

1884.
—
VICTORIA.

NINETEENTH REPORT

OF THE

BOARD OF VISITORS

TO

THE OBSERVATORY;

TOGETHER WITH THE

Annual Report of the Government Astronomer.

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

By Authority:
JOHN FERRES, GOVERNMENT PRINTER, MELBOURNE.

NINETEENTH REPORT

OF THE

BOARD OF VISITORS TO THE OBSERVATORY.

TO HIS EXCELLENCY SIR HENRY BROUGHAM LOCH, *Knight Commander of the Most Honorable Order of the Bath, Governor and Commander-in-Chief in and over the Colony of Victoria and its Dependencies, &c., &c., &c.*

We have the honour to submit to Your Excellency our Nineteenth Report upon the Melbourne Observatory, to which we made our annual visitation on the twelfth instant.

The erection of the new Transit Circle was completed on the seventh of July, and it will soon be ready to take the place of the old instrument. It affords us much satisfaction that by the liberality of the Government and Legislature the Observatory has been furnished with an instrument of the most recent and approved design, of admirable workmanship, and fit in all respects for the highest class of work.

The Great Telescope is undergoing some repairs and adjustments, which its constant use for many years has rendered necessary. The Astronomer agrees with us in thinking that it would be prudent to send one of the two specula to England to be repolished, and that upon its return the other should be sent to the maker for the same purpose. Mr. Ellery is conducting some investigations to determine the best method of reproducing the results of observations made with this instrument, and he hopes to succeed in obtaining a great improvement upon the present plan.

We concur in the view that the form in which the meteorological results are published might be altered with advantage. If the statements were condensed, as the Astronomer proposes, not only would much labour be saved, but the facts would appear more clearly to the public.

The weather forecasts, which used to be limited to the southern parts of the colony and the Straits, have been extended to the northern districts, by direction of the Government, and two, one for the southern and one for the northern division of Victoria, are now published daily.

A system has been organized for announcing astronomical discoveries in all parts of the world by telegraph. The central bureau is at Kiel, and the Melbourne Observatory has been chosen as the central station for Australasia.

We beg to recommend that a small party be despatched to observe the next eclipse of the sun, which will be visible in New Zealand, on the 9th of September, 1885, and to support Mr. Ellery's application for the necessary provision.

We are glad to find that the subject of observing and measuring the effects of earthquakes is engaging the attention of the Observatory, and we expect that the Astronomer will shortly be able to obtain accurate and interesting observations of these phenomena.

In the course of our inspection of the instruments and appliances of the Observatory—which we found in excellent order—it appeared to us that many of the difficulties experienced in astronomical observing from the heated air arising from the use of gas for the necessary illumination could be obviated, and the work generally

facilitated, if, instead of gas, electric incandescent lamps were used about the instruments and observing rooms. A small gas-engine and a dynamo machine, which could be obtained at a very small cost, would suffice, and having ascertained that Mr. Ellery shares our opinion, we strongly recommend the proposal to the acceptance of the Government.

We also advise that the Observatory buildings be painted or coloured inside, and that the new transit room be painted outside. The internal walls of the main building have not been touched since they were built, twenty-one years ago, and the external walls of the new portion need painting to protect the cement from the weather. Some repairs are greatly needed at the quarters of the Government Astronomer, and an additional room is necessary to give him the accommodation he requires, and which we have satisfied ourselves is indispensable to his convenience. We shall be glad if the very moderate sum which this would cost can be provided during the present financial year.

GEORGE VERDON, F.R.S., Chairman,
JAMES MOORE, M.A.,
G. V. SMITH,
F. STANLEY DOBSON, LL.D., M.A.,
M. H. IRVING, M.A.,
W. C. KERNOT, M.A.,
J. E. BROMBY, Hony. Secy.

REPORT OF THE GOVERNMENT ASTRONOMER TO THE BOARD OF VISITORS TO THE OBSERVATORY.

August, 1884.

THE Report I have now the honour to submit to the Board of Visitors refers to the year commencing June 30th, 1883, and ending 30th June, 1884.

I regret I have to inform you of the loss, by death, of one of the staff. Our third assistant, Mr. Joseph Turner, who had charge of the work with the great telescope, died on August 25th last year, after a brief illness.

