

1909.

VICTORIA

## FORTY-SECOND REPORT

OF THE

BOARD OF VISITORS

TO

THE OBSERVATORY;

TOGETHER WITH THE

REPORT OF THE GOVERNMENT ASTRONOMER

FOR THE PERIOD FROM 1<sup>ST</sup> MAY, 1908, TO 31<sup>ST</sup> MAY, 1909.

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

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In Authority :

J. KEMP, GOVERNMENT PRINTER, MELBOURNE.



## FORTY-SECOND REPORT OF THE BOARD OF VISITORS TO THE OBSERVATORY.

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*To HIS EXCELLENCY SIR THOMAS DAVID GIBSON-CARMICHAEL, Baronet,  
Knight Commander of the Most Distinguished Order of Saint Michael  
and Saint George; Governor of the State of Victoria and its  
Dependencies in the Commonwealth of Australia, &c., &c., &c.*

We have the honour to inform Your Excellency that we made our annual visitation to the Melbourne Observatory on 10th June, 1909, and received the report of the Government Astronomer, which is appended.

From this report, and from other sources of information, we have ample evidence that the special as well as the routine duties of the Observatory in all its Departments have been efficiently carried out, and that the instruments and apparatus are in good condition and well cared for.

We are pleased to report that the officers who were appointed last year to fill the vacancies on the staff have already thoroughly justified their appointment, and, as a result, that the Observatory is now, as far as its staff is concerned, in a better condition than it has been for many years in the past.

One of the public services rendered by the Observatory is the standardization of weights and measures. This generally involves adjustment as well as verification, but in the Weights and Measures Act there is a schedule of charges for verification only. Adjustment is, in many cases, both tedious and expensive, and we recommend that the Act be amended by the addition of a schedule of charges for the adjustment of balances, weights, measures, &c., so that a fair charge may be made by the Observatory for services rendered.

The Observatory supplies correct time to the Postal Department, which is distributed to all the post-offices in the State. In addition, the Commonwealth makes some revenue by supplying this time to private individuals. We think that the Observatory is entitled to receive some return for this service, and we therefore recommend that a departmental inquiry be made into the existing arrangement between the Commonwealth and the Observatory in regard to the time service.

We wish to draw Your Excellency's special attention to the following matter, which seriously affects the usefulness and the reputation of the Observatory:—

Prior to 1895 the more important results obtained by the Observatory were regularly published by authority of the Government. In 1895, owing to retrenchment, the publication of all Astronomical work was stopped and, up to the present, has not been begun again. We have now a great accumulation of valuable scientific matter—Astronomical, Magnetic, and Meteorological, ready for the printer, in the procuring of which a large sum of money has been expended, and which can be of no practical utility until it has been published and distributed.

The unique position of our Observatory as the most southern in the world renders its Astronomical records of special value to Astronomers in other parts of the world, and we urge, for the credit of the State and of the Observatory, that they be made available for distribution as soon as possible.

Apart from the question of publishing the matter that has accumulated during the last fifteen years, we would ask that your Government grant regularly a sum of £300 per annum for the purpose of printing current work in the form of an Observatory Annual, so that at least the amount of unpublished work may not still further accumulate.

A total eclipse of the sun, visible only from the southern parts of Tasmania, will take place on 9th May, 1910. The Astronomical importance of such occasions is well known, but, owing to certain unfavorable conditions, as stated in the last paragraph of the Government Astronomer's Report, European and American Governments are not sending expeditions to observe the eclipse, and rely on Australia, which has not contributed anything to eclipse work since 1871, to take what advantage it can of the opportunity.

All civilized countries have from time to time spent large sums in equipping expeditions for solar eclipse observations, and as on this occasion all the responsibility is thrown on us, we recommend that means and facilities be provided for the Observatory to organize a properly fitted out expedition to observe this eclipse.

In regard to the Observatory itself, we would urge the erection of a plain wooden building, of which the estimated cost is £300, to be used for housing a 12" reflecting telescope, a zenith telescope, and a 6" equatorial.

