

1876.
—
VICTORIA.

ELEVENTH REPORT

OF THE

BOARD OF VISITORS

TO THE

MELBOURNE OBSERVATORY;

WITH THE

ANNUAL REPORT OF THE GOVERNMENT ASTRONOMER

FOR THE

YEAR ENDED 20TH JUNE 1876.

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

By Authority:

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ELEVENTH REPORT OF THE BOARD OF VISITORS TO THE OBSERVATORY.

TO HIS EXCELLENCY SIR GEORGE FERGUSON BOWEN, *Knight Grand Cross of the Most Distinguished Order of Saint Michael and Saint George, Governor and Commander-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 made its annual inspection on 20th June, and received the Government Astronomer's Report, which is appended.

The Board has much pleasure in reporting that it finds all the instruments in good working order, and the establishment generally in an efficient and satisfactory condition.

The work has been carried on steadily and assiduously in the various branches of Astronomy and Physical Science for which the Observatory is especially intended, and the results are, for the most part, reduced up to date, and ready for publication.

The Board is of opinion that the different classes of observation to which the various instruments, &c., are devoted, are such as to produce the most valuable results to science at the present time; and it notes with satisfaction that the Great Telescope is being devoted almost entirely to the revision of the nebulae fixed by Sir John Herschel at the Cape of Good Hope in 1835—for it must be borne in mind that the desirability of re-observing these objects in the Southern Hemisphere constituted one of the principal reasons for the establishment of the Great Telescope at Melbourne.

The Government Astronomer draws special attention in his Report to the desirability of publishing the results of the observations made with the Great Melbourne Telescope (which are so highly satisfactory, and so much enquired after) with as little delay as possible. The Board entirely concurs in this, and recommends that Mr. Ellery's suggestion as to the method of doing so be adopted.

The young gentleman who, at the suggestion of the Board, was appointed on probation, about 18 months ago, for the purpose of being trained in the special work of the Observatory, to fit him for filling any vacancy that might probably occur in the staff, resigned his position early in this year, much to the regret of all the other officers. His place has not been filled up yet; but as there can be no doubt of the wisdom of having a youth trained for the very special work of the establishment, the Board would recommend that another youth should be selected to fill the vacancy.

The Government Astronomer brings prominently under the notice of the Board the desirability of remodelling the meteorological work of the department, more especially as regards the coast meteorology and the intercolonial weather telegrams; and reports that he is now engaged in an endeavor to establish a more uniform system among the adjacent colonies than at present exists. The Board is of opinion that the propositions in the Government Astronomer's Report on this point are likely, if put into practice, to lead to a greatly improved knowledge of the weather generally, and especially of movements of storms along the coast lines; and it cannot too urgently recommend that Mr. Ellery be accorded all the help necessary to enable him to carry these views into practice. For instance, it would be highly desirable that the lighthouse-keepers and other persons under Government, who are now

requested to take regular observations, should be made to feel it to be more a peremptory duty, by receiving a small annual bonus (say about £5 per annum), as is done in England and in other countries.

The Board of Visitors cannot conclude its Report without calling attention to Sir George Airy's highly complimentary statement, "that the Melbourne Observatory has produced the best catalogue of stars of the Southern Hemisphere ever published."

HENRY AMSINCK, Commander.

G. F. VERDON, F.R.S.

G. V. SMITH.

JAMES MOORE, M.A.

M. H. IRVING, M.A.

J. E. BROMBY, D.D., Hon. Sec.

J. W. STEPHEN, M.A.

REPORT OF THE GOVERNMENT ASTRONOMER, 1876.

To the Board of Visitors of the Melbourne Observatory.

GENTLEMEN,

I have now the honor to submit the report of the present state of the Observatory and of the work done during the year which has elapsed since the last visitation on the 31st May 1875. At that time I was absent in Europe on leave, and the establishment was under the charge of the Chief Assistant, Mr. E. J. White. I returned to Melbourne early in April, and resumed charge the first week of the same month. It may not be out of place here to state that I was most highly pleased, on my resuming charge, with the state of the Observatory, the work, and with the efficient and careful manner in which all its affairs had been managed during my absence.