Mr. Turner had been ten years and a half in the position he held, and was always a most diligent, painstaking observer. He did a large amount of valuable work with the large telescope, which will honorably associate his name with this Observatory and the Melbourne revision of the Southern Nebulæ. The vacancy thus created was filled by Mr. Pietro Baracchi, of whom I spoke in my last report (page 9), as the gentleman who so satisfactorily carried out the longitude determinations between Port Darwin, Singapore, Adelaide, and Melbourne, in January and February, 1883.

The chief assistant, Mr. E. J. White, who had been absent in Europe on a year's leave, returned in April last much benefited by his holiday.

The new transit circle arrived on 22nd May last, and its erection in the new transit room was at once commenced.

I.—PERSONAL ESTABLISHMENT.

The permanent staff is now as follows:—

Mr. ELLERY, Director, Government Astronomer;
Mr. WHITE, Chief Assistant;
Mr. MOERLIN, Assistant;
Mr. GILBERT, ,"
Mr. BARACCHI, ,"
Mr. PRINGLE, ,"
J. BURLEY, Messenger.

There are also three unclassified assistants, Messrs. Kemp, Ingamells, and Hauser, engaged in the meteorological and intercolonial weather service work, as well as a mechanic and a workman in connexion with the great telescope.

Keeping the grounds in order gives almost constant occupation to one labourer, and I have had to ask for provision on this year's estimates to meet this requirement.

There has been no change of importance in the distribution of duties during the year, except temporarily in consequence of Mr. White's absence, and of the death of Mr. Turner. Mr. Baracchi succeeds Mr. Turner in charge of the great telescope.

II.—GROUNDS AND BUILDINGS.

I have been able to continue the gradual improvement of the Observatory grounds, but, owing to building operations in connexion with the new transit room for several months of the year, there has not been so much done in that direction as I had hoped to accomplish. Two new shrubberies, between the main building and the large telescope house, have been formed and planted, new paths formed, and old useless ones grassed over.

The buildings generally are in good repair, but the interior of the main building urgently requires renovation. I have made provision on our estimates for the cost, and I hope to get the work done within the next few months.

The erection of the new transit room, which was in progress at the date of my last report, was finished in December last, but a few alterations and additions, chiefly to the roof and shutters, were afterwards found necessary, and completed a few weeks ago.

The dome of the north equatorial, which I reported last August under alteration and repair, was completed in September, and has worked most satisfactorily since.

The great telescope house is in good order, and the roof has worked easily and well since the repairs two years ago.

III.—INSTRUMENTS.

Astronomical Instruments.—The new transit circle of 8-inch aperture arrived in excellent order in May last, and the mounting was commenced forthwith. This was a somewhat tedious operation, but was satisfactorily completed on 7th July. At the present time it is quite ready for work, and we are only waiting the completion of some steps, platforms, and observing chairs to commence using it for our ordinary meridian observing.

The instrument is a fine specimen of Troughton and Simms' well-known skill in the construction of astronomical instruments of this class, and is very similar in form and dimensions to those constructed by the same firm for the Cambridge Observatory in England, as well as for the Cambridge Observatory of Boston, U. S., America. The telescope has an aperture of 8 inches, and focal length of 108 inches, axis 52 inches long, and steel pivots of $4\frac{1}{2}$ inches diameter. The pivot bearings are carried on two short iron pillars, resting on massive stone piers, which rise about 5 feet above the floor. The axis carries two divided circles, one on each side of the telescope, of which one is fixed, the other movable about the axis. The circles—3 feet in diameter—are read by a reading telescope and four microscopes carried on gun metal circles, attached to the short iron pillars already mentioned. The instrument is constructed throughout with a view to great stability.

The form of axis of this instrument differs considerably from others of this class, and is an innovation designed to obviate the troublesome flexure of the axis to which large transit instruments are often subject. Instead of the casting forming the axis being in the form of two cones, with a central cube as usual, it takes the form of two cones united by a cylinder, crossed by another cylinder for carrying the eye and object ends of the telescope. The introduction of this form gave rise to many unexpected difficulties to the maker, and delayed the completion of the instrument for a year. Mr. Simms informs me, however, that ultimately he found the result very satisfactory. As no observations for flexure in any direction have yet been made, I cannot say whether this form possesses the greater rigidity expected of it or not. So far as I can at present form an opinion, I think we possess a splendid transit instrument, fit for the highest class meridian work. The collimators, which rest on piers at the north and south ends of the transit room, have objectives of 6 inches diameter, and are reciprocally visible through a perforation of the same aperture in the central part of the axis of the transit instrument.