These instruments have been out of commission for many years, but are at present being overhauled with the intention of using them for important Astrophotographic research work.

Finally, we would again urge the necessity of having the Observatory sewerred. With the present large staff of permanent and temporary officials, some of whom are ladies, the present old-fashioned arrangements are wholly undesirable.

THOMAS R. LYLE, Chairman.

H. J. WRIXON.

A. J. PEACOCK.

J. M. REED.

ALFRED DEAKIN.

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## REPORT ON THE STATE OF THE MELBOURNE OBSERVATORY AND ON THE WORK DONE DURING THE PERIOD 1ST MAY, 1908—31ST MAY, 1909.

*Grounds and Buildings.*—The works done for maintenance and repairs of the buildings and grounds consisted in—

Re-painting the inside walls and ceilings of the Computing room, the upper rooms of the magnet house, the Great Telescope room, and the engine house.

Re-painting and repairing the roof of the Great Telescope house, and the domes of the North Equatorial and Photoheliograph.

Re-painting, repairing, and partly renewing the boundary fences.

Repairing and re-asphalting footpaths and yard of the Lodge.

- Putting in order the long drain leading from the underground rooms of the central buildings into the Domain.

Enlarging the engine house by the addition of a new brick-walled room 14' x 8' for the installation of a 4-kilo Watts Rotary Converter, and other electrical appliances.

*Works still required.*—The sewerage connexions and completion of the lavatories.

Three wooden simple structures to house a 12" reflecting telescope, a zenith telescope, and a 6" equatorial.

*Equipment.*—A rotary converter has been installed for transforming the alternate current supplied by the City Council into direct current. This is to be used in connexion with the arc lamp of a Leitz projecting apparatus, also for the requirements of the workshop and machinery for polishing the mirrors of the great telescope.

A Voigtlander 6" portrait lens, 42" focus; a 4" rapid rectilinear by H. Dallmeyer, 33" focus; and another smaller photographic doublet were purchased.

These are intended for cameras to be attached to existing equatorial mountings, and employed for cometary photography and other Astronomical purposes.

Several minor appliances were obtained for the laboratory and testing rooms; also four small electrical transformers and accessories for regulating the lights employed in telescopic observations.

A 12" Newtonian Reflector; a zenith sector, by Troughton and Simms, constructed in 1860; an equatorial mounting with a 6" telescope, formerly belonging to a P.V. instrument; and a 4" Cooke telescope, which were dismantled many years ago, have been put together again and overhauled. They can now at a very small cost be erected and utilized, if provision can be made for housing them.

The Astrograph telescope and 8" South Equatorial necessitated a few slight repairs, alterations, and adjustment.

A thorough inspection was made of the time-ball apparatus and tide-gauge at Williamstown, and several repairs and adjustments effected. The transit circles, the micrometric measuring machines, and all self-registering instruments were periodically examined, cleaned, adjusted, and kept in good working order.

Some trouble is given on unusually damp days by the sagging of wires in the East Transit circle.

This defect is being minimized by inserting drying material occasionally inside the tube, and by ventilation. It seems inadvisable to re-wire the present diaphragm, as it is hoped that the single movable wire method of registering transits will be applied to this instrument shortly.

The driving of the South Equatorial is not satisfactory at present. An investigation is to be made into the cause of this and other defects at the earliest opportunity.

The mirrors of the great telescope require to be re-polished before this instrument can be employed again for systematic work.

In every other respect the Observatory equipment, including all self-registering instruments, time-keepers, testing apparatus, and machinery is in good working condition.

*The Staff.*—A complete renewal of the Permanent Astronomical Staff took place during the period under review. Mr. W. J. Swan, who for many years filled the position of Assistant Observer and Computer, took his departure from the Observatory on 1st August last to re-enter, at his request, the Department of Lands and Survey, from which he originally came to us.

Applications to fill this vacancy were called for by the Public Service Commissioner early in May, 1908, and Mr. C. J. Merfield, late of the Sydney Observatory, well known for his various works on Gravitational Astronomy, was selected from among a large number of applicants and duly appointed to Class F of the Professional Division. He took up his position at the Observatory on 1st July.

