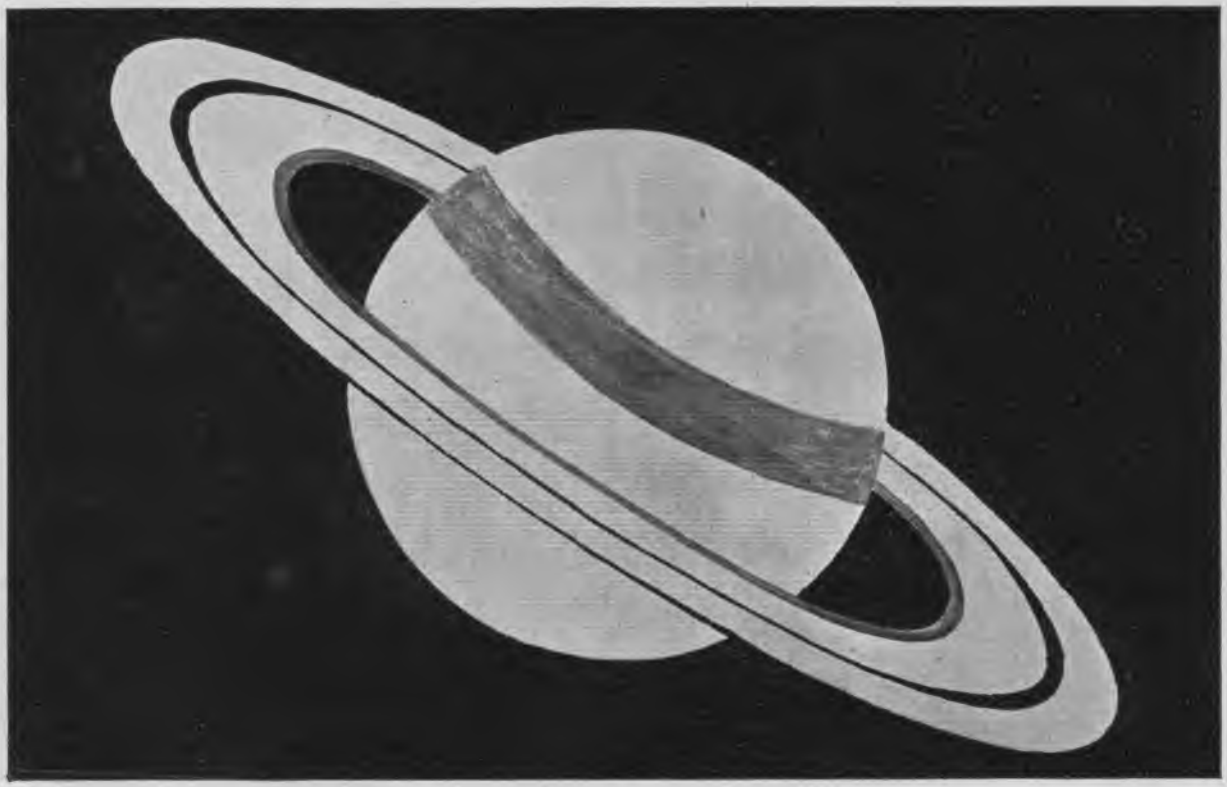

Drawing of Saturn, 1924 May 9, by BERT F. JEAREY, with 5-inch Refractor, at Sea Point, Cape Town.

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"EENDRAGT MAAKT MAGT."

South Africa's Place in the Advancement of Astronomy.

(Presidential Address, Session 1923-24.)

By R. T. A. Innes, D.Sc., F.R.S.E., F.R.A.S., etc.,
Union Astronomer.

On the 27th June, 1924, Dr. Innes delivered his Presidential Address before the Society at Cape Town. After showing some views illustrating the work of the Union Observatory, Dr. Innes proceeded:

The list in the Nautical Almanac for 1924 gives the positions of 153 observatories. Some of these are extinct, such as the late Mr. Tebbutt's at Windsor, N.S.W.; others, such as Bidston (Liverpool), undertake no astronomical investigations. Nevertheless, including all, there are 17 south of the Equator, and no less than 136 north of it.

The position is even more accentuated, because north of the Equator means as a rule far north. One-half of the Northern Hemisphere lies between 0° and 30° N. Latitude. In this zone there are but 9 observatories. So that there are but 26 observatories with zenithal skies over three-quarters of the Earth and 127 for the remaining quarter, which has thus a surface density of 15 telescopes to 1 elsewhere. Fortunately the range of sky is much more than zenithal, so that far northern telescopes can make useful observations even south of the Equator, Theoretically, the whole sky could be observed from an observatory on the Equator, both poles being elevated some 36′ each by refraction. Practically, good observations require as a rule to be made at an altitude of at least 30°, and of course if still higher, so much the better. The 26 observatories south of 30° N. Latitude enjoy much clearer skies than the 127 north of 30° N. Latitude. Their advantage in this way is probably double, and in extreme cases there are six times as many opportunities of observing. So far the most important factor in observing

has not been considered; it is, of course, the human element. It is not finally the number of observatories that advance astronomical knowledge, but the number of active astronomers. At present there are 17 observatories south of the line in the Nautical Almanac list.

If but 12 of these (all close to the 30° South Latitude circle) were well distributed in longitude and fully staffed, and there were but 12 similarly situated on the northern circle of 30°, then every requirement in the way of observation would be fully met.

The seventeen southern observatories are:

	h	
Adelaide	9E	−35°
Arequipa	5W	−16°
Brisbane	10E	−27°
Cape of Good Hope	1E	−34°
Cordoba	4W	−31°
Johannesburg	2E	−26°
La Plata	4W	−35°
Lourenco Marques	2E	−26°
Mauritius	4E	−20°
Melbourne	10E	−38°
Montevideo	4W	−35°
Perth	8E	−32°
Rio de Janeiro	3W	−23°
Santiago	5W	−33°
Sydney	10E	−34°
Wellington	12	−41°
Windsor, N.S.W.	10E	−34°

Of these, six are closed or have no modern astronomical equipment, and two others publish nothing. Thus there are but nine southern observatories which are active in the way of research. Of these nine I consider that only one is fully equipped with men and material, and that is the Cape Observatory. I dare say that H.M. Astronomer will not agree with me in this, but if so, I ask him to look at the others. Somewhat similar remarks apply to the long list of northern observatories—some are extinct, some are moribund, and some are pedagogical: the ratio of north to south remains much the same.

This brings me to the heart of the difficulty of distribution as between the far north and the south. Land, men, and money are all scarce south of the line. From the white percentage point of view and from the *per capita* cost of an astronomer, the white people south of the line do quite as much as the northerners. If the Government of Great Britain, with an income of £930,000,000, supports an astronomical staff of 57 persons, what should the Union of South Africa with an income of £33,000,000 support?

This simple proportion sum answers "Two." Actually it supports six. There are, however, in Great Britain many old-established observatories maintained by universities, etc., which so far have no analogues in South Africa.

The lack of land, men and money forbids the slightest hope that we south of the line can man and equip observatories on the scale possible in the Northern Hemisphere.

This is not a new derivation. The existence of the Cape Observatory shows that it was considered more than a century ago. The establishment of the Parramatta Observatory in Australia is also a case in point. Observations from our hemisphere were so lacking that ardent amateurs like Lacaille and Sir John Herschel set up temporary observatories quite close to us. More recently, American astronomers have established branch observatories in this hemisphere, such as the Harvard Branch Observatory at Arequipa and the Lick Observatory near Santiago. If we look at some of the important additions to our knowledge of the Southern Heavens, our debt to astronomers from the north is clearly set forth:

Lacaille's Catalogue of Stars.
Brisbane's Catalogue of Stars.
Gilliss's Santiago Catalogues.
Herschel's Cape Observations.
Gill's Ascension Parallax Work.
All the Cape Observatory Work.
The San Luis Catalogues of Boss.

The late Sir David Gill hit on another method of getting work done—he invited astronomers from the north to come and work at the Cape Observatory as volunteers. Some who came thus—their names are household words to every friend of astronomy—were: Auwers, De Sitter, Elkin, Kapteyn, McClean.

The north has also helped by presenting equipment, such as the well-known Franklin-Adams Star-Camera at the Union Observatory.

The establishment of branch southern observatories still goes on, such as the Smithsonian Observatory at Calamo, and the branch observatory of the Ann Arbor Observatory at Detroit which Dr. Hussey is establishing near Bloemfontein so as to continue his survey of the sky for double stars.

It should, therefore, be recognized that whilst the Governments of the Southern Hemisphere were quite willing to establish and equip admirably situated observatories, it was impossible for those observatories to be fully manned, and even difficult to get the observations which had been made with restricted staffs published. It seemed as though we of the south had the observatories and the clear skies, but had not sufficient astronomers. This being so, Gill has given us the hint—why

should we not invite the northern astronomers to visit us and to work with us as an integral part of our function?