The arrangements for illumination of the circles and telescope are well designed and very effective, one source of light opposite either axis giving illumination to the four microscopes and reader of the circle, as well as bright or dark field illumination for the telescope micrometer wires.

The old transit circle is still doing duty, and producing good work; the pivots, however, are showing serious signs of wear, and have become very ridgy. As we do not reverse this instrument, this does not yet, however, appear in any way to injuriously affect the results.

The great telescope has had a thorough overhaul, and the mirrors have been carefully cleaned, and are now in better condition than at the date of the last visitation. It is found that the north end of the polar axis has sunk a little—producing an error in declination of about 40 minutes—owing to a gradual slipping down of the bearing on the inclined plane of the north pier. I am making arrangements to get the bearing raised by hydraulic pressure. With this exception, the telescope is in good working order.

The south and north equatorials are also in good condition; the improvements and additions to the former (described in my last report) have proved by use to be highly satisfactory. Observing with the small north equatorial is found much more convenient and comfortable since the mechanism of the dome was altered and the floor raised, and so disposing of the old movable platform.

The photoheliograph continues to work well. I ordered, some time since, a new secondary magnifier, in order to increase our sun-pictures from $3\frac{1}{2}$ to 8 inches, as is being done at Greenwich and Kew, but I have not yet received it from the makers.

The various clocks and chronographs are in good order, and performing well. A new barrel chronograph, with parabolic pendulum, has been constructed in our workshop. It is a little different from the others in some respects, inasmuch as the magnet and pen carriage moves by means of a screw on a slide at the back of the barrel, instead of in front, as heretofore. A change gear is supplied to the driving clock, so that the barrel can be made to revolve in either 30 or 60 seconds, as desired. The pen is a simple form of ruling-pen, with reservoir, which works admirably. This is for use with the new transit circle, and is placed in the transit room. The clock (Frodsham No. 84), until lately in the library, has been moved to the new transit room.

Since my last report I have received from Mr. Hillger, the well-known London optician, a Pritchard's dark wedge photometer, but, owing to pressure of other work, no systematic use of it has yet been commenced.

A cathetometer, for barometer testing, was received from Troughton and Simms in May last.

Magnetic and Meteorological Instruments.—These remain the same as at the time of my last report. The self-registering instruments continue to work well and satisfactorily, and the superiority of Morgan and Kidd's argento-bromide paper, in place of the old Talbot type process formerly used, is now beyond a doubt. The saving of time and other great advantages mark the adoption of this kind of paper for our photographic registration as a decided progress in the method.

The magnetographs were all carefully examined and cleaned in February last.

The erection of the new transit room has brought the main building rather too close to our thermometer shed (45 feet), and I intend to have the latter removed to a site in the S.E. portion of the grounds at an early date.

IV.—THE LIBRARY.

The increase to our library during the year by donations is shown in the Appendix. A complete catalogue and catalogue of reference has just been completed.

V.—PUBLICATIONS.

As regards the publication of the Results of Astronomical Work, vol. VI., covering the years 1876 to 1880, is in the press, and expected to be ready for issue in about a week.

The last volume published of the Results of Observations in Meteorology and Terrestrial Magnetism was for 1876, and I have had under consideration the question of whether we cannot still further epitomize and condense this publication. The accumulation of printed meteorological observations is becoming an incubus to every observatory, and the rapid increase of the numbers of these from all parts of the world raises a question as to the utility or value of publishing such observations *in extenso*. My opinion has for a long time been that all purposes would be better served by each observatory keeping its own original records, and publishing only carefully arranged abstracts and condensed results, which would most easily and rapidly answer most of the inquiries and investigations likely to be made, and present in a convenient and compact form all the most useful and generally required meteorological, climatic, and other physical statistics. This would result in a great saving of expense in publication, in exchange, in library space, and, above all, in greater utility to science and to the public generally. I propose, therefore, to issue the "results" without any of the mere meteorological observations, which now, for the most part, appear in the monthly record, and to confine them to carefully prepared meteorological and physical statistics, in the form of abstracts, means, averages, &c.