Messrs. J. A. Moroney and G. H. Woodhouse were definitely appointed to the Professional Division of the service in Class I and Class J respectively, on the 14th May, 1908.

Mr. J. M. Baldwin, whose official connexion with the Observatory in his capacity of Chief Assistant dates from 1st June, 1908, as stated in my last report to the Board, reached Melbourne last November, and entered upon his duties immediately after his arrival.

The office cleaner, A. E. Annis, was transferred to the Department of Ports and Harbors on the 14th May, 1908, and was succeeded by A. Chamberlain, who, after a probationary period, was permanently appointed on 10th November last.

The Permanent Staff is now constituted as follows :—

Mr. J. M. Baldwin, M.A., Chief Assistant.  
 Mr. C. J. Merfield, Assistant Observer and Computer.  
 Mr. F. Kemp, Meteorological and Photographic Assistant.  
 Mr. J. J. Mannix, Meteorological and General Assistant.  
 Mr. J. A. Moroney, Junior Assistant Observer and Computer.  
 Mr. G. H. Woodhouse, Junior Assistant Observer and Computer.  
 Miss C. E. F. Peel, Assistant Astronomical Computer.  
 Mr. T. R. Sorrell, Clerk.  
 Mr. J. Byrne, Senior Messenger and Mechanical Attendant.  
 Mr. A. Chamberlain, Office Cleaner.

*Duties of the Permanent Staff.*—Mr. Baldwin shares with me the general supervision of all Observatory work; has special charge of the equatorial telescopes, including the astrograph, and the operations of the Measuring Bureau, in which he is assisted by Mr. Johns.

Mr. Merfield has charge of the Transit circles, the time service, and reduction of observations, including the preparation of star catalogues and all other computations and investigations in connexion therewith. He is assisted by Messrs. Moroney, Woodhouse, and, occasionally, Sorrell and Laurence.

Mr. Moroney takes part in meridian observations and their reductions under Mr. Merfield; assists in the daily time service; has charge of the library, and supervizes the reduction of magnetic records.\*

Mr. Woodhouse takes part in meridian observations, computations, and time service under Mr. Merfield.

Mr. Kemp attends daily to self-registering instruments, including the magnetographs and the seismograph; has charge of the dark room and of photographic material, and develops all photographic records; makes meteorological observations twice daily and tabulates them.

Mr. Mannix deals with accounts and ordinary correspondence; prepares all departmental returns; has charge of stores; attends to self-registering instruments in the absence of Mr. Kemp; makes meteorological observations; and acts as Caretaker.

Mr. Sorrell assists in computations and clerical work generally.

Miss Peel acts as the Senior Assistant in the Astrophotographic Measuring Bureau, and her duties are solely in connexion with the measurement of photographic plates.

Mr. Byrne attends to the cleaning of Astronomical instruments and apparatus; also to various duties in connexion with the verification of standard weights and measures, the care of Observatory buildings and instrumental equipment generally.

Mr. Chamberlain attends to the general cleaning of observing rooms and offices, and junior messenger's duties.

*Temporary Staff.*—The following changes took place since the date of my last report :—

In the Astrophotographic Bureau Miss E. Hockin, Miss V. Noonan, and Miss I. Trigge resigned on the 2nd February, 14th April, and 15th May respectively. Miss E. Hockin rejoined the Bureau on 10th May. Extended leave of absence, through sickness, was granted to Miss Peel and Miss Alexander, amounting to six weeks in the former and two months in the latter case.

An examination of applicants for these vacant positions was held at the Observatory on 18th March last, but, unfortunately, none of the candidates were successful. I am experiencing considerable difficulty at present in finding suitable persons for the work of the Bureau.

In the Magnetic Staff Messrs. A. D. Turner and E. Macdonald resigned on their appointment to permanent positions in the Public Service of the Commonwealth and of the State on 22nd September and 13th October respectively. These two vacancies and another which occurred previously through the resignation of Mr. W. D. F. Brunner (reported last year) were filled by the appointment of Messrs. H. E. Goble, W. H. Cove, and R. H. Fyfe on the 5th of January last.