PERSONAL ESTABLISHMENT.

There has been little change in the personal establishment during the year. Mr. Hay, a young gentleman who, in accordance with a suggestion of the Board, was appointed on probation, with a view to training him for Observatory work, resigned his position in November last, much to the regret of the whole of the Observatory staff; for he was very attentive and diligent in his duties, and won the esteem of all the officers. It is very desirable that his place should be filled. The staff at present consists of—

Mr. ELLERY, (Director), Government Astronomer,
Mr. WHITE, Chief Assistant,
Mr. MOERLIN,
Mr. TURNER,
Mr. GILBERT.

In addition, there are a messenger and a workman (principally engaged in connection with the great telescope) on the permanent staff, and a clerical assistant and a mechanic temporarily engaged.

BUILDINGS.

The main building and the great telescope house are in fair condition, requiring only ordinary repair, such as painting, &c.; but the magnetic house remains in the same unsatisfactory state reported to the Board on former visitations. It will require radical alterations before it can fulfil the necessary conditions of a magnetic house, and it is a question whether it should be rebuilt in a more permanent manner, or a new outer building erected over the magnet chamber. I have had some alterations made in the south equatorial house; the shutter arrangements were found unsatisfactory in practice, and a new form of shutter has been fixed, which is found much more convenient, and has at the same time admitted of a considerable reduction in the weight of the dome, by dispensing with the counterpoise and crank work of the old shutters. This building is now in excellent condition, and the rest of the buildings are in good working order.

The grounds of the Observatory are not in the state I could desire. The alteration in the Domain having rendered it necessary to provide a new mode of access, a road was partly formed about eighteen months ago to open on to the park drive to the south-west, and the gates on the north-east side have just been moved to the new position. In consequence of these alterations, which will no doubt eventually be a great improvement, the Observatory ground has been much broken up, and appears somewhat in disorder. I propose to do such planting, &c., as the means at my command will admit of, for which Mr. Guilfoyle, the Director of the Botanical Gardens, promises the necessary trees. The proximity of the Observatory grounds to the new residence of the Governor, and the fact that they form a part of the Domain, render it very desirable that the horticultural arrangements and care of them should be undertaken in connection with the rest of the Domain, and I would ask the support of the Board in the endeavor to bring such an arrangement about.

A new and permanent chain standard has been erected in the grounds, by means of which the lengths of surveyors' and engineers' chains can be accurately tested.

INSTRUMENTS.

The instruments (with one or two exceptions) are in excellent order, including the transit circle, great telescope, and south equatorial, &c., the only exception worthy of note being that of the anemograph, which has for some years past shown unmistakable signs of wear. This wear now interferes with its satisfactory action, and I am afraid it will be necessary, at no very distant date, to replace it with a new one of a more modern and perfect construction. In Mr. White's report last year he referred to certain defects in the 8-inch south equatorial which, in their hurry to get to Melbourne in time for the transit of Venus, the makers had evidently overlooked. I took the object-glass to England with me and got it repolished by the makers; and, as upon trial at the works in London, there appeared still a slight defect in centering, this also was remedied; and I am glad to state that, from some tests I have put it to since my return, I consider it to be very greatly improved, and its performance now appears to be excellent. All the minor instruments and apparatus referred to in former reports are in a satisfactory condition. Our stock of meteorological instruments is now exhausted, and observations at some of the country stations have been suspended for want of new ones. I ordered a small supply while in England, but it has not arrived yet.

TIME SIGNALS.

No change has been made in the method of distribution of Observatory time throughout the colony. The Williamstown time-ball, which is of course the most important of our time-signals, has been dropped with the usual regularity. The failures during the past year have been 13 out of 303, all owing to derangement of the telegraph line through which the signals were transmitted. The ball and machinery were repaired under Mr. White's direction during my absence in Europe. The whole apparatus is now very old, most of it having been constructed nearly twenty years ago, and it will be absolutely necessary to replace it before long. Knowing this, I took the opportunity while in Europe to inspect the various time balls and signals in use, with the view of obtaining the best form for a new time-ball here, and I have come to the conclusion that it will be best to adopt a slightly modified form of our present simple arrangement.