The monthly record of meteorology and terrestrial magnetism has been published up to March, 1884, and the MSS. up to May are in the printer's hands.

I am glad to report that the publication of the results obtained with the great telescope is now actually in progress, and the first part in the printer's hands. I reported, on a former occasion that we had reproduced a considerable number of the drawings of the nebulae by lithography—nebulae and stars *white* on a *black* sky—and that although these were as good as the process seemed to admit of, I was not satisfied that it was the best method. Without waiting however for the selection of a better way, it is thought desirable to publish those that are printed, which if not of the highest class artistically considered, are at all events faithful and clear pictures of the appearances of the bodies they represent; and in the meantime experiments are in progress with the view of finding some method by which the drawings can be reproduced more economically and artistically.

VI.—THE WORK OF THE OBSERVATORY.

Transit Circle Observations.—In view of the expected arrival of our new transit circle but very little fresh meridian work was entered upon during the past year. The usual routine observations for time and position of instrument were continued. The observing list however was enlarged by the addition of a number of stars, selected by Dr. Auwers, of Berlin, to assist in the formation of a fundamental catalogue of southern stars, and most of them observed three times in both R.A. and declination.

The number of observations with the transit circle of the different kinds are as follows:—

Right Ascension Observations	...	...	...	2,146
Polar Distance ditto	...	...	...	1,253
Observations for Instrumental Errors, viz.:—				
Collimation	...	...	...	165
Level	...	...	...	161
Nadir	...	...	...	161
For Runs of Microscopes	...	...	...	50
For Flexure of Telescope	...	...	...	13

All the right ascensions are finally reduced, and 1,091 of the polar distances are reduced to mean places, and 162 to apparent places.

Work with the Great Telescope.—In consequence of the failing health of the observer, Mr. J. Turner, and his subsequent death, in August last, the telescope was not so actively engaged last year as usual, until Mr. Baracchi had become familiar with its use, and obtained some experience in nebula drawing.

The work done comprises observation and drawing by Mr. Turner of Herschel's Nebulae Nos. 4296, 4378, 4382, 4476, 4477, 4478. He recorded a new but faint nebula found during his observations of the 3rd August, 1883.

Mr. Baracchi's observations commenced in October, and include observation and drawing of Herschel's Nos. 183, 187, 1352, 1353, 964, 966, 968, 979, and examination of 31 of the small nebulae, already observed and drawn by our previous observers, for the purpose of a final revision before publication. Mr. Baracchi also made complete new drawings of the nebulae of η Argus, 30 Doradus, and the Horseshoe or Sickle nebulae.

The telescope was used for observations of Pons' comet during the last part of its apparition.

A complete investigation of the value of the instrumental constants, value of screws, micrometers, &c., was also made in April and May.

The Photoheliograph has furnished 178 sun-pictures during the year.

Special and Occasional Observations.—There has been no special work of more than ordinary interest to claim our attention during the year. In January Pons' comet, rediscovered in America some time previously, came within reach of southern observatories, and we had it under measurement from January 6th till March 18th, when it became too faint for further observation. A comet

was found in the same month by an amateur astronomer, Mr. D. Ross, while searching for *Pons comet*. This turned out to be a new one, and it was named after the discoverer "Ross' comet." This body was only visible in the southern hemisphere during its whole apparition. Its orbit was not found to agree with that of any known comet, so it is regarded as a stranger.

Australian Longitudes.—The completion of the telegraphic determination of Australian longitudes is now only waiting a new series of exchanges between Sydney, Adelaide, and Melbourne. New Zealand has been connected with Sydney by a most successful set of time exchanges through the cable. The connexion of Brisbane and Sydney is in progress, and when these and the final exchanges between Melbourne–Sydney and Melbourne–Adelaide are made, it will only remain to connect Western Australia to have the longitudes of all the chief Australian and New Zealand cities and ports determined upon the same basis.

Meteorology and Terrestrial Magnetism.—This part of the work has been carried out as hitherto without much change. Monthly determinations of the absolute force of terrestrial magnetism have been continued, and the magnetographs have furnished unbroken records of variations. All the instruments recording photographically, except the electrograph, have been kept in operation. Regular registration with the electrograph was discontinued, because it appears at present that no object is likely to be gained by continuous records of this kind. The instrument is always ready for eye observation, or for registration, when it may appear desirable to obtain records. The anemograph (Robinson) continues in satisfactory operation, and prolonged experience with the Hagemann vacuum anemograph only confirms the opinion I formerly expressed of the sensitiveness and accuracy of this method of registering the pressure of the wind. The sunshine recorder has supplied us with a register of the hours of sunshine throughout the year.