I am glad to say that a start has been made in this direction. An agreement has been entered into between the Governments of the Union and of Holland, which, with the permission from the Minister for the Interior, is quoted here textually:—

"1. In the interests of astronomical science it is desirable that the astronomers of the Northern Hemisphere should have opportunities of continuing or extending their researches to the Southern Hemisphere when necessary.

"2. Although the number of observations situated south of the Equator is much smaller than of those north of the Equator, they are generally well situated as regards cloudless skies, and at most of them the proportion of nights available for observation is very high.

"3. The number of southern observatories is sufficiently large, if full use could be made of them.

"4. The number of observing astronomers living in the Southern Hemisphere has always been small because populations are sparse and the funds locally available for permanent astronomical careers are strictly limited.

"5. It consequently frequently happens that the instrumental equipment of southern observatories is larger than can be worked by their respective staffs.

"6. Besides this, northern astronomers, having made special instruments for special investigations, will, when their northern programmes with these instruments are completed, wish to transport them to southern latitudes so that their use may cover the whole of the sky. For such temporary erections there is ample room at many southern observatories.

"7. In many parts of Western Europe the skies are frequently cloudy, so that continuity of astronomical observations is often impossible, and the observing astronomer is at a great disadvantage.

"8. For such reasons, and in order to make full use of the existing southern stations, measures should be taken to provide for the possibility of a regular transference of astronomers from northern observatories to southern ones. Such visits to the Southern Hemisphere have in an irregular way taken place in the past, as of Maskelyne, Lacaille, Sir John Herschel, Auwers, Boss and others. The Arequipa station of the Harvard Observatory was founded with the same end in view, namely, so that the researches inaugurated in the north could be extended to cover the whole sky.

"9. To this end the Directors of the Observatory of Leiden and the Union Observatory at Johannesburg have agreed as follows:—

"I. Astronomers from the Leiden Observatory shall have every facility to visit Johannesburg and to use the instrumental equipment of the Union Observatory for the purpose of extending to the southern sky the researches that they have been making over the northern.

"II. It is understood that the Union Observatory shall not be responsible in any way for the salaries and travelling expenses of the visiting astronomers, nor for the cost of new instruments and apparatus which they may require for their work.

"III. It is understood that the visiting astronomers shall have no independent rights in the Union Observatory, and shall be subject at all times to the rules and regulations in force there, and that programmes of work shall be so arranged as not to interfere with the regular work of the Union Observatory.

"IV. In exchange the astronomers on the staff of the Union Observatory shall be allowed to enter the Leiden Observatory as research students for courses of instruction in theoretical and practical astronomy, and shall have every facility in using the resources of the Leiden Observatory subject to the approval of the Director.

"V. It is understood that the salaries and travelling expenses of these astronomers shall be borne by the Union Observatory, and that they shall be subject, while staying at Leiden, to the general rules and statutes of the University of Leiden."

Under this agreement Dr. Hertzsprung, from the Leiden Observatory, has already arrived at the Union Observatory, where he will stay for some 15 months, and he will be followed by Mr. van den Bos, a well-known double-star observer.

The Union Government has gone further. It was common knowledge that the authorities in charge of the Yale University Observatory were anxious to erect a large photographic telescope in the Southern Hemisphere so as to continue their stellar parallax work over the whole sky. This being so, our Government sent an invitation through Dr. Schlesinger that the Yale telescope should actually be erected in the grounds of the Union Observatory, and it offered every facility which would not lead to an increase of the present astronomical budget. This invitation has been accepted by the Regents of the Yale Observatory, and we may expect to see their 26-inch telescope in commission before the end of the year.

It should be remarked that many towns in the Union also sent invitations to Yale, and I am proud to think that they

did so. It showed on their part an enlightened self-interest. Most of the offers included free land and free municipal service, including electric power. In advertising South Africa, a point should be made that many of our municipalities will offer substantial inducements to research institutions.

If it is good that Gill and the Union Government should encourage northern astronomers to visit us, it is to be hoped that the example will be followed up. There are some beautifully equipped and ideally situated observatories, both in British Dominions and in South America, at which first-class work can be done. Why should they not invite northern astronomers?

A century ago the observer and his observatory had to be attached to the soil. Perhaps the observatory must be attached to the soil, but it is no longer necessary for the observer to be. Steam and oil have made the world grow small—the most distant observatories are now really close together—the amenities of civilization have spread, and to-day it is no hardship for an astronomer to go to any of the great observatories and to live there for several years if necessary. When one contrasts the great cloudiness of Europe with the clear skies of the Southern Hemisphere, one can imagine that every northern astronomer longs for at least a few years' experience south of the line. Astronomy is an international science, and calls for international co-operation.

If international co-operation does increase, as we hope it may, then we may expect that in the near future the observatories south of the line will come to be regarded more and more as purely observing stations, and that their observations will be reduced and published internationally, as was the well-known and exceedingly valuable *Astronomische Gesellschaft* Catalogue.

In a recent number of *Astronomische Nachrichten* we read that the Royal Observatory of the Roman College, which was founded in 1776, has been closed, and its equipment divided amongst various official observatories in Italy.

In *"L'Astronomie"* for April, 1924, this action is thus referred to:

> "I regret to inform you that the Fascistist Government, for reasons of economy and superfluity, has decreed the suppression of the official observatory in Rome, that of the Roman College. This important scientific Institute was founded by Pio Sextus with the concourse of Cardinal Zelada and the astronomer Callandrelli. It became celebrated by the works of Dumouchel, de Vico, Sestini, and, above all, of Secchi, Tacchini and Millesovich. Now, in consequence of a devastating war and as a sop to the requirements of financiers, a minister posing in philosophy qualified it as futility and squashes it."

I do not venture to critize the Dux's action. It might be quite right. We must remember that those in authority who have the spending of public moneys are in a responsible position. The action is arresting, and we might ponder over it and ask ourselves if observatories at large do their duty—as observatories—and give the public who support them fair value. By fair value I mean advancing the science of astronomy by making useful observations regularly and publishing them promptly. Many observatories, although well equipped, have never done anything—they would seem to be mere sciolist manifestations. If observatories have to be closed, it is to be wished that astronomers at large should be consulted. If this is to be done, it is necessary that astronomers should meet together in such societies as our own. This naturally makes us think of the first Astronomical Society which held its first council meeting on the 10th March, 1820. It was then called the Astronomical Society of London. In its early days it did much direct work in advancing astronomy, which at that time was at a rather low ebb. It reorganized the matter given in the Nautical Almanac in 1830, and initiated some changes about 1890. Recently there has been published the most interesting "Centenary History of the Royal Astronomical Society," and in reading it, it is impossible not to remark how, with increasing years, the Society's active excursions decreased and a period of passivity was entered on. In 1911-12, Gill urged more action, and we read: "A report was received in 1912 January, . . . but the matter got no further; Gill died in 1914 January, and six months later came the Great War. It is much to be hoped that this question may be reopened."

All the more important countries have their Astronomical Societies, but most are naturally of little influence outside their own country. There are, however, two societies who make a world-wide appeal: one is the *Astronomische Gesellschaft,* whose catalogue has already been mentioned—truly international—but with headquarters in Germany, and naturally managed (and let me say well managed) by German astronomers; the other is the *International Astronomical Union,* which held its first General Assembly in Rome in 1922, and which, I may interpolate here, was attended by the late Mr. S. S. Hough, then our President. Whilst any person can join the *Astronomische Gesellschaft,* admission to the *International Union* is by countries. Great Britain and the Union are both adhering countries.

I wish to direct your attention to Statute II of the Union; it reads as follows:—

"II. National Committees.

"3. A National Committee shall be formed in each of the countries belonging to the Union. It shall be formed under the responsibility of the principal Academy of the

country concerned, or of its National Research Council, or of some other National institution or association or institutions, or of its Government.

"4. The functions of the National Committees shall be to promote and co-ordinate in their respective countries the study of the various branches of Astronomy, more especially in relation to their international requirements.

"They shall be empowered to propose singly or jointly with other National Committees questions falling within the purview of the Union for discussion by the Union.

"The National Committees shall nominate delegates to represent them at the meetings of the Union."

This is quoted so that you may consider if there should not be some connection between this society and the S.A. National Committee A South African National Committee does not exist, I fear, outside of myself, or rather the office I hold. This is not right.

To secure really useful international co-operation through such a body as the *International Astronomical Union*, its scope should be enlarged. My suggestion, advanced with much hesitation, is that every observatory should be invited to send in once a year a report on its work past, present and future, with a list of its more important instruments and the work done with them. To facilitate record, the Union might furnish a questionnaire to be filled up. This annual report might be identical with the report which most astronomers who fill official posts are already obliged to furnish for departmental record, although one at once recognizes that a report made for the pigeon-hole of a Government office may differ much from a report which will be scrutinized by a scientific international body.

