

1872.

VICTORIA.

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E I G H T H R E P O R T

OF THE

BOARD OF VISITORS

TO THE

O B S E R V A T O R Y ;

WITH THE

ANNUAL REPORT OF THE GOVERNMENT ASTRONOMER.

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PRESENTED TO BOTH HOUSES OF PARLIAMENT BY HIS EXCELLENCY'S COMMAND.

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## EIGHTH REPORT OF THE BOARD OF VISITORS TO THE OBSERVATORY.

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To HIS EXCELLENCY THE VISCOUNT CANTERBURY, *K.C.B.*, *Captain-General and Governor-in-Chief of the Colony of Victoria, and Vice-Admiral of the same, &c., &c., &c.*

MAY IT PLEASE YOUR EXCELLENCY—

The Board of Visitors to the Observatory has made its annual inspection, and has the honor to forward the Report of the Government Astronomer. The Board finds that the instruments are all in good working order, those out of use being carefully guarded against deterioration.

The Great Telescope is giving increased satisfaction. The A speculum, re-polished by Mr. Le Sueur, is still in use, and observations on a more extended scale are being made. Photographic pictures of the moon are being taken, and promise to be both excellent in themselves as works of art, as well as useful in aiding the scientific observations of that planet now taking place in Europe.

The usual course of Sidereal observation has been proceeded with, delayed only by the absence of the staff on the Eclipse Expedition.

The Zone observations have been temporarily suspended, as they were far ahead of the means of reduction at the disposal of the Government Astronomer. The number of stars observed up to this period has been 48,672; the number reduced was 36,917; thus showing the pressing necessity of increased clerical assistance. Not only is it impossible with the present staff to reduce the Zone observations fast enough, but it has been found impracticable to keep pace with the working of all the self-registering instruments, of which there are a considerable number, in the reduction and exhibition of their results. In order that the public may have the full benefit of those that are reduced, Mr. Ellery has, with the sanction of the Chief Secretary, published monthly records, to the end of March, of Observations in Meteorology and Magnetism, in a form both popularly useful and suited for after-reference in the requirements of science.

A large number of drawings of nebulae and other celestial objects observed with the Great Melbourne Telescope has accumulated, and it is most desirable in the interests of science, and also for the satisfaction of the public, that these drawings should be published without delay. The Board desires to express a hope that the requisite funds for this purpose will be provided by Parliament.

The Board regrets that the expedition to observe the total eclipse was, from the unfavorable weather, a failure. The gallant endeavour, however, thus made by the colony to do all in its power to add to the general stock of the world's knowledge, especially in a matter which has excited a very ardent interest throughout every scientific circle, cannot but be a source of deep satisfaction to all who have the honor of the colony at heart.

The Board is much gratified at the large increase to the library, by donations of scientific works from almost every portion of the globe, testifying to the acknowledged position of this Observatory, while largely augmenting the stores of astronomical and magnetic information accumulated.

The Government Astronomer complains of serious defects existing in the Magnet House. The Board has taken the matter into consideration, and urgently recommends that the remedies suggested by the Government Astronomer be forthwith carried out.

The Board regrets that the Crown grant of the land set aside for the Observatory purposes, and pointedly referred to in their last Report, has not been issued. The Board begs, through Your Excellency, to draw the attention of the Government to this subject, and trusts that no further delay may take place.

The necessity for the officers of the Observatory to attend during longer hours than any other members of the Civil Service, and that too very frequently at night, coupled with the obligation to find a residence close at hand, furnishes a strong ground for a special allowance to those officers who have not quarters provided them. The Board therefore would urge upon the Government that the allowance in lieu of quarters, which, much against its wish, was withdrawn two years ago, be again given to the three officers who have not quarters.

(Signed)

H. AMSINCK, Commander R.N.,

JOSEPH H. KAY, Captain R.N., F.R.S.,

W. P. WILSON, M.A.,

A. J. SMITH, Commander R.N.,

J. WILBERFORCE STEPHEN, M.A.,

JAMES MOORE, M.A.,

J. E. BROMBY, D.D.

Melbourne Observatory, 16th May 1872.

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## REPORT OF THE GOVERNMENT ASTRONOMER.