The Temporary Staff is now composed as follows :—

*Astrophotographic Measuring Bureau.*

Miss E. Sheldon,  
 Miss E. Hockin,  
 Miss A. Alexander,

Miss M. A. Heagney,  
 Miss H. M. Browne.

*Magnetic Staff.*

Mr. W. Chitty,  
 Mr. H. E. Goble,

Mr. W. H. Cove,  
 Mr. R. H. Fyfe.

Mr. G. F. Johns, Assistant Astrophotographic Observer and Computer.

Mr. G. Sangster, employed on clerical duties.

Mr. C. M. Otto, instrument maker, in charge of the workshop.

In addition, Mr. H. J. R. Laurence is occasionally employed in Astronomical computations.

Mr. R. Vaughan attends daily to the time-ball and tide-gauge at Williamstown.

A gardener and a charwoman have also been employed as usual.

The routine duties of the Temporary Staff may be briefly summarized as follows :—

The ladies of the Measuring Bureau attend to the measurement of the Astrophotographic plates.

The Magnetic Staff is engaged in preparing for publication the long series of magnetic records of the last 40 years.

Mr. Johns assists Mr. Baldwin in the observations with the astrograph and in computations related to the Astrophotographic Zones of Sydney and Melbourne.

Mr. Sangster assists in library duties, tabulation of records, and clerical work.

Mr. Laurence is engaged at irregular intervals in computations for the 1900 Star Catalogue.

Mr. Otto has charge of the workshop, adjusts weights, measures of capacity and balances, and does all instrumental work required.

*Meridian Work.*—The observations shown in the following table were made with the 8" transit circle by Troughton and Simms:—

Objects Observed.					No. of Observations in—	
					R.A.	N.P.D.
Clock stars	...	...	...	...	851	230
Azimuth stars	...	...	...	...	538	264
List stars	...	...	...	...	1,044	1,041
Anonymous, do.	...	...	...	...	20	20
Jupiter	...	...	...	...	4	4
Neptune	...	...	...	...	2	2
♄ Antliae	...	...	...	...	10	3
Total	...	...	...	...	2,469	1,564

Observations for instrumental errors—

Collimation	...	...	...	264
Level	...	...	...	180
Nadir	...	...	...	137
Runs	...	...	...	81
Flexure	...	...	...	21

266 stars were also observed on various dates in day-time for clock error as occasion required.

The list stars were selected from the plates of the Astrophotographic Catalogue to be used as standard reference stars for the determination of plate constants.

The total number of stars in this list is 7,500, of which 7,112 have been observed at least three times; 85 twice, 77 once, and only 226 still remain to be observed three times in order to complete the work.

Mr. Merfield states—"Observations of the clock star  $\epsilon$  Antliae indicate that the position published in the British Nautical Almanac is erroneous. My observations confirm the position as given in the Fundamental Lists of Auwers."

Some 430 stars were observed for determining the relative personal equation of the observers, Messrs. Merfield, Moroney, and Woodhouse.

A series of observations had been previously carried out during the month of July for determining the personal equation between Messrs. Merfield and Swan, in order to bring the past and present meridian observations to a common standard.

The 5" West Transit circle is not used for systematic work at present, but the instrumental errors have been determined periodically, and 50 observations of clock stars and 98 of circumpolar stars were obtained.

The Annual Catalogue for 1907 has been prepared, and that for the year 1908 will be completed before the end of next August.

The reductions of current observations are well in hand.

*Astrophotographic Work.*—The astrograph was employed by Mr. Baldwin for experimental work with various small cameras temporarily attached to it, and for the determination of instrumental errors and adjustment; also for photographing comet Morehouse and some special fields in connexion with observations of variable stars, to be referred to later. A series of 100 photographs of this comet was obtained by him and by Mr. Johns on 46 nights between 26th January and 16th April. It was not found practicable to advance the duplicate series of catalogue plates nor to complete the triple exposure chart series, but of these latter only a small number of scattered regions remain to be taken, and will probably be dealt with in the course of the current year.