Not all astronomers know what their colleagues elsewhere may be doing, what works may be projected, etc. My contention is that in these days of easy communication and easy travel, the days of isolation are vanishing, and that the work of each observatory should be adjusted, not regimented, with a view to efficiency of effort. There need be no fear that the action of the Union on such reports would in any way control an astronomer's activities or restrict the scope of his investigations. The result would be quite the reverse. Some astronomers find their Governments unsympathetic, and find themselves unable to get the necessary funds for printing, equipment, salaries, etc. There is no doubt that in such cases the advocacy of the Union could be secured and the astronomer's hands greatly strengthened. At the same time, it must be confessed that the questionnaire will not be a pleasant object to the astronomer who has turned his observatory into a haven of rest. But we need not shed tears contemplating his troubles: his existence weakens all of us.

HOW TO FIND THE FAMOUS TELESCOPIC OBJECTS OF THE SOUTH.

By James Moir, D.Sc., M.A., F.I.C., etc., etc.

This paper is written because the author believes that many amateur observers are unable to find certain well-known objects in the heavens, and because practically all the books which have popularized astronomy are written for the Northern Hemisphere.

The following descriptions are intended to be used along with A. W. Long's maps (obtainable locally for a few shillings) for the time of observation. If the map is not used, the amateur—if "green" enough—may start looking for an object which is not above the horizon at the time:

(1) *Omega Centauri,* the large spherical cluster, lies at a distance of 13 degrees from the top star of the Cross (Gamma Crucis), and at an angle of 135° to the axis of the Cross, the angle being measured on the same side of the Cross as the Pointers are, *i.e.,* in the direction of Libra. The height of the Cross (Alpha to Gamma) is 6 degrees, a measurement which can be used all over the heavens in finding other objects.

Omega Centauri contains nearly ten thousand nearly equal stars, of which perhaps 10 per cent. can be seen in a 4-inch telescope, the rest forming a nebulous background like a tailless comet. The cluster is as large as the moon, but only a quarter of it is bright.

(2) *Xi Toucani* (also called 47 Toucani) is a similar object: it is smaller (half the size of the moon), and with centre relatively much brighter than the outside. If the sky is clear enough for the smaller Magellanic Cloud to be picked up, the object is found at 1 degree from the Cloud in the direction of Grus.

If the sky is hazy, imagine a line from Achernar to Alpha Trianguli, when Xi Toucani will lie on this line one-third of the way from Achernar. Achernar is the bright star lying on the opposite side of the pole from the Cross Pointers. Alpha Trianguli is the yellow star opposite to the brighter of the two Pointers in a striking diamond-shaped figure.

Both of these clusters are conspicuous in a field-glass as round, hazy objects a quarter the size of the moon in the field-glass.

The individual stars in Xi Toucani are entirely beyond the power of an amateur's telescope; there are about 9,000 of them.

(3) *M2 Aquarii.* This is a third globular cluster, and being 1 degree South of the Equator, just comes within our purview. The cluster is 5 degrees north of Beta

Aquarii, *i.e.*, on the line between the Dolphin and Pegasus. Beta Aquarii is the nearest bright star due north of the lozenge-shaped end of Capricornus, and is half-way between Fomalhaut and the Dolphin. This ball of stars is of looser texture than the others.

(4) *The Keyhole Nebula.* This is the bright spot in the Milky Way near the Cross (about as far off on one side and curving to the south as the Pointers are on the other). It is sometimes marked as Eta Argûs on the maps, and lies roughly on the line joining Canopus to the boundary of Virgo and Libra.

Even a field-glass shows the black chasm or keyhole between the two nebulæ, and quite a small telescope shows an extraordinary frog-spawn effect caused by equal small stars lying on a nebulous background. This background is gas rendered luminous by electrical discharges.

The whole neighbourhood is a "glorious and innumerable procession of stars," to quote Herschel junior.

(5) *The Looped Nebula* (30 Doradûs). This occupies a position relative to the larger Magellanic Cloud similar to the position of Xi Toucani relative to the smaller Magellanic Cloud, *i.e.*, lying near in the direction of Argo, and as the larger Cloud is visible even in moonlight, no other directions for finding 30 Doradûs are necessary. It requires a large telescope to see it adequately, when it appears as a lace-work of superimposed figures-of-eight, in a way even more remarkable than the Orion Nebula, although much fainter.

(6) *The Trifid Nebula* (M. 20 Sagittarii). This is the middle object of a luminous patch which really consists of two clusters and the nebula. It is 6 degrees due North of Gamma Sagittarii, one-third of the way from the triple group at the end of Sagittarius and Antares, and one-third of the way between Antares and the middle of Capricornus. The word "trifid" means that it is split into three parts by three winding dark lanes meeting in the centre, something like the three-legged symbol of the Isle of Man. The other two adjacent objects are striking star-clusters.

(7) *The Omega Nebula* (M. 17 Sagittarii). This object, which resembles a horseshoe, requires a fairly good telescope. It lies at the edge of a small round bright patch of the Milky Way, half-way between Antares and Epsilon Aquilæ, the latter being the tail star of the Eagle in line with the three stars forming its body (with Altair in middle). It is also half-way between the well-known pair in Serpens and the south near edge of Capricornus.

(8) *Planetary Nebula H. 27⁴ Hydræ.* This is a fairly bright blue oval nebula, like a faint imitation of Jupiter. It is 2 degrees south of Mu Hydræ, which itself is the second

conspicuous star from Alpha Hydræ away from the head of Hydra. A line from the head of Hydra to the quadrilateral of Corvus has the nebula near its middle.

(9) *Faint Spiral Nebula in Aquarius N.G.C. 7293.* This is included for completeness, though much inferior to the Great Nebula of Andromeda. It lies one-third of the way from Fomalhaut to Alpha Aquarii, 6 degrees from the nearest star in the "water-drops" of Aquarius. It is about the size of the moon, but very faint.

(10) *The triangular star-cluster Kappa Crucis.* This is near the second-brightest star of the Cross, Beta Crucis. The cluster appears of the 4th or 5th magnitude, and lies towards the Coalsack in the continuation of the line joining the top of the Cross to Beta, about 1 degree from the latter. The cluster looks like a sextant or like Euclid's figure for the *Pons Asinorum,* with one of the central stars conspicuously red.

(11) *The brilliant scattered cluster M7 Scorpionis.* This is visible as a hazy spot between the end of the tail of Scorpio, and the adjacent bright stars of Sagittarius. It is about 1 degree in size and about 5 degrees measured at right angles from the last three stars of the tail of Scorpio. Some 20 stars are conspicuous, with many smaller ones.

(12) *The scattered cluster M6.* This is 4 degrees northwest of M7, and makes an isosceles triangle with the Scorpion's sting and M7.

(13) *The large faint cluster near Sirius.* This is M41, and is best found with field-glasses, being 4 degrees due south of Sirius, *i.e.,* roughly towards Canopus. Over 100 stars are visible, but only 5 are bright.

(14) *The Clusters near the "False Cross."* The first is about 6 degrees from the Keyhole Nebula (No. 4 in this paper) in the direction of the greater Magellanic Cloud. The rest are Omicron Velorum, Pi Puppis, Epsilon and Theta, and X Carinæ, all striking.

(15) *The Cluster in Scorpio N.G.C. 6231.* At the place where Scorpio makes a sharp bend of 120 degrees is the star Zeta Scorpionis (really a naked-eye pair). The hazy place just north of this is the cluster which contains 150 stars within the range of a four-inch telescope.

(16) *Double Stars.—Alpha Centauri* is the best double star of the whole heavens. It is the brighter of the two Pointers, and can be split into two by a good binocular (if held steady). *Alpha Crucis* is the star at the foot of the Cross, and consists of a close, very bright pair with a fainter third star at right angles some distance off—a striking combination. *Rigel* is the very bright white star at the top (south) side of Orion. It has a small blue companion visible in a 3-inch telescope. *Sigma Orionis* is 1 degree

from Orion's belt at one side and is a very complex star, two in very small telescopes, and ten in very large ones. *Sigma Scorpionis,* the small star next to Antares, is a beautiful white and blue pair. *Antares* itself has a close green companion which (owing to the glare) requires a 5- or 6-inch glass to reveal it. *Sirius* has a fairly bright violet companion, but an 8-inch glass is required to show it, again owing to glare. *Beta Piscis Australis,* of which the companion is reddish, is the second star from Fomalhaut 7 degrees off towards the long end of Grus. *Beta Capricorni,* close to Alpha (a pair visible as a double star without optical aid), is a coloured pair, blue and yellow. *Theta Eridani* is a striking equal pair, and easy for any telescope. It is a bright star, the fourth from Achernar at a distance of 20 degrees, and making a rough isosceles triangle with Canopus and Achernar, Theta being northerly to these two. *Nu Scorpionis* is a double-double of the same kind as Epsilon Lyræ of the Northern Hemisphere: a low power shows it as two, and each of the two splits into a pair with higher magnification. This star is a few degrees following Beta. *Beta* and *Xi Scorpionis* are both remarkable doubles: the former is the northern claw of the Scorpion, about 8 degrees from Antares in the direction of Arcturus; the latter is faint, about 8 degrees due north of Beta on a line passing between the well-known pairs of stars in Serpens. Both of them are doubles with a third faint star. *Gamma Crucis,* the deep-orange star forming the head of the Cross, has a distant but easily-seen blue companion. *Gamma Leporis* has a red companion (which is rare) and another faint one: it is on the prolongation of the line joining Rigel of Orion to *Alpha Leporis,* the brightest star South of Orion (about 10 degrees from Rigel), and lies about 5 degrees from Alpha Leporis.