THE Report I have now the honor of submitting to the Board of Visitors to the Observatory refers to the period between the date of the last visitation, 18th April 1871, and the present date. During this time but little change has taken place in any portion of the establishment: the personal staff remains the same, some few additions and repairs to the buildings have been effected, and additional apparatus pertaining to the Great Telescope has been received. I shall, however, detail to you the past year's history of the Observatory, the work that has been done, the present state of the establishment, and describe such changes or additions as have been made, or now appear desirable.

### PERSONAL ESTABLISHMENT.

This remains the same as at the date of the last visitation, and consists of—

Mr. ELLERY (Director), Government Astronomer,  
Mr. WHITE, Assistant Astronomer,  
Mr. MOERLIN, Assistant Astronomer,  
Mr. E. F. MACGEORGE,  
Mr. J. E. GILBERT.

There are also attached to the Observatory—

J. THORPE, Messenger,  
F. DE LA MARE, Workman,

the latter being for the most part engaged in work connected with the Great Telescope.

### BUILDINGS.

The main building now urgently requires fresh painting to prevent decay. This work has already been requisitioned for, and should not be long delayed. The roof of the Absolute Magnet House is also in need of repair.

The Great Telescope House is in a satisfactory condition. The flat roof, which used to leak considerably in wet weather, has been repaired, and now appears to be weather-proof; the movable roof continues to work most satisfactorily. Considering the large dimensions and weight ( $7\frac{1}{2}$  tons) of this structure, and the fact that it is cut through at one end to enable it to pass the pier, the maintenance of its form, and the ease with which it is worked, it may be regarded as an achievement in construction which reflects great credit on Mr. Merritt, of the Public Works department, who designed it. In my last Report I stated that the Magnetograph House required some repairs in consequence of the continued settling of the earthwork which supports the outer walls; this defect has been temporarily remedied, but I think it will be eventually found desirable to build a new house of stone or brick, and below the general surface of the ground, in order to secure a more even temperature than is now possible, and which is so necessary in magnetographic work. In using the Great Telescope for celestial photography it is necessary that the observer shall have easy access to the mouth of the tube, which, when lowered on to the wall of the Telescope Room, is yet about 15 or 16 feet from the ground. It was at first thought that a movable ladder or steps would answer the purpose, but, considering that not only easy but *rapid* access is necessary, a ladder or steps of that height would be awkward and even unsafe to manage; it was finally decided to erect a permanent platform at the north end of the building; from which the tube could be reached easily and safely in all requisite positions of the telescope. This work was completed in January, and not only answers its purpose most satisfactorily, but improves the appearance of the Telescope House very considerably. A set of steps runs on a pair of rails on the platform, and affords a most convenient means for focussing, placing, and withdrawing the sensitive plate.

The fencing enclosing the Observatory grounds has been thoroughly repaired and painted.

### INSTRUMENTS.

The instruments in regular use are in good working condition, and such as are only used occasionally, or are put by, are carefully inspected from time to time to prevent, as much as possible, any deterioration; of the latter class I may mention the zenith sector, the mounting of the prime vertical instrument, Professor Neumayer's old magnetic instruments (of which some have been lent to Mr. Todd, of South Australia), any of which could be fitted for use in a short space of time. The old 45-inch transit instrument, formerly used at Williamstown, is still under loan to the Adelaide Observatory.

There are also in the Observatory under my charge a number of the geodetic instruments which have come in, in consequence of the almost entire suspension of operations in the field. These have all been lately overlooked, and put in good order by the instrument maker. The transit circle and clock (Frodsham 998) continue to give us every satisfaction. In my last Report I alluded to an alteration that had been made in the compensation of the pendulum, and stated that, from a cursory examination of the rate subsequent to the alteration, it appeared very much improved; a year's experience shows that the compensation is now almost perfect.

The normal telegraph clock, which had been constructed in the Observatory workshop a little prior to the last visitation, has not behaved so well as was expected; its performance, so far as rate goes, is excellent, but I now think that the labor of lifting six pairs of springs by wheels on the minute arbour is too much for it. In a gravity escapement clock the weight required is much larger than in the ordinary dead beat, and in this clock it has to be still further increased to overcome the contact springs at each beat; even with three times the weight theoretically required the clock will sometimes catch for a second, for want of power. Of course this can be obviated by additional weight, or by putting some of the contact springs out of gear. I have, however, hitherto endeavoured to gain more power by decreasing the friction of the train