I have been able to distribute 22 new rain-gauges in various parts of the country during the year, and we now obtain monthly returns from about 186 places. As usual, I meet with ready help and offers of assistance in collecting rain statistics from all parts of the country, but my chief effort is directed to get rain-gauges established in districts at present badly represented in this respect. The various country secondary meteorological stations continue to work satisfactorily, and our records from Portland, Cape Otway, Cape Schanck, Wilson's Promontory, Gabo Island, Echuca, Ballarat, and Sandhurst are complete and regular. From seventeen other stations returns of a less complete character are also regularly received.

Some little time since a request was made to the Chief Secretary that the country press might be supplied with the weather forecasts issued from the Observatory to the town press; the matter was referred to me for compliance if possible. As the forecasts hitherto issued referred chiefly to districts south of the Dividing Range, and as the requirement of a forecast by the country press had reference chiefly to agricultural districts inland, it became necessary to make two forecasts each day, one for the southern, and one for the northern districts. In order to do this, I found it necessary to obtain weather telegrams from Swan Hill, Sandhurst, Charlton, and Benalla, in addition to those already being supplied. In May last, arrangements were completed with the Telegraph Department, and now forecasts for *Victoria South* and *Victoria North* are sent each afternoon to every principal telegraph office in the colony.

Distribution of Time, Time-balls, Post Office Clock, &c.—These continue the same as at the date of my last report, no change having been made. Of the 297 times the ball was hoisted at Williamstown, it was dropped correctly 290 times; of the 7 failures, 6 were due to interruptions on line, and 1 to defect in the time-ball mechanism itself.

The Post Office clock, although it has stopped on two occasions from undiscovered causes, continues to go extremely well.

The Tide-gauge, Williamstown, has supplied us with an unbroken record of the tides of Hobson's Bay throughout the year.

Of the work done gratuitously for the public, I may mention that 26 chronometers and 2 watches have been rated, and 51 aneroids tested, in the twelve months.

VII.—INTERCOLONIAL WEATHER TELEGRAPHY.

The intercolonial weather system improves each year, not only as regards the more perfect representation of Australia by weather telegrams, but also in the completeness of the telegrams themselves and the punctuality of their arrival. This work is a large tax on the several colonial Telegraph Departments, and I must here give my testimony to the great assistance, the readiness, and despatch accorded to us by the officers of the Telegraph Department in this undertaking.

VIII.—GENERAL AND CONCLUSION.

In my last report I referred to the organization of a scheme for astronomical telegrams among the various national observatories, Kiel being chosen the central bureau, and Melbourne the reporting observatory for Australia. The system has been in operation over a year, and works well. We have received from Kiel several telegrams relative to or announcing discovery of comets, and have despatched one announcing discovery of Ross' comet.

The rainfall map published last year met with general approval, and it is gratifying to know that this method of illustrating our annual rainfall is approved of in other quarters, for I have lately received some splendid rain maps of India, in which our mode of showing the grades of rainfall has been most artistically and skilfully followed out. Our map for this year, I expect, will be issued very shortly. It will differ somewhat from the last; with a view of making it cheaper and

more accessible to the public, it is constructed on a smaller scale, but a larger area is included, and it now embraces all the southern portion of Australia and Tasmania.

In arranging for the work of the year, I have not considered any great change necessary. In the first place, the meridian work will now occupy a larger portion of the time of the staff than recently. The revision of the southern nebulae will be proceeded with, and I hope also to commence a series of observations for measurement of magnitudes of the principal southern stars with Pritchard's wedge photometer. Other extra-meridian work will be taken up as occasion arises.

The meteorological, magnetical, and other physical work will be continued as heretofore. As regards sun-pictures, it is probable an 8-inch picture will be substituted for the present one of $3\frac{1}{2}$ inches, so soon as the new secondary magnifier, now expected from home, arrives.