The method of controlling the clocks at the railway stations, Houses of Parliament, and at various watchmakers' establishments by positive and negative currents from the Observatory, continues to work satisfactorily; but I think a little more supervision at the railway stations, which I shall try and secure, would obviate the few interruptions that do occur, and would tend to keep the clocks in *exact* accord with the normal clock at the Observatory.

The Post Office clock goes with wonderful precision, and almost equal to the best astronomical clocks in the Observatory; its error is ascertained from automatic signals sent to the Observatory every day about noon, and is published in the daily papers. The greatest errors have been 21 seconds fast, and $14\frac{1}{2}$ seconds slow. Its rate has been altered eight times by adding or subtracting small weights from the upper end of pendulum rod.

THE LIBRARY.

Numerous and valuable donations of books to the library have been received during the last year.— (See Appendix.)

PUBLICATIONS.

There has been no publication of any astronomical work during the year except by the transmission to Greenwich of the observations of the transit of Venus. The last volume of *Astronomical Results* issued was volume IV. for 1870. The Results for 1871 to 1875, with the exception of the introductions, are now ready for the printer. The Results of the Meteorological and Magnetical Work for 1873 and 1874 were published last year, and those for 1875 are nearly ready for the printer.

The publication of the results of our work with the great telescope is a subject that has received much consideration, and I have in former reports stated that the difficulties in the way were—(1st) want of funds; (2nd) want of some satisfactory method of reproducing the drawings of nebulae, &c., made at the telescope. From repeated trials it appears that lithography is likely to produce the best results, and some of the nebulae drawings have been copied on stone at the Crown Lands Office and printed. These, although very good indeed, are not in all respects satisfactory. Pressure of other work will now, however, I believe, prevent the department from doing this work for us. While in Europe I made enquiries concerning, and inspected many proposed methods for the reproduction of these drawings for publication, but the result was not satisfactory. The best style that has come under my notice is one devised by an officer attached to the Mining department; it is a toned lithograph, *white* on black ground, and the specimens he has sent me (lying on the table) represent the nebulae as they appear in the telescope more nearly than any other method I have seen. The officer referred to is an amateur observer as well as a lithographer, and has therefore a better knowledge of the appearances it is sought to produce than most other lithographers. I am very anxious to secure part of his services for this work, and have already made a preliminary application to the Government about the matter. There is now a very considerable amount of work, most of it of the greatest interest, ready for publication. Numerous and urgent enquiries for the results of the observations with the Great Melbourne Telescope are constantly being received from Europe and America, and I consider it therefore of great importance that they should be given to the world with as little further delay as possible. If my application for the help of the officer referred to is agreed to, I see no difficulty in at once publishing all the completed work of the great telescope.

WORK OF THE OBSERVATORY.

The Board is aware that during most of the period that has elapsed since their last visitation I have been absent on leave, and that on resuming my duties early last month I found that the work of the establishment had gone on most satisfactorily under Mr. White's direction; and it now remains to report in detail what has been done and what is in progress. After the unusual pressure on the working power of the establishment caused by the transit of Venus last year, no new work of any extent has been undertaken; indeed the disposal of much of the ordinary work, which got somewhat in arrears during the busy time referred to, in addition to the regular work of the Observatory, has been found more than sufficient to occupy the staff during the year.

The apportionment of the work has been the same as heretofore, with the exception that Mr. White acted as Government Astronomer in my absence. The work with the transit circle has been limited as much as possible, so as to allow of the preparation of the annual catalogues, which had got considerably in arrears. The subjects of observation during the year have been the usual standard stars for clock error, the stars of our fundamental azimuth catalogue, and the stars observed by the American Transit of Venus Party in New Zealand for finding the latitude of their station. These observations are under the charge of Mr. White, and are made by him, assisted by Mr. Gilbert. The numbers recorded are as follows:—

R.A. observations	...	...	...	...	...	1211
P.D. observations	...	...	...	...	...	454
Observations of error of collimation	...	...	...	...	...	126
" " level and nadir	...	...	...	...	...	137
" " runs of microscopes	...	...	...	...	...	43
" " flexure	...	...	...	...	...	11

All these observations are reduced up to date.