and escapement in every possible way, but now find that more weight must be used; the strength of the work will safely carry five times that now on. Owing to its unsatisfactory performance hitherto, this clock has not been used for the controlling or other work outside the Observatory, for which it was intended, but it is used for controlling half-seconds pendulums in the Observatory. The three chronographs are in good working order; they remain the same as at the date of my last Report. The various instruments used in the magnetical and meteorological observations are in regular use, and generally speaking in good condition; the magnetographs, thermographs, and barograph have furnished records in their respective departments almost without a break. Nevertheless, once or twice, short interruptions have occurred through stoppage of gas pipes, but not of sufficient duration to be of consequence. I have not succeeded in obtaining sufficiently good insulation for the "water dropper" of the electrograph in its new position in the Thermograph Room to induce me to resume the registration; before doing so I believe it will be necessary either to get a special building for it or restore it to its old place in the Observatory. I am reluctant to adopt the latter course, for the same reason that induced me to move it from there in the first place, that is, the dampness caused in part of the west wall by the dropping water being driven against it by the wind.

The anemograph has worked better since the alteration of the direction-fans; the wear, however, is very great, the result of the accumulation of fine dust in the oil which is used for lubricating the centres. New gun-metal balls and steel linings have been fitted to the velocity apparatus, as the old balls had become crystalline and uneven, and had worn deep channels in the cast-iron chamber wherein they run.

The standard bars apparatus has been partly fitted up in the east basement room, but it will be necessary to erect a pair of stone piers before it can be said to be complete.

#### TIME SIGNALS.

There has been no change in this portion of the work; the true time is disseminated throughout the colony by means of the telegraphic wires every day at one o'clock, and at other times when required. The Williamstown time-ball signal is considered of the most importance, and every effort is made to secure its correctness and regularity; now and then, however, an interruption has occurred through a break in the telegraph wire, or defect in the indicator at the lighthouse; every precaution is adopted to avoid them, but as the time-ball line is an integral part of the Cape Otway line, and not entirely free, it seems impossible to avoid occasional interruptions. The automatic return signal, giving notice of the instant of ball drop, is found to be of great value. The time-balls and time-signals at Melbourne, Geelong, and at various coast stations, are worked in the same manner as formerly.

An arrangement has been made by which a galvanic signal can be obtained every five minutes from the Post Office clock on the Observatory chronograph; the error of the clock thus ascertained every day, except Sundays, is published in the daily papers, with the notices of times of the drop of the time-balls. The performance of this clock is remarkably good, and since the substitution of a mercury compensation pendulum for the wood and lead compensation first used, leaves little to be desired as regards rate; for instance, from August last till 17th February, no alteration was made to the pendulum, and the rate during that time averaged about 3-10ths of a second per day; and it appears that the pendulum itself is so truly compensated that no difference of rate due to seasonal change has yet been noticed. I believe this is the only instance of the application of a two-seconds mercurial pendulum to a turret clock. The cost was about £50, but a small item in the total cost of a public clock; the greater perfection in time-keeping which results, however, is undoubtedly cheaply purchased at such an outlay.

The time line for clock controlling has been extended to the Railway Station at Spencer street, where the platform clock is attached. Preparations are also being made to control all the clocks in the Houses of Parliament from the Observatory; most of these being dial clocks with short pendulums, it has been necessary to place a clock with a *one second pendulum* in the building, control this with the time line, and control the dial clocks with it by a special circuit and contact springs. I find, by experience, that it is very necessary that each clock on the control line exposed for public reference should have an indicating galvanometer open to public inspection, which will show, by the omitted vibration at every 60th second, whether the clock is under control or not. This has been done at the Spencer-street railway, but nowhere else at present; it should, I think, be insisted upon as one of the conditions in the use of the time line, for not only does it inform the public of the correctness of the clock, or otherwise, but immediate notice is given of any break in the circuit. On one or two occasions short interruptions have occurred, generally from the loosening of the attachments of some of the clocks. In the case of an interruption which occurred a few weeks ago, however, it was found that the wires leading into Mr. Gaunt's, in Bourke street, had been cut.