*Measurement of Photographic Plates of the Melbourne and Sydney Zones.*—This work has been continued by the special Bureau under conditions similar in all respects to those reported in previous years.

114 Sydney plates, containing 49,651 stars, and 311 Melbourne plates, containing 84,159 stars, were measured in the direct and reverse position as usual.

Only 45 plates of the Melbourne zones, and about one-half of the total number of plates comprising the Sydney zones, now remain to be measured.

An investigation of the formulæ hitherto employed at various observatories for the determination of plate constants was carried out by the Chief Assistant with the object of finding the most suitable method to be adopted for the Melbourne zones. He afterwards prepared, with the assistance of one of the junior computers, a number of tables and curves, intended to facilitate the reduction.

The form of publication was also discussed and decided upon. This last stage of the photographic catalogue is now being dealt with, and the printing of the work can be commenced as soon as authority is obtained.

*Other Astronomical Work.*—The 8" South Equatorial was employed by Mr. Baldwin for re-determining the screw-value and intervals of the Dark field filar micrometer and other instrumental constants and adjustments.

A series of positions of Comet 1908 c (Morehouse), based on some 500 comparisons of the comet with known stars, was obtained by Mr. Merfield with this instrument between the dates 6th February and 17th April, 1909.

The  $4\frac{1}{2}$ " North Equatorial was placed at the disposal of Mr. R. J. A. Barnard, M.A., of Ormond College, Melbourne University, for the observation of variable stars, and several fields were photographed with the astrograph to facilitate his observations. Mr. Barnard has been for a long time deeply interested in this class of work, and deserves every encouragement and assistance we can give him, so far as circumstances permit.

A discussion of methods for determining division errors of a meridian circle and the preparation of a scheme which seems the most suitable for this purpose in regard to the Melbourne instrument was undertaken and completed by the Chief Assistant.

*Time Service.*—The time-ball at Williamstown was dropped at 1h. 0m. 0s. Victorian statute time (10h. 0m. 0s. in advance of Greenwich mean time) on 330 days. It failed on two occasions through faults on the lines outside the Observatory. Time signals were supplied daily (Sundays excepted) to all telegraph stations in the State. The clock of the General Post-office was compared daily on the Observatory chronograph and its error published on the following day in the Melbourne papers. The principal Railway clock at Spencer-street station and other public clocks have been maintained under continuous electric control from the Observatory. The usual private firms in town have been daily supplied with clock signals.

*Terrestrial Magnetism.*—The Kew pattern magnetographs have been kept in continuous action, excepting an interruption of 27 hours owing to failure of the gaslight. In the reduction of magnetic records the computations of the monthly means of hourly variation deduced from the measures of hourly ordinates, have been completed in respect of the two elements horizontal and vertical components to the end of the year 1883. The results for declination are up to date.

*Seismology.*—The Milne Horizontal Pendulum has supplied a continuous record, the breaks being limited to the time required for winding and changing the sensitive paper on each Friday morning.

The records of the period show the occurrence of 115 slight earth tremors and 34 distinct shocks, 11 of which appear to belong to the class of violent earthquakes. The disastrous Sicilian earthquake of December, 1908, is amongst the latter. Thirteen of the recorded shocks were felt within the State, one in New South Wales, one in South Australia, and three in New Zealand, all of which were probably of local origin. Twelve other records seem to correspond to violent earthquakes reported by cable from various parts of the world.

*Weights and Measures.*—The operations in this Department consisted in the verification and adjustment of legal authorized copies of standard weights and measures issued by the Government to municipalities and the adjustment of balances for the Department of Customs. Complete sets of standards were re-issued after verification and adjustment to the municipalities of St. Kilda, Prahran, Williamstown, Stawell, Ballarat East, Ballarat City, Kingston, Geelong, Daylesford, Maldon, Richmond, Beechworth, Castlemaine, Fitzroy, St. Arnaud, Malvern, Ararat, Maryborough, Colac, City of Melbourne, Eaglehawk, Mildura, Avoca, Creswick, Dunmunkle, Wangaratta, and Buninyong. Two new municipalities, namely, Shire of Shepparton and Shire of Camperdown, were supplied with full sets of standards. This work comprises the verification and adjustment of—

959 weights ranging from 56 lbs. Avoir, to 1 grain.  
286 measures of capacity from 1 bushel to half ( $\frac{1}{2}$ ) gill.  
27 measures of length.  
36 balances.