Beta Crucis does not require any finding. *Delta Corvi* is a distant yellow and blue pair: it is the one of the quadrilateral of Corvus nearest to Spica. 32 *Eridani* is a similar coloured pair, also known as *Omega Eridani.* It is rather difficult to find. It lies on the line joining Sirius, Rigel and the tail of Cetus, about 13 degrees from the latter and 10 degrees due north of *Gamma Eridani.* Others not requiring descriptions (being easily found) are *Gamma Virginis, Alpha Piscium, Gamma Leonis,* and *Gamma Ceti,* all striking close doubles.

Telescope tests, Iota Leonis, Zeta Aquarii, Pi Aquilæ, Zeta Cancri, Tau Ophiuchi, and *Epsilon Arietis* are bright but very close doubles. For faint but not very close companions, in addition to Antares, there are *Delta* and *Lambda Geminorum.*

ASTRONOMICAL SOCIETY OF SOUTH AFRICA.

Session 1923-24.

Annual Report of the Council.

In presenting their Report for the year 1923-24, the Council have to record a successful year's working of the Society. The membership now stands at over 100 members and associates, and a reference to the list printed in the Journal (Vol. 1, No. 3) will show that the Society has representatives living in all parts of South Africa. The friendly relations between the Society and the Durban and Pretoria Astronomical Associations continue.

The visit of the President (Dr. R. T. A. Innes) to Cape Town last month was marked by the delivery of his Presidential Address on "The Place of South Africa in the Advancement of Astronomy." Dr. Innes is now on a visit to England in connection with the 26-inch object-glass for the new telescope which, after long delays, will no doubt soon be in operation at the Union Observatory. The Society wishes him every success on his journey.

During the year under review the Council met five times. The Council records with much regret the loss of the services of their Honorary Secretary, Mr. C. L. O'B. Dutton, who has left Cape Town. Since Mr. Dutton's departure, Mr. H. E. Houghton has been acting as Honorary Secretary.

The Council is pleased to report that Mr. H. Spencer Jones, M.A., B.Sc., F.R.A.S., who took up his duties as His Majesty's Astronomer at the Cape of Good Hope in 1923, has since become a member of the Society.

The Society had the honour of welcoming to South Africa Professor W. J. Hussey, Director of the Observatory of the University of Michigan, who spent some months in the Free State and the Transvaal testing the suitability of the climate for refined astronomical research. It is understood that Professor Hussey has selected a site near Bloemfontein for his new 27-inch telescope, and that it is hoped that the instrument will be completed during 1924.

The thanks of the Society are due to the authorities at the Royal Observatory and the Union Observatory for their continued courtesy and help. The periodical visits of members to those institutions are greatly appreciated, and their sympathetic attitude towards a Society largely of amateurs is very gratifying.

The Society is much encouraged by the interest shown in astronomy at the recent meeting in Cape Town of the South African Association for the Advancement of Science, when two members of the Society took prominent part. Dr. J. K. E. Halm's address as President of Section A of the Association and Mr. Spencer Jones's popular lecture attracted considerable attention.

Two numbers of the Society's Journal have been published during the year under review. It was hoped that more would have been issued, but the production of the Journal has necessarily to keep pace with the supply of contributions and the funds available. The Council trusts that members and associates will give serious thought to this matter, and that those who are willing to submit articles (to the Editor direct, or through the Honorary Secretary) will come forward in increasing numbers. The Society's cordial thanks are due to those who have contributed articles to the Journal during the present year. Several recent books on astronomical subjects have been reviewed in the Journal, and these works, together with publications received in exchange from other Societies, etc., have been placed in the Society's library. The Union Astronomer has presented some additions to the series of Observatory Circulars.

The Society also published the booklet by Dr. Halm on the "Universal Sundial," referred to in the Council's last report. Enquiries from all parts of South Africa indicate a widespread interest in this subject among farmers and others, and the appreciative remarks received have shown that the design of such a Sundial fulfils a long-felt want. It is hoped that members and associates will endeavour to further the sale of this useful booklet.

The Council wishes to commend to the attention of members and associates the desirability of increasing the output of the various Observing Sections. Systematic observations and records of meteors and of the zodiacal light would form a welcome addition to our present knowledge of these phenomena. It is thought, moreover, that there are many telescopes which are comparatively idle or used only casually owing to the lack of a definite scheme of work on the part of the owners. With the many fine nights we experience, it seems regrettable that any good instrument should be out of use, and the Council trusts that members and associates will seek to stimulate their enthusiasm by joining one or other of the Observing Sections, the respective Directors of which will be glad to hear from new workers.

In conclusion, the Council desires to emphasize the objects of the Society as set forth in the Constitution, viz., the encouragement and stimulation of the study of astronomy throughout South Africa, and the association of observers and their organization in the work of astronomical observation and research, and to give a cordial invitation to any persons interested in astronomy, whether as observers of the sky or as students of the subject, to join the Society. Any such applications should be made to the Honorary Secretary of the Cape Centre (P.O. Box 2061, Cape Town) or of the Johannesburg Centre (P.O. Box 2402, Johannesburg).

Reports

FOR THE YEAR ENDED 1924 JUNE 30.

COMET SECTION

Your Director has much pleasure in again thanking the Royal and Union Observatories for their continued help in observing and computing the orbits of comets discovered by members of the Section. He also wishes to thank Mr. D. McIntyre, Senior, who came to his assistance with his car at the time of the discovery of D'Arrest's Comet.

In South Africa the past year has been a poor one for comet-searching owing to the bad weather, continual haze, and difficult seeing. The conditions have been altogether abnormal, and may account for three comets only having been discovered. We are pleased to record that two of them fell to the net of a member of the Section. The monthly search of the southern sky has been faithfully performed by your Director, but he has only been able on four occasions to search the whole sky from dusk to dawn. It is hoped, now that several of the younger members are working, to be able in future to keep the whole sky under constant observation, and perhaps it may be your Director's good fortune to record a "Smith," a "Jearey," or a "Forbes" comet when he writes his next Annual Report.

The following new comets have been discovered since the date of our last report:—

Comet 1923 a (Bernard-Dubiago). A bright telescopic comet was discovered independently by Bernard at Madrid on 1923 October 11, and by Dubiago at Kasan on 1923 October 14. On the latter date its position was R.A. 7 h. 46 m. 43 s., Dec. 20° 37′ S. The comet was travelling rapidly in a southerly direction, and it was first seen in South Africa by our member, Mr. R. Watson, at Beaufort West, on November 4. He at once reported the discovery to the Royal Observatory, and to your Director. On the 6th, 7th, and 8th November the comet was easily visible to the naked eye as a hazy 5.5 magnitude star. Through the telescope (6-inch Cooke photo-visual) it was a beautiful and fairly large object, and had the appearance of a very bright patch of nebulous matter, much condensed in the middle, with a distinct nucleus. The head, or coma, was almost round, the nebulous matter extending out to a considerable distance, and gradually fading away to invisibility. Its tail was easily visible for about half a degree, and could be traced for quite a degree by swinging the telescope. It was narrow where it left the head, but broadened out towards the tip. The comet was followed for nearly a fortnight by the writer. Mr. Wood reports that it was difficult to observe on November 28, owing to its low altitude.