#### THE GREAT TELESCOPE.

The whole of the mechanical arrangements connected with the Great Telescope are in good order. No change has been made in the disposition of the mirrors since my last Report. Mirror A is still used and maintains its polish satisfactorily. The photographic apparatus, which had arrived a short time before the last visitation, has been fitted, but it was found necessary to shorten the tubes about two inches, as the plates could not be brought to focus without. Some trials of the working of the apparatus have been made, and the arrangements seem to be quite satisfactory. The results of some experimental photographs of the moon give us every reason to expect that exquisite pictures will be produced by mirror A, and show that the figure of this mirror must be very good indeed; it would also seem to indicate that whatever defects in definition have been noted, originate in the small mirror.

Mirror B remains in the polishing machine. It has not been used since its removal from the telescope in April 1870. The 12-inch mirror and telescope intended to afford practice and experience in grinding and polishing arrived in November last. Owing to preparations for the Eclipse Expedition, however, nothing was done with it till after the return of the Observatory party in January.

The mirror was in a rough-ground state, and a grinding tool was sent with it. Mr. MacGeorge commenced the grinding in February. On getting a sufficient polish to test it, it was found to have a focus too long for the tube sent by six or seven inches, and on measurements being made the curvature of the grinding-tool was found to correspond to a focus too long for the mounting by that amount. We have, therefore, had to get another tool made to increase the curvature of the grinder to the proper radius, but the re-grinding has not been commenced.

The telescope itself is of the Newtonian form, mounted equatorially with roughly graduated circles. Besides the value of this instrument in affording experience in grinding, polishing, and testing, when completed it will be found a most useful adjunct to the Observatory.

A convenient observing chair is much wanted. Considerable difficulty has been found in designing one that will meet the various requirements; Mr. MacGeorge has, however, constructed a small model that promises well, and I propose getting a chair constructed according to it.

No alteration has been made in the eye-stops; they are the same as when Mr. Le Sueur left. I intended to have had a fresh set made with small apertures so as to increase them gradually to the requisite sizes, but it has been delayed for want of time.

The library has been increased during the past year by the purchase of several standard works and periodicals, and notably so by the following donations:—