In September next year a total eclipse of the sun will take place. The path of totality lies almost entirely over the South Pacific, New Zealand being the only land on which it will be visible, for the central line passes through Cook's Straits. I do not yet know if any expedition from Europe or America will be sent out to observe it, but I think it desirable we should organize a small observing party for carrying out the necessary physical and other investigations for which this eclipse will present a favorable opportunity. Sir W. Jervois, the Governor of New Zealand, and Doctor Hector have already asked if we intend organizing an observing party, and in case we do so the former has kindly promised all the aid he can render in the matter.

The occurrence of long-continued earthquake disturbances in Tasmania during the past year, and the tendency they have lately exhibited to extend to the southern part of Australia, coupled with the probability that they are indicative of a new centre of seismic action not very far removed from the eastern portion of Bass Straits, suggests the propriety of instituting some seismometer apparatus at our Observatory, and I have now under consideration the question of the form of apparatus best suited for this locality.

ROB. L. J. ELLERY,
Government Astronomer.

Observatory, August 11th, 1884.

APPENDIX.

BOOKS, ETC., PRESENTED TO THE OBSERVATORY.

Title and Author of Book.	By whom Presented.	
Report of the Astronomer Royal to the Board of Visitors of the Royal Observatory, June 2nd, 1883	Greenwich Observatory	England.
Greenwich Magnetical Observations, 1881	Ditto	"
Greenwich Astronomical and Meteorological Observations, 1881	Ditto	"
Greenwich Astronomical Results, 1881	Ditto	"
Corrections to R.A. of Nautical Almanac Stars for 1884, Jan. 1	Ditto	"
Daily Weather Reports: July, 1882, to June, 1883	Meteorological Office	"
Quarterly Weather Reports, Official. Nos. 33, 50, 52	Ditto	"
Hourly Readings, Official. Nos. 51 and 54	Ditto	"
Meteorological Atlas of the British Islands, Official. No. 53	Ditto	"
Sunshine Records of the United Kingdom for 1881, Official. No. 56	Ditto	"
Rainfall Tables of the British Islands for 1866-80. J. G. Symons, F.R.S. Official. No. 47	Ditto	"
Report of 2nd Meeting of the International Meteorological Committee (Official Copy). Non-Official. No. 15	Ditto	"
Memoirs of the Royal Astronomical Society. Vol. 47	Royal Astronomical Society	"
Monthly Notices of the Royal Astronomical Society. Vol. XLIII., No. 7, to XLIV., No. 6	Ditto	"
Report of the Kew Committee for the Year ending October, 1883	Kew Observatory	"
Instructions for the Observation of Phenological Phenomena. 2nd Edition	Meteorological Society	"
Quarterly Journal of the Meteorological Society. Nos. 45-49	Ditto	"
Meteorological Record. Nos. VIII.-XI.	Ditto	"
Report of the 51st Meeting of the British Association for the Advancement of Science, Southampton, 1882	British Association	"
Results of Meteorological and Magnetical Observations, 1882	Stonyhurst College Observatory	"
Report of the Radcliffe Observer to the Board of Trustees, 1883	Radcliffe Observatory, Oxford	"
On the Explanation of certain Weather Prognostics	Hon. R. Abercromby	"
On an instance of Change of Personality and on the Orbit of α Centauri	A. M. W. Downing	"
Report of the Meteorological Commission for 1882	Meteorological Commission	Cape of Good Hope
On the Influence of Magnetism on the Rate of a Chronometer. Dr. Bøeddicke	Dr. Bøeddicke	Ireland
Proceedings of the Philosophical Society of Glasgow	Philosophical Society of Glasgow	Scotland
Meteorological Observations Recorded at Six Stations, January, 1882, to October, 1883. Corrected and reduced	Indian Meteorological Department	India
Report on the Meteorology of India in 1881. H. F. Blandford, F.R.S.	Ditto	"
Report on the Administration of the Meteorological Department of India, 1882-3. H. F. Blandford, F.R.S.	Ditto	"
Indian Meteorological Memoirs. Vol. II., Part 2. H. F. Blandford, F.R.S.	Ditto	"
Meteorological Results, Chowringee and Alipore: April, 1883, to March, 1884	Ditto	"
The Great Trigonometrical Survey of India. Vols. VII., VII., IX. Results of Meteorological Observations, 1882. A. V. Nursingrow, F.R.A.S.	India Office	"
Victorian Year-Book, 1883-4	Vizagapatam Observatory	"
Census of Victoria, 1881	Government Statist	Victoria
Certain Books	Ditto	"
Journal and Proceedings of the Royal Society of New South Wales	Mr. Andrew Turner	"
Annual Report of the South Australian Institute, 1882-3	Royal Society of New South Wales	New South Wales
Meteorological Observations made at Adelaide Observatory and other places, 1881	South Australian Institute	South Australia
Statistics of New Zealand, 1881; Meteorology	Adelaide Observatory	"
Census of the Colony of Tasmania, 1881	Superintendent, Meteorological Stations	New Zealand
Statistics of Tasmania, 1882	Government Statist	Tasmania
Report of the Royal Society of Tasmania, 1883	Ditto	"
Report of the Meteorological Observer	Royal Society of Tasmania	"
Report on the Kimberley District. By the Honorable John Forrest, C.M.G.	Meteorological Observer	"
Meteorological Report for 1882	Lands Office	West Australia
Report of the Meteorological Service of the Dominion of Canada. C. Carpmael, M.A.	Meteorological Recorder	"
Monthly Weather Report: March, 1883, to April, 1884	Meteorological Office	Canada
General Meteorological Register for 1880. Toronto	Ditto	"
Report of Canadian Observations of the Transit of Venus, 6th December, 1882	Ditto	"
Report of Progress Canadian Geological and Natural History Survey	Geological and Natural History Survey	"
Abstract of Registers from self-recording instruments of the New York Meteorological Observatory of the Department of Public Parks: January, May, November, and December, 1883	Dr. Draper, Director, New York Meteorological Observatory	United States
A Determination of the Semi-diameter of the Moon, from two occultations of the Pleiades. H. M. Paul	Washington Naval Observatory	"
Telegraphic Determination of Longitudes in Japan, China, and the East Indies, in 1881 and 1882	Bureau of Navigation	"
Annual Report for 1882-3	Harvard College	"
Observations of the Comets of 1880, 1881, and 1882	Cincinnati Observatory	"
Transit of Venus, 1882	Leander McCormick Observatory	"
Zodiacal Light	Arthur Searle	"
Contributions to Meteorology: Barometer Gradients in Great Storms	Elias Loomis	"
Sir W. Herschel's Observations on Variable Stars	E. C. Pickering	"
Researches on Spectrum Photographs. By Professor Henry Draper, M.D., LL.D.	Messrs. Pickering and Young	"