The work with the great telescope has been continued regularly by Mr. Turner. The chief portion consists as hitherto of observations and drawings of the nebulae observed by Sir John Herschel and figured in his work.

Out of about 150 nights which were more or less fit for observing with the telescope, 40 were solely occupied with visitors. The work done comprises the examination, measurement, and sketching of 70 of the nebulae and clusters figured in Sir John Herschel's work; most of these have been carefully drawn and described, and are ready for publication. The result of these observations indicates that several of the nebulae are considerably changed, while others appear so completely altered as to be scarcely recognisable save by their position with respect to adjacent stars. These changes have all been carefully noted.

The nebulae about η Argus has been compared with the drawing of March 1875, and as no decided changes can be detected, that drawing has been considered sufficient to represent its present condition.

Several drawings of Mars and Jupiter have been made; those of the former at its opposition in June last year, and of the latter during last May. Observations of the conjunction of Saturn's satellites were made from 26th August to 29th December last year, with the view of more accurately determining their periods; cloudy weather interfered so much, however, that only ten out of ninety conjunctions could be actually observed. It is intended to resume these observations at the next opposition of Saturn.

The photoheliograph has been kept in constant use, and a sun picture has been obtained on almost every day that the sky was sufficiently clear. During the year 148 heliograms have been secured; they show that there has been a remarkable absence of spots during the period over which they extend.

The 8-inch equatorial was put in working order on the arrival of the object-glass in January last, but beyond a few occasional observations for testing its performance, or revision of objects observed with the great telescope, it has not been much used. During the alteration of the dome shutters I dismantled the whole instrument, made some necessary repairs, and had the whole of the ironwork repainted. It has been re-erected, and it is hoped that all the adjustments will be completed in a few days. The instrument will then be in much better order and more convenient for use than it ever has been; for, on account of the hurried way in which the makers were compelled to construct it, many matters of detail were overlooked or incompletely carried out.

The meteorological and magnetical work, which is under the charge of Mr. Moerlin, has been carried on as hitherto. The absolute force of the magnetical elements has been regularly determined each month and reduced up to date. The results are published in the Monthly Record of Meteorology and Terrestrial Magnetism. The photographic records of the different magnetic instruments are complete to date, but no regular tabulation has been undertaken, chiefly for the reason that it has not been yet satisfactorily decided whether they should be tabulated at all, in part, or in full. I expect to receive the opinion of the Meteorological Congress on this point. The usual meteorological observations made here as well as at the various country stations are reduced up to date and published up to the end of last February, and the manuscripts for March and April are in the hands of the printer.

The anemograph curves are tabulated up to date.

The photographic curves from the barograph and thermograph are complete, but have only been tabulated so far as necessary to furnish special information, more especially in connection with the system of simultaneous observations over the globe, instigated by the United States Signal Service and approved by the Meteorological Congresses at Vienna and Utrecht.

During the year 49 chronometers have been rated, 26 aneroid barometers have been tested under the barometrical air-pump, and several thermometers and anemometers compared with our standards.

In connection with this part of my report, I may mention, that since the beginning of the year, two pupil surveyors have attended at the Observatory for the purpose of being trained in the use of field astronomical instruments and in the methods of astronomical observations and computation used in higher class surveying. This privilege is granted to certain pupil surveyors selected by the Survey Department in accordance with some special regulations adopted by it a year or two ago. As far as the two pupils referred to are concerned, I believe this arrangement has proved very beneficial, for, after two months' assiduous work at the Observatory, they have acquired a more thoroughly practical knowledge of this branch of astronomy than is usually possessed by surveyors.

I do not propose to make any material change in the regular work of the Observatory during the ensuing year, except perhaps in the meteorological and magnetic portion. It is intended to assiduously continue the same observations with the transit circle as in previous years, for I consider this the most important and valuable, and constitutes the fundamental work of the establishment, the results of which have already made the Melbourne Observatory well known in the world.