Comet 1923 b (D'Arrest's Periodical). This comet was discovered by your Director on 1923 November 10 (position, R.A. 21 h. 28.5 m., Dec. 29° 25′ S.), and reported personally to the Royal Observatory the following evening. Unfortunately, owing to clouds obscuring the sky, neither Mr. R. Woodgate nor the writer could find it, and we had no better result the following night owing to the same cause. At Newlands, where Mr. D. G. McIntyre and Mr. C. L. O'B. Dutton were working, it was glimpsed through openings in the clouds, and when the discoverer returned, he was able—though with great difficulty—to secure the field where it was on both nights. Those fields, along with the one secured on the night of discovery, were destined to prove very useful later on. As the comet could not be seen after the 12th November owing to the moon being in the vicinity, and getting brighter every night, it was recognized that something would have to be done to secure the positions accurately, or the comet would be lost, as it would not be possible to see it again for nearly a fortnight, or until after full moon. Fortunately Mr. H. E. Wood, of the Union Observatory, was able to supply us with a photograph of the region, and the three fields were at once recognized, and by their aid the comet was again picked up as soon as the moon had left the evening sky. After this it was seen in many Observatories, and its identity with D'Arrest's clearly established. At discovery it was a very faint little patch of nebulous matter, slightly brighter towards the middle. Under a higher power than the comet eyepiece the nebulous appearance was lost, and it appeared as a small cluster of scintillating points of light. Messrs. Dutton and McIntyre both noticed this. The writer commenced to search for this comet as early as June, and from the last week in July until the last week in September he went over the ground again and again in a vain attempt to find it. Mr. Wood had also been exposing photographic plates, but with no better result. The attempt to find it was given up in September, as by this time it was not only well past perihelion, but was also rapidly leaving the earth. Yet in November it was picked up without much difficulty. On finding that the new comet was D'Arrest's, Mr. Wood again went over his photographs, and he was able to identify it on two plates. He writes as follows: "I found the comet on two plates of September 5 and 7. I found them by working back from my own orbit of the comet. The images are extremely faint: when you know where they are and have the illumination correct you can see them. They cannot be seen when the plate is examined through a lens, and this is really why they were not discovered earlier. Actually the comet was several magnitudes fainter near perihelion than it was two months after perihelion." We have given more particulars about the finding of this comet than usual, as it is a good illustration of how uncertain in brightness comets sometimes are at or near

perihelion, and also that it is sometimes easier to find a comet than to verify it. The last photograph taken at the Union Observatory was on 1924 January 31, so that it was under observation for almost five months.

Comet 1924 a (Reid). A new comet was discovered by your Director on 1924 March 25 in position R.A. 2 h. 38 m. 15 s., Dec. 36° 18′ S. It was found in the early evening rather low down in the west, and was difficult to observe owing to haze over Table Mountain. The discovery was reported to the Royal Observatory the following day. Unfortunately, owing to bad weather, it was not seen again until the 28th, when it was photographed for the first time at the Royal Observatory, and its cometary nature established. At discovery the comet was a fairly bright, but very small object, appearing like a nebulous star. On the 28th, when it was again seen, it had changed completely; it was now a fairly large bright nebulous patch with a strong concentration towards the centre, where there was a distinct nucleus; it had also developed a short tail. At discovery on the 25th the magnitude was estimated to be about 10, whereas on the 28th it was about 8. It did not change much after this date, and was still about 9.5 magnitude near the end of April, when it got too low in the West for the discoverer to follow it longer.

Dr. Halm has computed the following orbit from three early observations:—

Comet Reid 1924 a.

$$T = 1924 \text{ Feb. } 23.7835 \text{ M.T.Gr.}$$
$$\pi = 11^\circ\ 58'.6.$$
$$\Omega = 111^\circ\ 18'.3.$$
$$i = 72^\circ\ 48'.5.$$
$$\log q = 0.2334.$$

Mr. Wood reports that the comet was observed from March 29 to May 29 at Johannesburg; it was then very faint. Its position on 1924 May 29 was roughly R.A. 5 h. 41.3 m., Dec. 6° 53′.9.S.

Encke's comet is now almost due, and should be picked up within the next two months. It is in the morning sky, and rather far north to be an easy object for searchers in the south.

The Donohoe Comet Medal of the Astronomical Society of the Pacific has been awarded to Messrs. Bernard and Dubiago for their independent discovery of comet 1923 a.

William Reid,
Director.

Note.—The first observation of Encke's comet at this return has been obtained by Professor van Biesbroeck at the Yerkes Observatory on July 31. The position of the comet on that date was R.A. 3 h. 24.9 m., Dec. 28° 6′N., almost exactly at the predicted place. Its magnitude was sixteen.—Ed.

MARS SECTION.

REPORT FOR 1923-4 (TO 10TH JULY, 1924).

Except for the last month of the period, the position as regards clear observations of this planet was the same as last year, namely, that the object was too far away. Nevertheless, observations were commenced in the first week of May in view of the planet presenting a much more southerly aspect than it has within ten years. This southerly aspect is the one represented in all the text-books, apparently because when a northerly aspect is presented, the European observatories have an unfavourable view. On the other hand, the writer has so far only seen the northerly aspect, of which the prominent feature is the dark and pointed *Mare Acidalium* surrounding the planet's north pole. He has numerous drawings of this, made in 1918, 1920 and 1922, the best of which was made at the 9-inch refractor of the Union Observatory.

The earliest observations were made by Mr. F. C. S. Haden, Johannesburg, and Mr. J. Werner, Piet Retief (4-inch refractors), at dawn on 5th May, 1924. This shows a *south* polar cap so brilliant that the drawing shows it projecting from the circular outline, an illusion which I have noticed myself when Mars is gibbous. In addition, a vague two-pointed marking is drawn in latitude 45° N. approximately. The second observation was my own, at 6.30 a.m. on 16th May, and is essentially the same as that of Mr. Haden, except that the snow of the south pole came farther down on the preceding side than on the following. The brilliance of the pole was extraordinary, the colour being blue-white—no doubt a colour-contrast effect. The *Syrtis Major* was seen in the north-following quadrant, but was very vague. (Mr. Haden's and my telescopes are both 4-inch refractors.)

Four observers collaborated on the 17th and 18th May (dawn), resulting in three good drawings of the *Syrtis Major,* which had then become fairly central. That of Major G. C. Fox, Sea Point (Fig. 1), who had the best telescope (10-inch reflector), is the best, but those of Matthew Deas, Beaufort West, and D. L. Forbes with C. F. Wickes, Durban, are in agreement as to the position of the prominent part of the marking. (Former, 8½-inch reflector, latter 8-inch refractor.)

So far no trace of the *Mare Acidalium* round the north pole of Mars has been seen this year, so that the planet has canted round considerably since 1922.

Another thing that emerges is that when Mars is not near, no power less than 150 is of any use.

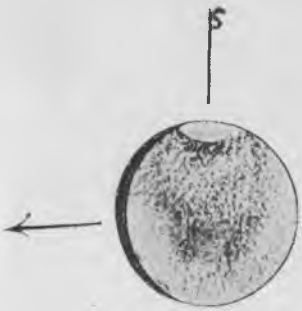

Fig. 1.

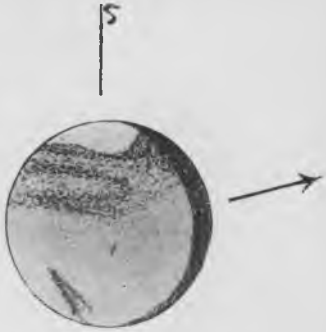

Fig. 2.

Fig. 3.

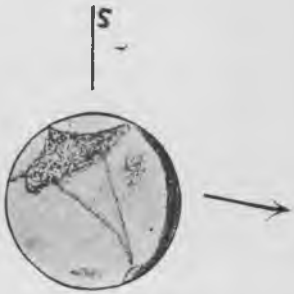

Fig. 4.

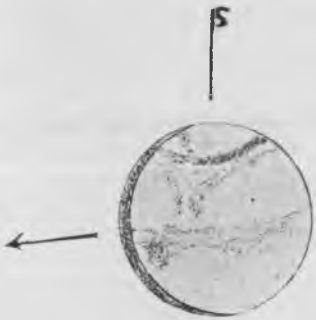

Fig. 5.

Fig. 6.

Figures 2, 4 and 6 are star-diagonal views.

On the 28th May at dawn (actually 6.37 a.m.) I secured what is really a good drawing for a 4-inch, owing to very exceptional definition. (Fig. 2. The view is that of *Mare Cimmerium.*) [It is to be noted that contrast between markings and planetary background is at least four times as good just before sunrise as against a dark sky. Five minutes before sunrise or five minutes after sunset appears to be the time of greatest contrast (*cf.* the similar phenomenon in a 10 days old moon with the naked eye).] This drawing shows the brilliant south pole to have a vague point on it in the preceding section of it, and with a dark band round it, and a grey wider band reaching to centre of the disc. This band had a lighter patch in its following portion (? *Hesperia*). A small dark patch in the north-following quadrant is probably one of the projecting points of the *Mare Acidalium,* and was seen again on June 4th.

Messrs. Forbes, Deas and Werner observed again at dawn on June 1st and 2nd. The results show the brilliant south polar cap with a black line and a wider (30° to 40° on Mars) grey band. Mr. Deas' drawing shows a peak on this band slightly preceding the centre of the disc. (Fig. 3.) Faint markings near the north pole are shown by Messrs. Deas and Forbes. Two days later I observed myself and got a similar result (Fig. 4), except that the wide grey band was much thicker on the following side, and had a pale patch at the south following edge. Major Fox, observing next day (5th June), got a similar result, but much more diffuse. He observed in darkness, however (6.0 a.m.), which is a handicap for contrast. This observer also got a remarkable drawing the next week (12th June), which shows the black line round the south pole and three pointed dark markings near the middle of the disc. On the 19th and 20th June Mr. Deas got two drawings, showing what are apparently "islands" (large pale spots in the grey-green of the southern "sea." The one in the S.W. is Hellas, and that in S.E. is Argyre.) (Fig 5.) The north margin of the "sea" is farther north than in the previous drawings. The writer was seriously ill, and unable to confirm these observations.