*Testing of Instruments.*—The duty of rating chronometers for the shipping, testing air-meters for the Inspectors of Mines, and verifying nautical, meteorological, and surveying instruments for the public, was carried out as usual.

*Tides.*—The registration of tides at Point Gellibrand has been continued uninterruptedly by means of the self-registering tide-gauge.

Regular returns of tide observations were supplied by the tide stations at Geelong, Point Lonsdale, and South Channel Pile Light.

It is intended to erect a self-registering tide-gauge at Point Lonsdale as soon as a shelter for the instrument is provided by the Department of Ports and Harbors.

*Library.*—The additions to the Library are as follows:—

Presented—376 volumes,  
57 periodicals,  
126 pamphlets.  
Purchased — 51 volumes,  
18 periodicals.

494 astrographic charts, presented by the following Observatories:—

Greenwich Observatory	...	...	222
Paris	„	...	44
Algiers	„	...	50
Bordeaux	„	...	23
Toulouse	„	...	26
San Fernando	„	...	64
Tacubaya	„	...	65
Total	...	...	494

Also one copy of the 10th Fascicule of the "Atlas Photographique de la Lune," published and presented by the Paris Observatory.

Four volumes were bound at the Government Printer's Office.

The pamphlets are now all classified according to subject, and placed in the shelves specially prepared for them.



A list of additions and alterations required to be made in the "Catalogue of the Scientific and Technical Periodical Literature in the Libraries in Melbourne" in respect to the Melbourne Observatory to 1st August, 1908, was furnished to the Editor, Dr. Hall.

*Visitors.*—Two hundred and ninety-five visitors were shown over the Observatory in day-time, and 152 at night.

The many changes in the Observatory staff which have occurred during the period covered by this report, and more especially the renewal of all the Astronomical Assistants have necessarily involved considerable expenditure of time in training and organizing, but the work done shows that fair progress has been made under the circumstances, and I have every reason to be gratified with the efficiency of the whole staff. The new officers are interested and enthusiastic in their astronomical work, and much may be expected from them in the future. The appointment of a Chief Assistant has made it possible to insure a proper supervision over the varied duties of this branch of the Public Service, and a better management of it.

The most pressing need of the Observatory is now the publication of our astronomical, meteorological and magnetic records, a great mass of which has for a long time been ready for the printer. This question is becoming more serious and embarrassing every year, and requires immediate consideration.

The fifth conference of the Permanent Committee of the Photographic Chart of the Heavens was held at Paris last April, to which I was invited by the President of the Committee. The desire that this Observatory should be represented at the conference was expressed from other astronomical quarters in England, and a formal request to that effect was made by the Colonial Office to the State Government, but it was found inexpedient to accept the invitation.

A total eclipse of the sun will take place in the late afternoon of 9th May, 1910, and the only accessible region of the globe from which it can be seen is the southern part of Tasmania. It must be admitted that the usually unfavorable weather conditions at that locality in the late autumn, and the low altitude of the sun at the time of totality, render the prospect of obtaining good and valuable observations of the eclipse very uncertain. It is, probably, for this reason that no official parties will be sent out either from Great Britain or America on the occasion. This circumstance, however, makes it all the more incumbent upon us in Australia to take full advantage of the opportunity offered by such an important astronomical event. The Joint Eclipse Committee of the Royal Society and Royal Astronomical Society of London have offered to assist us with the loan of special instruments and advice. I hope the Board will recognise the importance of urging the State Government to provide facilities and means to enable me to organize an expedition from this Observatory to go to Tasmania next year to observe the eclipse.

Melbourne Observatory,  
June, 1909.

P. BARACCHI.