The revision of Sir John Herschel's figured nebulae is to be continued with the great telescope, and the same instrument will also be employed upon occasional planetary work, such as that referred to above. In connection with this, I may mention that, although the mirrors retain their high reflecting polish exceedingly well, the fact must not be overlooked that the time when they will have to be repolished will inevitably arrive, and that perhaps earlier than we now anticipate. I intend therefore to devote some time this year to practice in grinding and polishing large surfaces in order that both Mr. Turner and myself may obtain further experience in the matter.

Sun pictures will be obtained on every day possible with the photoheliograph; and I also hope to personally undertake a series of observations with the south equatorial (8-inch), more especially of the objects to be observed with the great telescope, for the purpose of micrometric measurements, which will, I anticipate, enable the larger instrument to be devoted more exclusively to the figuring and revision of the features of the nebulae.

It is very desirable to remodel our system of meteorological work, especially as regards the country and coast stations, as well as the present very incomplete and unsatisfactory method of intercolonial weather telegrams. The country stations are, with a few exceptions, worked so irregularly and spasmodically as to render the results almost useless. With the view of securing a more regular and satisfactory system I partly drew up a scheme before I left for Europe last year, and communicated with the astronomers of New South Wales and South Australia on the subject. I have no doubt of their co-operation in the matter. While in Europe I had several conferences with members of the European Meteorological Congress; and just prior to my leaving for Melbourne I propounded a series of questions on the subject, which Mr. Scott, the head of the Meteorological department in England promised to submit to the members of the

congress individually for an expression of their opinion ; but I have not yet received the replies. I am of opinion that a simple, uniform, but not elaborate system of intercolonial weather telegraphy (including New Zealand and Tasmania) should be adopted ; and that as regards the meteorology of our own colony, the coast stations—Portland, Cape Otway, Wilson's Promontory, and Gabo Island—should be made primary stations, from which it would be absolutely necessary to secure uninterrupted observations ; and that the interior should be represented by four, or at most five, secondary stations (where observations need only be made once, or at most twice a day), irrespective of course of rainfall stations, which should be in as many localities as possible. I am about submitting a scheme of weather telegraphy, founded on the system in operation in Europe, to Mr. Russell of Sydney, Mr. Todd of Adelaide, the President of the Royal Society of Tasmania, and the head of the meteorological offices in Queensland and New Zealand, with the hope of coming to an agreement for the adoption of an uniform system prior to submitting it for the sanction of the Government. There does not appear any great difficulty in the way of establishing a system which will meet all the most important public requirements in this direction without increasing to any extent the cost of the present one ; and I believe the demand on the Telegraph Department would be very much less than it is at present if the cypher system adopted by the Meteorological Congress were adopted. I hope I may be able to report to the Board at their next visitation that the desired reforms in this part of the Observatory work has been accomplished.

During my late visit to Europe I made it my business to inspect the equipment and enquire into the working of as many of the English and Continental observatories as possible. I saw very much to interest me, and gathered important information on many points ; I was, however, highly gratified to find that the opinion expressed by the American and German astronomers—who came out to observe the transit of Venus—on the efficient state of the Melbourne Observatory was borne out by personal experience ; for out of ten European observatories I visited, with the exception of Greenwich and Paris, I did not see any better or even so well equipped as our own, or one in which a greater amount of standard work is being done. I cannot find that we are much behindhand in any direction, but in some respects the very reverse ; and the only detail in which I considered the Melbourne Observatory is deficient, as compared to even Greenwich or Paris, is in the small size of our transit circle. Most of the European and American observatories possess, or are now being provided with, instruments of this kind with larger apertures and of a more complete form than the one we possess ; not that I believe better work is likely to be done with these instruments than our own, but the larger apertures of course render it possible to obtain observations of much fainter stars than can be got with the smaller.

As an instance of how our work in Melbourne is appreciated in Europe I may mention that at a meeting of astronomers at Greenwich to celebrate the bi-centenary of that establishment, Sir George Airy publicly stated that "the Melbourne Observatory had produced the best catalogue of stars of the Southern Hemisphere ever published."