The last drawing is by Mr. Forbes with Mr. Wickes (Fig. 6). It shows a very dark line round the south pole; the "sea" is 60° wide, and reaches into the northern half of the disc parallel to the equator: it is darker at the north edge, and did not reach to the gibbous edge (? *Hesperia* interrupting *Mare Cimmerium*).

James Moir,
Director.

[Drawings of Mars made during the 1924 opposition will be published in a later issue of the Journal.—Ed.]

VARIABLE STAR SECTION.

The total number of observations received during the year 1923-1924 is 1,723, divided among the observers as follows: Mr. H. E. Houghton, 540; Mr. A. W. Long, 119; Mr. W. H. Smith, 1,064.

As is usual with variable star observations, several maxima and minima have just been missed owing to proximity to the sun. This is unfortunate, but is unavoidable.

A list of the observed maxima and minima is given below:—

001032	S Sculptoris	M	6.9	1923, Nov. 28.
001862	S Tucanæ	M	8.4	1923, July 24.
005475	U Tucanæ	M	8.8	1924, Jan. 17.
043263	R Reticuli	M	7.5	1924, Mar. 3.
043738	R Cæli	M	8.5	1924, Mar. 12 (flat).
050848	S Pictoris	M	7.8	1923, Dec. 26.
051247	T Pictoris	M	8.6	1924, Feb. 28.
051533	T Columbæ	m	12.1	1924, Jan. 2.
		M	7.4	1924, Apl. 18.
070772	R Volantis	M	8.9	1923, Sept. — (very flat).
074241	W Puppis	M	8.7	1923, Dec. 28.
082476	R Chameleontis	M	8.4	1923, July 31.
092962	R Carinæ	M	4.0	1924, Jan. 3.
100661	S Carinæ	m	8.3	1923, Aug. 9.
		m	8.1	1923, Dec. 29.
		m	9.2	1924, May 31.
111661	RS Centauri	M	9.0	1924, Apl. 4.
131283	U Octantis	M	7.8	1923, Nov. 10.
134677	T Apodis	M	10.0	1924, Mar. 26.
140528	RU Hydræ	M	8.0	1924, Apl. 1.
140959	R Centauri	m	9.2	1923, July 31.
151822	RS Libræ	M	7.6	1923, July 9.
152849	R Normæ	M	7.5	1923, May 18.
155823	RZ Scorpii	M	8.5	1923, July 30.
164319	RR Ophiuchi	M	8.0	1923, June 3.
172486	S Octantis	M	8.0	1923, Aug. 6.
174551	U Aræ	M	8.2	1923, July 17.
180363	R Pavonis	M	8.8	1923, July 14.
195142	RU Sagittarii	M	7.1	1923, Sept. 4.
223462	T Tucanæ	M	7.9	1923, Sept. 30.

In the majority of cases the observed dates agree quite well with the predicted dates.

W. M. Worssell,
Director.

METEOR SECTION.

There is evidence of a slight increase in the interest shown in this section. Several reports of bright meteors have been received from members. Unfortunately, on no occasion have two reports appertained to the same meteor, neither have the dates of any two of these observations coincided. There thus remains a considerable increase of co-operation necessary before it will be possible to ascertain the characteristics of large meteors seen in these latitudes, or to determine the existence of new showers and their times and radiants.

There are, however, to hand accounts of two outstanding showers, both, by a most remarkable coincidence, occurring on the morning of the same day. The earlier shower was observed by Mr. W. Reid from his observatory at Rondebosch. This shower had several unique features, though I believe Messrs. Reid and Skjellerup saw a similar display some years ago. Mr. Reid's account of his observations is as follows:—

"On the morning of 1923 December 16, at 12.15 a.m. (South African standard time), while comet-searching in the eastern sky, I suddenly saw a rather peculiar meteor; it came from between γ and ι Canis Majoris, and its flight ended between δ Velorum and ϵ Carinae. The meteor was about second magnitude, it was moving very slowly, and it left a distinct train behind it. There was nothing very remarkable about this, but the remarkable thing was to follow. From 12.15 a.m. until 12.35 no fewer than twenty-three meteors, all the same magnitude, moving slowly, and leaving distinct trains behind them, came from the same spot, and ended near the same place as the first one. Sometimes there was a minute or more between them, but generally I had no sooner followed one until the end of its flight when another one started, though I never saw two at the same time. I should like to point out one or two peculiarities about this flight. All the meteors were duplicates of each other. All left trains behind them, which lasted for a very short time. All came from the same spot and ended at the same place, and all were about second magnitude throughout their flight. So strongly was I impressed with the idea that they were part of a flight of meteors passing the earth at right angles to it, and we were only picking up a few on the fringe of the swarm, that I turned my telescope on the place from which they were coming, and also on the place where they were disappearing, in the hope of seeing something, but in this I was disappointed."

At about the same time, but possibly starting a little later, a totally different shower was observed by several campers, including Boy Scouts, at Camps Bay. These observers could not, of course, have seen Mr. Reid's shower, owing to the proximity of the mountain. The presence of the moon in the earlier part

of the evening may also have prevented the observation of some of the forerunners of the shower. Between 1 a.m. and 4 a.m., however, an unusual number of bright meteors, well over twenty an hour, was observed. They varied between first and second magnitudes, with a few fainter and very rapid meteors interspersed. No trails remained. The radiant will have been somewhere in the vicinity of 10 h. 30 m. R.A. and 45° S. Dec. This position must be regarded as very approximate, as the majority of observers were handicapped by the presence of trees.

This concludes the account of reports received during the year, and it must again be emphasized that unless many more members will systematically look for and report occurrences such as the foregoing, few or no good results will accrue. The procedure for would-be observers to follow has been laid down in the Journal (Vol. 1, No. 2). It is hoped that it will be followed in the coming year by a greatly augmented body of members and associates.

D. G. McINTYRE,
Director.

The Editor acknowledges the receipt of the following:

Reports, 1921 *and* 1923: *"Gazette Astronomique," April, June to September,* 1924, *published by the Société d'Astronomie d'Anvers (Antwerp); "Die Himmelswelt," March to August,* 1924, *published by Die Vereinigung von Freunden der Astronomie und Kosmischen Physik (E.V.), Berlin; Bulletin of the Observatory of Lyons, April,* 1924; *"Scientia," July,* 1924; *Bulletin of the Astronomical Society of Bordeaux, No.* 6, 1923-4.

THE ASTROPHYSICAL LABORATORY OF THE ROYAL OBSERVATORY, CAPE OF GOOD HOPE.

Through the courtesy of H.M. Astronomer, Mr. H. Spencer Jones, the members of the Cape Centre paid a visit to the Astrophysical Laboratory in May last, when Dr. J. Lunt very kindly gave a demonstration of the apparatus in use there. A most interesting evening was spent, and the thanks of the Society are due to Dr. Lunt for his painstaking preparation and description of the various phenomena witnessed.

On entering the laboratory, one saw a bewildering number of spectroscopes, varying in size from a direct-vision instrument only a few inches in length to a huge apparatus, mounted on a long slate bench, where the light was passed through a battery of four prisms and turned through an angle of 180°. Each of the instruments was arranged to show some typical spectrum.

Among gases, the bright line spectra of argon and neon were shown, the latter in an ingenious constant deviation spectroscope. These spectra consisted of bright lines (coloured in accordance with their position in the spectrum) which were peculiar to the gas in question. Another spectroscope was directed to a bright incandescent filament throwing its light through the gaseous peroxides of nitrogen, where the opposite effect was shown, the continuous spectrum due to light of all wave-lengths proceeding from the filament being crossed by a number of dark lines and bands characteristic of the gases. In another corner, the red and yellow lines in the spectrum of glowing lithium and sodium vapours were shown. The conditions on the sun were well illustrated by an intense electric arc light placed behind a Bunsen flame in which a bead of a sodium salt was glowing. The vibrating molecules of the sodium compound showed the familiar two yellow lines in the spectrum. The more intense arc light behind gave a continuous spectrum, but the wave-lengths corresponding to the sodium lines were blotted out by the glowing sodium vapour, and instead of two yellow lines there appeared two black lines. This exemplified the state of things on the sun, where the external gases, though hot and glowing and emitting bright lines of their own, make themselves known to us by the black lines which they produce across the continuous band of light given by the incandescent surface of the sun.