#### DONATIONS RECEIVED FROM SOCIETIES, ETC.

Report of the British Association for the Advancement of Science, Exeter, 1869	...	G. B. Airy.
Greenwich Magnetical and Meteorological Observations, 1868	...	Ditto.
Greenwich Astronomical Results, 1868	...	Ditto.
Greenwich Observations, 1868	...	Ditto.
Breen's Correction of Bouvard's Elements of Jupiter and Saturn (Appendix to Greenwich Observations, 1868)	...	Ditto.
Catalogue of 2760 Stars for 1864 (Appendix II. to Greenwich Observations, 1868)	...	Ditto.
Description of the Great Equatorial at the Greenwich Observatory (Appendix III. to Greenwich Observations, 1868)	...	Ditto.
Meteorological Observations made at the Government Observatory, Sydney, for the Month of June 1871	...	H. C. Russell, Esq.
Barometer Manual, Board of Trade	...	Robt. H. Scott, Director, Meteorological Office.
Smithsonian Report, 2 vols., 1868 and 1869	...	Washington. Jos. Henry, Secretary, S. Institution.
Patents and Patentees, vol. iv.	...	W. H. Archer, Esq., Registrar-General, Victoria.
Reports on the Solar Eclipse of 7th August 1869	...	Comm. B. F. Sands, U.S.N.
The Indians of Cape Flattery	...	J. G. Swan, Smithsonian Institution.
Quarterly Weather Report of the Meteorological Office for the Months July to October 1869	...	Robt. H. Scott, Director, Meteorological Office.
Quarterly Weather Report of the Meteorological Office for the Months October to December 1869	...	Ditto.
Quarterly Weather Report of the Meteorological Office for the Months January to March 1870	...	Ditto.
Report of the Meteorological Committee of the Royal Society for the Year ending 31st December 1870	...	
Results of Meteorological Observations taken at Port Louis, Mauritius, for the Years 1865, 1866, 1867, 1868, 1869, 1870	...	
Monthly Notices, Meteorological Society, Mauritius, 23rd March 1871	...	
Monthly Notices, Meteorological Society, Mauritius, April 1871	...	
Om Planeten Neptunus	...	Af. Athanasius Franz Didrich Wackerbarth.
Bulletin Astronomique de l'Observatoire de Paris: Nos. 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47	...	Ch. Delaunay.
Bulletin Astronomique de l'Observatoire de Paris: New series, Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	...	
Reale Istituto Lombardo di Scienze e Lettere Rendiconti: Serie II., vol. i., Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20; serie II., vol. ii., Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15	...	By the Association.
Meteorologische Beobachtungen, angestellt auf der Leipziger Universitäts-Sternwarte im Jahre 1869	...	Prof. Bruhn, Leipzig.
Zwei Bemerkungen zu Regnault's Tafel der Spannkraft des Wasserdampfes	...	Von A. Moritz.
Zeitschrift der österreichischen Gesellschaft für Meteorologie, Nos. 10 and 14	...	
Nouvelles Météorologiques, 1870, Nos. 9, 10, 11, 12	...	Soc. Météorologique de Paris.
Der 8. Novr. 1845, Jubel-Erinnerungstage, Rückblick auf die Jahre 1845 bis 1870	...	W. von Haidinger und E. Döll.
Ueber die directe Insolation und Strahlung an verschiedenen Orten der Erdoberfläche	...	A. von Wojekoff.
Planet—Och Komet Observationer. Auställda ar 1869	...	Axel. Möller, Lunds Observatory.
Planet—Och Komet Observationer. Auställda ar 1870	...	Ditto.
Protocolle der Verhandlungen der Zweiten Conferenz der Commission für die Vorbereitung der Beobachtung des Venusdurchgangs von 1874	...	
Bestimmung der Längen—Differenz zwischen Berlin und Lund, 1868	...	Von C. Bruhns.
Resultate aus den Meteorologischen Beobachtungen, angestellt an den Fünfundzwanzig Königl. Sächsischen Stationen, 1868	...	Dr. C. Bruhns.
Sammlung von Hülftafeln zur Berechnung Barometrischer Höhenbestimmungen	...	Von A. Moritz and H. Kiefer.
Proceedings of the Royal Society of Great Britain, vol. xviii., Nos. 115, 116, 117, 118; June 1869, December 1869, February 1870, March 1870	...	
Leyton Astronomical Observations, 1865-69, vol. ii.	...	C. G. Talmage, Leyton.
Schriften der Universität Kiel, 1855-69, 15 vols.	...	Commission for editing Kiel University Publications.
Annuario del Observatorio de Madrid, 1869-70	...	Antonio Aguilar.
Observaciones Meteorológicas efectuadas en el Observatorio de Madrid, 1869	...	Ditto.
Resumen de las Observaciones Meteorológicas de Provincias, 1868	...	Ditto.
Resumen de las Observaciones Meteorológicas efectuadas en el Península, 1866, 1867	...	Ditto.
Results of Meteorological Observations made at Radcliffe Observatory, 1868	...	Rev. R. Main, M.A.
Radcliffe Observations, 1868, vol. xxviii.	...	Ditto.
Astronomical and Meteorological Observations made at U.S.N. Observatory, 1867	...	Comm. B. F. Sands, U.S.N.
Transactions of the Connecticut Academy of Arts and Sciences, 1867-71, vol. i., part 2	...	
Transactions of the Connecticut Academy of Arts and Sciences, 1870, vol. ii., part 1	...	
Annual Report of the Director of the Cincinnati Observatory	...	Cleveland Abbe, Dir. Cinn. Observatory.
On the Direction and Force of Wind, with the Fall of Rain and Snow at Wallingford, Connecticut	...	Francis E. Loomis, Ph. D., Cornell University, Ithaca, N.Y.
Dollen's Portable Transit Instrument in the Vertical of the Pole Star	...	Cleveland Abbe, Dir. Cinn. Observatory.