I have nothing definite to report as to the state of the final reductions of our transit of Venus observations. Ours, in common with all other British observations, were placed in the hands of the Astronomer Royal at Greenwich, and there is a large staff of computers engaged on the work. Unexpected difficulties with regard to the photographs arose, which rendered necessary fresh measurements for determining optical distortion of the sun's image. These and similar necessary matters cause great delay in arriving at the final result, and it will probably be many months before it can be ascertained.

ROBT. L. J. ELLERY,
Government Astronomer, &c.

Melbourne Observatory, 20th June 1876.

APPENDIX.

BOOKS, ETC., PRESENTED TO THE OBSERVATORY.

Names of Works, &c.	By whom Presented.
Memoirs of the Royal Astronomical Society, vol. xl., 1874 and 1875	Royal Astronomical Society.
Annales Météorologiques de l'Observatoire Royal de Bruxelles, tomes xxi. et xxii., 1872-3	Mon. A. Quetelet.
Annales de l'Observatoire Royal de Bruxelles, tome xxii., 1867	Ditto.
Bullettino Meteorologico dell'Osservatorio del R. Collegio Carlo Alberto in Moncalieri, vol. ix., num. 5, 31 Maggio 1874; vol. ix., num. 7, 31 Luglio 1874	P. F. Denza.
Magnetische und Meteorologische Beobachtungen an der K. K. Sternwarte zu Prag im Jahre 1873	Carl-Hornstein.
Jahrbücher der K. K. Central Anstalt für Meteorologie und Erdmagnetismus, Neue Folge, band ix., Jahrgang 1872	Carl Jelinek.
Meteorological Observations, made at Sydney, for January, February, March, April, May, June, July, August, September, October, November, December 1875; and January and February 1876	H. C. Russell, Esq., F.R.A.S.
Annalen der Sternwarte in Leiden, herausgegeben von Dr. F. Kaiser, dritter band ...	Dr. F. Kaiser.
Nederlandsch Meteorologisch Jaarboek voor 1871	Dr. Buys Ballot.
Weekly Meteorological and Rainfall Report of Bengal from 18th April to 15th May 1875	H. F. Blanford, Esq.
Greenwich Observations, 1872	Astronomer Royal.
" Astronomical Results, 1872	Ditto.
" Magnetical and Meteorological Observations, 1872	Ditto.
Cape Catalogue, 1860	E. J. Stone, Esq., M.A., F.R.S., F.R.A.S.
Report of the British Association for the Advancement of Science, 1873	Association.
Proceedings of the Royal Society of London, vol. xxii., Nos. 151 to 155; vol. xxiii., No. 156, 1874	Royal Society.
Observations of Nebulæ and Clusters of Stars, made at Slough with a twenty-foot Reflector, between the Years 1825 and 1833	Ditto.
Quarterly Journal of the Meteorological Society, vol. i., Nos. 1 to 4, 1872; Nos. 5 to 8, 1873; vol. ii., Nos. 9 to 11, 1874; and No. 13, 1875	Meteorological Society.
Annales de l'Observatoire de Moscou, vol. ii.	Dr. F. H. Bredichin.
Report of the Astronomer Royal to the Board of Visitors of the Royal Observatory, Greenwich, read at the Annual Visitation of the Royal Observatory, 5th June 1875	Sir G. B. Airy.
Report of the Permanent Committee of the First International Meteorological Congress at Vienna for the Year 1874: Meetings held at Vienna and Utrecht, 1873-4	Meteorological Office.
Hourly Readings from the Self-recording Instruments at the Seven Observatories in connection with the Meteorological Office, September, October, and November 1874	Ditto.
Bullettino Meteorologico dell'Osservatorio del R. Collegio Carlo Alberto in Moncalieri, vol. vii., num. 7, 31 Luglio, 1872	P. F. Denza.
Circular zum Berliner Astronomischen Jahrbuch, No. 26, Ephemeride und Elemente des Planeten (114) Cassandra	F. Tietjen.
Verbesserte Ephemeride des Planeten (71) Niobe	Ditto.
" " " (128) Nemesis	Ditto.
" " " No. 27 (110) Lydia	Ditto.
Annalen des Physikalischen Centralobservatoriums, Jahrgang 1873, St. Petersburg ...	H. Wild.
Annales de l'Observatoire Physique Central de Russie, Année 1869	Ditto.
Repertorium für Meteorologie, herausgegeben von der Kaiserlichen Akademie der Wissenschaften, band iv., heft 1	Ditto.
Transactions of the Royal Society of New South Wales, 1874	Society.
Almanaque Nautico Para, 1876	By order of the Marine Observatory, San Fernando.
Norsk Meteorologisk Aarbog, 1872-3	Royal University, Christiania, Norway.
Om Visse Virkninger af Stromme paa Vandeto og Luftens Temperatur	Ditto.
Norske Faugst-Skipperes opdagelse af Kong Karl-Land	Ditto.
"Alberts" Expedition til Spidsbergen i November og December 1872, og dens Videnskabelige Resultater	Ditto.
Beretning om det Norske Meteorologiske Instituts Virksomhed i 1872	Ditto.
Bullettino Meteorologico dell'Osservatorio del R. Collegio Carlo Alberto in Moncalieri, vol. ix., num. 8, 31 Augusto 1874	P. F. Denza.
Weekly Rainfall and Meteorological Report of Bengal, from 16th May to 12th June 1875	H. F. Blanford, Esq.
Report of the Meteorological Reporter to the Government of Bengal, 1874-5 ...	Ditto.
Report of the Midnapore and Burdwan Cyclone on the 15th and 16th October 1874 ...	Ditto.
The Winds of Northern India, in relation to the Temperature and Vapour Constituent of the Atmosphere	Ditto.
Jahrbücher der K. K. Central-Anstalt für Meteorologie und Erdmagnetismus, Neue Folge, band x., Jahrgang 1873, Vienna	Carl Jelinek.
Der Ganzen Reihe, band xviii.	Ditto.
Ueber eine Bestimmung der Sonnen Parallaxe aus Correspondirenden Beobachtungen des Planeten Flora auf mehreren Sternwarten der Nördlichen und Südlichen Halbkugel im October und November 1873	Dr. J. G. Galle.
Astronomische Beobachtungen auf der Grossherzoglichen Sternwarte zu Mannheim ...	Dr. E. Schonfeld.
Circular zum Berliner Astronomischen Jahrbuch—	
No. 28, Elemente und Ephemeride des Planeten (135) Hertha	F. Tietjen.
No. 29, " " " (144) Vibia	Ditto.
No. 30, " " " (136) Austria	Ditto.
Fourth Annual Report of the Meteorological Office of the Dominion of Canada ...	G. J. Kingston.