Yet another spectroscope (the large one referred to above) showed the spark spectrum of iron. In this powerful instrument only a small part of the spectrum was visible, consisting of a great many bright lines in the green region. The red or violet lines could be shown by means of suitable adjustments, but many additional lines existed far below the red and far beyond the violet ends. These invisible lines can be photographed; a rock-

salt prism is necessary to capture those wave-lengths longer than the red, and a quartz prism for those shorter than the violet.

Dr. Lunt explained the determination of a star's velocity, either approaching or receding, in the line of sight. The bright line spectrum of iron was photographed on each star plate for reference purposes, through the same slit and prisms, but above and below the star spectrum. The iron spectrum was obtained with a short exposure, at the beginning and end of the star exposure, but the spectrum of the star took a long time to impress itself on the plate. Indeed, even with the 24-inch telescope it was only possible to deal with stars including and brighter than magnitude 5.5. When the spectra of iron and the star are compared, it is usually found that there is a shift in the stellar lines, either towards the violet end if the star is approaching, or to the red end if the star is receding. The approach of the star appears to shorten the wave-lengths of the light reaching us, just as the note of the whistle of a locomotive is raised in pitch as it approaches us. The vapours surrounding the new star Nova Aquilæ (1918) were found to have an extraordinarily large motion towards us.

Dr. Lunt then showed an ingenious mercury pump, actuated by a small electric motor, which was used for exhausting glass tubes and for introducing the various gases whose spectra were to be examined.

The visitors were then admitted into the Observatory itself, to see the spectrograph which was attached to the eye end of the great telescope. The spectrograph consisted of a slit and collimating lens, four prisms, camera lens and plate holder; the electric spark giving the bright iron spectrum was shown, and the method of attaching the photographic plate. The prisms are maintained at a constant temperature day and night by an ingenious electrical thermostat.

On the termination of the visit, many expressions of thanks to Dr. Lunt and to Mr. Spencer Jones, who had accompanied the party, were voiced, both publicly and privately, and the members felt that their interest had been quickened and their knowledge increased by the visible demonstration of the various forms of apparatus previously only known to them in their reading.

SATURN.

The frontispiece is from a drawing made by Mr. Bert F. Jearey, Sea Point, and represents the appearance of the planet as seen through a 5-inch refractor on the evening of 1924 May 9. The powers used were 150, 220 and (not very successfully) 350. Regarding the reproduction, Mr. Jearey writes:—

"Ring C, which is the inner portion of the ring system, appeared to the observer as a faint pencil shading and a little more conspicuous and wider than shown in this representation, but not quite so pronounced as seen in most drawings of Saturn. The band on the planet appears as an arc, and not quite so dark as shown in the print.

"I have often seen other markings, but have drawn only what I saw on the evening of May 9."

Correspondence.

SEEING, GOOD AND OTHERWISE.

To the Editor.

SIR,

I should like to remind our country members of the great advantage many of them enjoy in having night skies unmarred by the glow from the lights of a large town. I remember a well-known South African astronomer saying that when electric light was introduced into his locality his whole scheme of observing was upset, owing to the perceptible illumination of the dark background of the sky. For the observation of the zodiacal light and of variable stars, and for comet-seeking, any artificial glow in the sky is a great hindrance.

May I also ask any members living up-country whether the increased altitude really gives better definition than at a lower level? Higher up there is certainly less air between us and the celestial objects, but I fancy that unsteadiness of seeing is quite common even at an altitude of 5,000 feet. In the Cape Peninsula it has been noticed that better seeing is often obtained on the Sea Point side than in the Southern suburbs, and it has been found in America that merely possessing a high altitude does not always favour a locality as regards the quality of observing conditions.

Yours, etc.,

MONS MENSA.

CAPE CENTRE.

Annual Report, Session 1923-4.

Your Committee, in presenting this, the Tenth Annual Report, have to record the unabated interest of the members in the affairs of the Society.

Meetings.

During the period under review there have been eight ordinary and two special meetings of the Centre; these were well attended. Your Committee have met seven times.

The following lectures and papers were read and discussed at the ordinary meetings, viz.: —

"The Planet Mars," by Mr. R. Watson.
"The Asteroids," by Mr. C. L. O'B. Dutton.
"Conception of the Universe," by Mr. A. G. Hoyer.
"On Determining the Surface Temperatures of the Stars," by Dr. J. K. E. Halm, F.R.A.S.
"The Planet Jupiter," by Mr. A. W. Long, F.R.A.S.
"The Planet Saturn," by Mr. W. H. Smith.
"Uranus and Neptune," by Mr. H. E. Houghton.
"The Moon," by Mr. H. W. Schonegevel.
"Comets and Meteors," by Messrs. D. G. McIntyre and W. Reid.

In February an Observational Meeting was held at the Royal Observatory, when the six and seven inch refractors were placed at the disposal of members, and in May a practical demonstration on "Spectra and Spectroscopes" was given by Dr. J. Lunt, F.I.C., in the Astro-Physical Laboratory of the Royal Observatory. The thanks of the Centre is tendered to His Majesty's Astronomer for these privileges, and to Dr. Lunt for his demonstration.

Membership.

During the year eight names have been struck off the roll, and one member has been transferred to the Johannesburg Centre. Twenty-two gentlemen have joined the Centre, eighteen as members and four as associates. There are now fifty-nine members and seventeen associates, a total of seventy-six, as against sixty-three at the commencement of the session.

Astronomical Articles in the Press.

The monthly notices with chart of the sky were published in the *Cape Times* as in previous years, and articles in Dutch on astronomical phenomena appear regularly in *Die Burger*. Both series of articles are contributed by members of this Centre. These articles are much appreciated by members.

FINANCIAL STATEMENT FOR THE YEAR ENDED 30TH JUNE, 1924.

Receipts.	£	s.	d.	*Payments.*	£	s.	d.
Balance in hand, 30th June, 1923	8	5	8	Contributions to Headquarters under Art. IX (i) of Constitution	24	15	7
Subscriptions to late Cape Astronomical Association	0	10	6	Copy of Journal	0	1	0
Subscriptions—				Rent	11	0	0
Arrears .. 4 9 0				Secretary's Expenses	4	13	2
1923-24 ... 43 0 3				Treasurer's Expenses	0	9	3
1924-25 ... 2 2 0				Rent of P.O. Box	1	5	0
	49	11	3	Printing and Stationery	1	17	0
Copy of Journal	0	1	0	Typing	0	13	0
Commission on Cheques	0	2	0	Bank Charges	0	13	3
Refund of Rent from Headquarters	1	0	0	Balance in hand, 30th June, 1924	14	3	2
	£59	10	5		£59	10	5

JOHANNESBURG CENTRE.

REPORT FOR SESSION 1923-4.

The session just closed has been somewhat uneventful in a local sense. Six members and one associate joined the Centre, and two associates and three members resigned. The last-mentioned include Mr. F. J. Nance, who was an active and valuable member of the Society. He served continuously on the Committee of the Johannesburg Astronomical Association and the Johannesburg Centre of the Astronomical Society of South Africa since 1920, and read several papers during that time. His departure from South Africa is a distinct loss to the Society.

The draft rules framed for the local Centre of the Society were approved by the Council in August, 1923.

In November the Johannesburg Centre contributed £10 towards the cost of publishing the Society's Journal.

A conversational meeting was held in July, and addresses were given by Dr. R. T. A. Innes (an account of the negotiations with reference to the Union 26-inch telescope), and by Mr. W. M. Worssell on "Variable Stars" in September and November respectively. Dr. J. Moir also contributed a valuable paper entitled "How to Find the Famous Telescopic Objects of the South," a copy of which was forwarded to members and associates of the Centre.

The customary quarterly visits were made to the Union Observatory, where members and their friends were again entertained with unvarying kindness by Dr. Innes and Messrs. Wood and Worssell. The Johannesburg Centre is greatly indebted to these gentlemen.

The undermentioned gifts are gratefully acknowledged:—Circulars, Union Observatory; copies of "Popular Astronomy," Madame von Klonowska.

FINANCIAL STATEMENT FOR THE YEAR ENDED 30TH JUNE, 1924.

Receipts.	£	s.	d.	*Payments.*	£	s.	d.
Balance in hand, 30th June, 1923	19	18	11	Contributions to Headquarters under Art. IX (i) of Constitution	6	8	6
Subscriptions—				Donation to Headquarters	10	0	6
Arrears .. 0 10 6				Rent of Rooms	1	10	0
1923-24 ... 19 8 0				Purchase of Publications	2	2	0
1924-25 ... 2 2 0				Subscription to British Astronomical Association	1	1	6
	22	0	6	Typing	1	12	6
For B.A.A. Handbooks	0	3	0	Secretary's Expenses	2	0	0
Exchange	0	0	6	Bank Charges and Commission	0	19	6
				Balance in hand, 30th June, 1924	16	8	5
	£42	2	11		£42	2	11

Astronomical Society of South Africa.