DONATIONS RECEIVED FROM SOCIETIES, ETC.—*continued.*

Astronomical Observations and Researches, Dunsink Observatory of Trinity College, Dublin, part 1	Board of Trin. Coll., Dublin.
Bolletino della Soc. Geografica Italiana, 1871	Cornelius Nipote, Firenze.
On an Equal Surface Projection and its Anthropological Applications	C. Piazza Smith, Edinburgh.
Bestämning af Planeten (92) Undinas Bana, Grundad på Observationer under Trenna Oppositioner	Frederick Anderson.
Undersökning af Planeten Pandoras Rörelse	Axel Möller, Lund.
Account of the Great Trigonometrical Survey of India, vol. i.	Col. Walker, presented by Secretary of State for India.
Index to the first twenty-nine volumes of the Monthly Notices of the Royal Astronomical Society	
Astronomical Society's Notices, vols. xxviii., xxix., xxx., xxxi.	
On the Solar Eclipse of 18th August 1868	Warren de la Rue.
Memoirs of the Royal Astronomical Society, vol. xxxvii., parts 1 and 2, vol. xxxviii., vol. xxxix., part 1, 1870-71	
Tables of Iris	Francis Brünnow, Ph.D., F.R.A.S.
Observations of Comets, extracted from Chinese Annals	J. Williams, Esq., F.S.A., Assistant Secretary, R.A. Society.
Annales de l'Observatoire Royal de Bruxelles, tome xviii.	A. Quételet.
Annales de l'Observatoire Royal de Bruxelles, tome xx.	Ditto.
Notices Extraites de l'Annuaire de l'Observatoire de Bruxelles pour 1868 et 1871	Ditto.
Annales Météorologiques de l'Observatoire Royal de Bruxelles, première année, deuxième année, 2 vols.	Ditto.
Physique Sociale, ou Essai sur le Développement des Facultés de l'Homme, tome i.	Ditto.
Etoiles filantes du milieu de Novembre 1867 et Etat de l'Atmosphère à la même époque	Ditto.
Sur les Etoiles filantes périodiques du Mois d'Août 1867, et sur les Orages observés en Belgique pendant l'Été de 1867	Ditto.
Anthropométrie, ou Mesure des différentes Facultés de l'Homme	Ditto.
Sir John F. W. Herschel. Notice	Ditto.
Loi de Périodicité de l'Espèce Humaine	Ditto.
Sur l'Anthropométrie, ou Sur la Mesure des différentes Facultés de l'Homme	Ditto.
Développement de la Taille Humaine	Ditto.
Orages en Belgique en 1867 et Aurore Boréale des 24 et 25 October 1870	Ditto.
Observations des Phénomènes périodiques pendant l'Année 1869	Ditto.
Contributions to our Knowledge of the Meteorology of Cape Horn and West Coast of South America	Robt. Scott, Director, Meteorological Office.
Annalen der Sternwarte in Leiden—Zweiter Band, 1870	Dr. F. Kaiser.
Klima von Neuseeland	Dr. J. Hanns.
Nederlandsch Meteorologisch Jaarboek, 1869	Nederlandsch Meteor. Inst.
Jahresbericht des Physikalischen Central Observatoriums für 1870	Kaiserlichen Akademie der Wissenschaften.
Repertorium für Meteorologie, Band ii., Heft i., 1871	Central Physical Observatory, Russia.
Annales de l'Observatoire Physique Central de Russie, Année 1867 et 1868	St. Pétersburgh.

## THE WORK OF THE OBSERVATORY.

There has been no change made during the past year in the allotment of the duties of the department. The general direction, correspondence, &c., falls to myself. Mr. White, chief assistant, has, as heretofore, had charge of the transit circle observations and reductions, and of all computations connected therewith. Mr. Moerlin has charge of the meteorological and magnetical work and computations. Mr. MacGeorge is occupied with the Great Telescope work, and Mr. Gilbert has charge of the clock and chronometer comparisons and rating, time signals, and the accounts of the department.

With the transit circle the observations have been for the most part confined to stars for clock errors and position of the instrument. The number of observations are as follows:—

R. A. observations	1142
P. D. observations	584

Observations of error of collimation were made 46 times; for level and nadir point, 125 times; for flexure of telescope and runs of microscopes, 45 times. All the R. A. observations are reduced up to the present date, and those for North P. Distances up to the 22nd October 1871.

A General Catalogue for 1870, containing the results of all the transit work at this Observatory, is now in process of preparation by Mr. White. This is a most laborious and tedious work; it is, nevertheless, well advanced, and will be complete after the computation of about five hundred more of the reduction constants and proper motions.

The observation of the Melbourne zones of the southern survey have been stopped, as they were getting far ahead of the reductions. The computing power in the Observatory is, I find, insufficient to keep pace with the regular zone observing. The present state of this work is as follows:—

Total number of stars observed	48,672
Number reduced	36,917

In order to gain experience in celestial photography, Mr. Moerlin commenced photo-heliography in October with the five-inch equatorial, and achieved very fair success; the Eclipse Expedition, however, interrupted the work, and left so much in arrears on the return of our party that he has not been able to resume this work.