APPENDIX—continued.

Title and Author of Book.	By whom Presented.	
Bulletin of the American Geographical Society, 1882, No. 5; 1883, Nos. 2, 3, and 4	American Geographical Society...	United States
Science Observer. Vol. IV., Nos. 5 and 6...	...	"
Anuario del Observatorio Astronomico Nacional de Tacubaya, 1884. Angel Anguiano	Tacubaya Observatory ...	Mexico
Anales del Ministerio de Fomento	Central Meteorological Observatory	"
Revista Cientifica Mexicana. Tome I., Nos. 24 and 25	Ditto ...	"
Boletin del Ministerio de Fomento. Tome VIII., Nos. 26-128; tome IX., Nos. 1-48	Ditto ...	"
Revista Mensual Climatologica	Ditto ...	"
Bulletin Astronomique et Météorologique de l'Observatoire Impérial de Rio de Janeiro: January to November, 1883	Imperial Observatory, Rio de Janeiro	Brazil
Annales de l'Observatoire Impérial de Rio de Janeiro. Tome I.	Rio de Janeiro...	"
Meteorological Observations, August, 1882, to July, 1883	Guatemala Observatory	Guatemala
Abstract, ditto, 1882	Ditto ...	"
Rapport Annuel sur l'état de l'Observatoire du Paris, 1882. M. le Contre-Amiral Mouchez	Paris Observatory	France
Annales du Bureau des Longitudes. Tome deuxième. 2 copies	Bureau de Longitudes ...	"
Connaissance des Temps 1881, 1882, 1884	Ditto ...	"
Annales pour les ans 1880, 1881, 1883, and 1884	Ditto ...	"
Ephémérides des Etoiles de culmination Lunaire et de Longitude. Par M. Lœwy, 1880, 1881, 1883	Ditto ...	"
Observatoire Astronomique de Province, 1879, 1881	Ditto ...	"
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