AUDITED FINANCIAL STATEMENT, 1923-24.

Receipts.	£	s.	d.	*Payments.*	£	s.	d.
Balance in hand, 30th June, 1923	14	0	9	Printing of Journal	49	7	0
Contributions from Cape Centre	24	15	7	Sundry Printing and Stationery	5	18	9
Contributions from Johannesburg Centre	6	8	6	Postages and Sundries	5	3	5
Sale of Journals	3	11	2	Rent and Electric Light	2	6	0
Advertisement in Journal	1	0	0	Bank Charges	0	17	2
Donations—				*Balance in hand, 30th June, 1924	11	15	9
Johannesburg Centre ... 10 0 6							
Natal Astronomical Association 5 0 0							
Anonymous 10 10 6							
	25	11	0				
Interest (P.O. Savings Bank)	0	1	1				
	£75	8	1		£75	8	1

Audited and found correct.
E. J. STEER.

**Note by Council.*—This balance does not include an amount of £4 11s. 9d. due from the Johannesburg Centre in respect of subscriptions collected during 1923-24.

Review.

"The Depths of the Universe," by G. E. Hale, Honorary Director of the Mount Wilson Observatory. Published by Charles Scribners' Sons, New York, at $1.50.

This is a continuation of the series of astronomical articles commenced in "The New Heavens" by the same author. There are three chapters in this book. The first deals mainly with the Adams method of determining stellar distances by the relative brightness of certain lines in the spectrum of the star and with the distances of globular clusters deduced from the presence in them of variable stars.

The second chapter, dealing with the existence of dark and feebly luminous nebulæ, is probably the most interesting. Considerable evidence is given to support the view that there are enormous clouds of cosmic dust in space. These are frequently sufficiently dense to obscure the light of stars behind them. Or, if they are near to bright stars, they may be excited into luminosity and appear as bright irregular nebulæ.

The final chapter deals with the magnetic fields associated with sunspots, and indicates that the true sunspot period is really 22 years, or twice the period of the variation of the numbers of sunspots.

The book is copiously and beautifully illustrated, many of the photographs having been taken with the 100-inch reflector at Mount Wilson. There are several indications in the book that a further volume may be expected. This will be eagerly anticipated.

H. E. W.

ASTRONOMICAL NOTES.

Effect of Altitude on "Good Seeing."

In a letter published in this issue, our correspondent, "Mons Mensa," raises the question of the effect of altitude upon definition. This is a question on which there is as yet no consensus of opinion. It is probably undoubtedly true that the best site for an observatory is at some high altitude where cloudless, dry, dust-free, haze-free and homogeneous atmospheric conditions prevail. From the point of view of "good seeing," homogeneous atmospheric conditions are of the greatest importance, and, while these are probably more frequent at high altitudes, they are not necessarily so. In selecting sites for new observatories, it is obvious that an elevated situation in a dry climate has been sought in many cases, *e.g.*, Arequipa, 8,041 feet; Mount Hamilton,

4,209 feet; Flagstaff, Arizona, 7,250 feet; and Mount Wilson, 5,900 feet. On the other hand, Evershed is of the opinion that the presence of a large water surface near an observatory tends to good definition, and considers that the best site is to be found on an oceanic island in a calm and dry region far from continental land areas. It will be remembered that Professor W. H. Pickering is stationed at Mandeville, Jamaica. For his particular work, the observation of planetary detail, the finest definition is required. Thus there exists great variety of opinion upon this question.

The Astronomical Day.

An important alteration in the astronomical method of reckoning time comes into force on 1925 January 1. Previously the astronomical day has commenced at Greenwich noon, twelve hours later than the civil day. Now the astronomical day is to be brought into conformity with the civil day, and will commence at the previous midnight. An observation made at 1924 December 31.50 Greenwich time is now to be considered as made at 1925 January 1.00 Greenwich time in the new reckoning.

The Smaller Magellanic Cloud.

Some interesting conclusions as to the size and the distance of the Nubecula Minor have been published by Dr. H. Shapley in a recent Harvard Circular (No. 255). From observations of variable stars of the Cepheid type found within the confines of the cloud, the distance of the cloud is deduced as 101,000 light-years. From this it follows that the dimension of the cloud itself, from side to side, is 6,500 light years. These figures depend upon the assumption that the relation between the period and the absolute magnitude of Cepheid variables found to exist in the case of stars comparatively near to us is generally true. Shapley has also come to the conclusion that the brightest variable stars in the cloud are super-giants, their diameters being of the order of 600 million miles. This is about the same as the radius of the orbit of Jupiter, and very greatly exceeds the diameters found for the giant stars Antares and Betelgeuze.

Astronomical Society of South Africa.

Officers and Council, 1924-25.

President: J. K. E. Halm, Ph.D., F.R.A.S., Royal Observatory, Cape of Good Hope.
Vice-Presidents: H. Spencer Jones, M.A., B.Sc., F.R.A.S.; Senator the Hon. A. W. Roberts, D.Sc.. F.R.S.E.. F.R.A.S.; W. M. Worssell, F.R.A.S.
Hon. Secretary: H. E. Houghton, P.O. Box 2061 (Tel. 2992 Central), Cape Town.
Hon. Treasurer: W. H. Smith, "Arum Villa," Plumstead.
Members of Council: W. H. Cox, W. B. Jackson, M.Sc., A. W. Long, F.R.A.S., W. Reid, H. W. Schonegevel, J. D. Stevens.
Alternate Members of Council: A. F. I. Forbes, B. F. Jearey, D. G. McIntyre.
Auditor: E. J. Steer.

Directors of Observing Sections.

Comet: W. Reid, "Glen Logie," Camp Ground Road, Rondebosch (Tel. 597 Claremont).
Mars: J. Moir, M.A., D.Sc., F.I.C., 24, Esselen Street, Hospital Hill, Johannesburg.
Meteor: D. G. McIntyre, "Kolara," Kenilworth (Tel. 1052 Wynberg).
Variable Stars: W. H. Smith, "Arum Villa," Plumstead.

Editor of Journal: H. E. Wood, M.Sc., F.R.A.S., Union Observatory, Johannesburg.
Librarian: The Secretary.

COMMITTEE OF CAPE CENTRE, 1924-25.

Chairman: D. G. McIntyre, "Kolara," Kenilworth.
Vice-Chairman: W. Reid, "Glen Logie," Camp Ground Road, Rondebosch.
Hon. Secretary: H. W. Schonegevel, P.O. Box 2061, Cape Town (Tel. 240 Central).
Hon. Treasurer: A. F. I. Forbes, "Craigie Brae," Liesbeek Road, Rosebank.
Members of Committee: Capt. D. Cameron-Swan, F.R.P.S., F.S.A. (Scot.), W. H. Cox, B. F. Jearey, A. W. Long, F.R.A.S., W. H. Smith.
Librarian: W. Potts, 4, Beaumont Place, Highfield Road, Three Anchor Bay.
Auditor: E. J. Steer.

COMMITTEE OF JOHANNESBURG CENTRE, 1924-25.

Chairman: W. M. Worssell, F.R.A.S., Union Observatory, Johannesburg.
Hon. Secretary: W. Eaton, P.O. Box 2402, Johannesburg.
Hon. Treasurer: F. B. Hall, P.O. Box 470, Johannesburg.
Members of Committee: T. Beamish, W. Geddes, W. B. Jackson, M.Sc., J. Moir, M.A., D.Sc., F.I.C., J. D. Stevens.

ASTRONOMICAL SOCIETY OF SOUTH AFRICA.

New Members.

Cowen, G., Box 30, Idutywa, Transkei.
De Kock, R. P., Box 43, Worcester.
Duncan, J., M.B., Ch.B. (E.), 6, Padnoller Avenue, Pretoria.
Dutton, Mrs. C. A., Carrington Street, Mafeking.
Ensor, G. E., X-Ray Department, Pretoria Hospital, Box 201, Pretoria.
Gundry, P. G., Ph.D., B.Sc., Transvaal University College, Pretoria.
Menzies, A., Royal Observatory, Cape.
Pierce, J. H., Royal Observatory, Cape.
Plummer, F. E., B.A. (Cantab.), Transvaal University College, Pretoria.
Troughton, Miss H. L., St. Albans, Estcourt, Natal.

The addresses of the following are now as stated below:

Davis, J. B., 34, Grey Street, Queenstown.
*Hemphill, C. P., "Woodcot," Hanover Road, Sea Point.
*Landers, V., c/o Y.M.C.A., Three Anchor Bay.
McAllister, Rev. J., Dundee, Natal.
McIntyre, D. A., M.B.E., J.P., "Kolara," Kenilworth.
McIntyre, D. G., "Kolara," Kenilworth.
Moir, J., M.A., D.Sc., F.I.C., 24, Esselen Street, Hospital Hill, Johannesburg.

*Associate.