The work upon which the Great Telescope has been engaged comprises further measures and drawings of  $\eta$  Argus, observations of Sirius and companions, of Saturn, Antares, Venus, H 3722, 30 Doradus, Jupiter, Orion, Rigel, Achenar, and  $\alpha$  Argus. These include drawings, revisions, and spectroscopic observations. Mr. MacGeorge has also taken every favorable opportunity for scrutinising the moon's surface, for revision of the lunar maps of the British Association Committee.

The meteorological and magnetical observations have been regularly carried on without any notable change of method. The photographic records of the several self-registering instruments are complete up to date. The observations for determination of the absolute force of terrestrial magnetism have also been



obtained every month as usual (November and December excepted). The tabulation and reduction of meteorological observations made at the Observatory and at the country stations are complete, including the tabulation of the anemograph records.

I regret to say that the tabulation of the photographic curves is not in so forward a state as could be desired. No tabulation has been done since the last visitation of the Board. This, however, need not be regarded as a matter of great importance, as it is work that can be done at any time with a little extra simple clerical aid. This fact, however, in connection with one or two others already referred to, shows that the establishment is short-handed for the work undertaken, and it will become a matter for consideration whether the observations should be curtailed or more assistance asked for.

#### PUBLICATION.

The material for volume iv. of the Melbourne Astronomical Observations is now in the press. In my last Report I referred to the difficulty I had with reference to dealing with the meteorological observations, and stated that I was of opinion that the issue of a monthly or quarterly record of the results of our observations in meteorology and magnetism in a form likely to be useful to the public, while it contained a full scientific record for after-reference, would be the best course to adopt. I subsequently asked and obtained authority from the Honorable the Chief Secretary (Mr. Duffy) to carry this into effect, and the numbers for January and February of this year have already been published. The form adopted is open to modification or addition, should any appear desirable, and I beg to invite any suggestions from the members of the Board with respect to this point.

I have not decided upon the best method of printing the drawings of nebulae and other objects made with the Great Telescope by Mr. MacGeorge. Black ground prints would undoubtedly be the best if a satisfactory and economical mode of producing them could be found. Several methods have been tried for reproducing them on a white ground by means of finely ruled or stippled copper; it gives a very satisfactory effect, but would be a somewhat expensive process. It is intended to try to make the original drawings in some dead black like black crayon. They would then, I believe, copy well by the ordinary photographic process; but, as the matter stands at present, the want of some satisfactory and economical plan for printing these drawings for publication still exists.

At the conclusion of my last Report I stated that a proposition had been made at the Royal Society of Victoria to fit out an expedition to observe the total eclipse of 11th December 1871, in the north of Australia. This proposition was eventually carried out, and I was instructed by the Honorable the Chief Secretary (Mr. Duffy) to organize and equip an observing party from this Observatory to accompany the expedition with a view of obtaining the desired observations. I accordingly had all the available and requisite instruments and appliances prepared for the work. The 5-foot equatorial was fitted to a portable stand, telescopes were mounted equatorially, photographic and spectroscopic apparatus were fitted for the purpose, and, moreover, special instruments and photographic apparatus adapted for the occasion, which had been forwarded by the Eclipse Committee of the British Association, arrived in good time to supply many deficiencies. To cover all the required observations, it was necessary to take Mr. White, Mr. Moerlin, and Mr. MacGeorge in the observing party, the charge of the establishment and the work being left to Mr. Gilbert. The expedition started from Melbourne on 23rd November, reached Eclipse Island on 7th December—five days before the eclipse. As is now well known, the weather was so bad as to prevent a single observation of any value being made, and the expedition left Eclipse Island on the 12th December, reached Sydney on the 25th, and Melbourne the 1st January 1872. The instruments taken on the expedition were found on our return to have suffered no damage whatever. Those sent out from England are packed up ready for sending back; but I am waiting for a reply to a proposition I made to purchase some which will be useful to the Observatory.

The arrangement hitherto made of admitting visitors to view the moon and planets on certain nights each month has been largely availed of; it interferes very considerably with the work, however, and the number of nights allotted will now have to be curtailed to admit of lunar photography being satisfactorily carried on.

ROBT. L. J. ELLERY,  
Government Astronomer.

Melbourne Observatory,  
18th April 1872.