BOOKS, ETC., PRESENTED—*continued.*

Names of Works, &c.	By whom Presented.
Washington Astronomical and Meteorological Observations, 1870	Rear-Admiral B. F. Sands, U. S. Navy.
Report of the Difference of Longitude between Washington and St. Louis, 1870 ...	Ditto.
On the Right Ascensions of the Equatorial Fundamental Stars and the Corrections necessary to reduce the Right Ascensions of Different Catalogues to a Mean Homogeneous System, 1870	Ditto.
Zones of Stars observed at the United States Naval Observatory with the Meridian Transit Instrument in the Years 1846, 1847, 1848, and 1849	Ditto.
Zones of Stars observed at the United States Naval Observatory with the Mural Circle in the Years 1846, 1847, 1848, and 1849	Ditto.
Results of Observations made at the United States Naval Observatory with the Transit Instrument and Mural Circle in the Years 1853 to 1860 inclusive	Ditto.
Journal of the Scottish Meteorological Society, with Tables for the Year ending 31st December 1874 : New Series, Nos. xliii., xlv., xlv., and xlvi.	Scottish Meteorological Society.
Bullettino Meteorologico dell'Osservatorio del R. Collegio Carlo Alberto in Moncalieri, vol. ix., num. 9, 30 Septembre 1874	P. F. Denza.
Hourly Readings from the Self-recording Instruments at the Seven Observatories in connection with the Meteorological Office, December 1874, and January, February, and March 1875	Meteorological Office.
Quarterly Weather Report of the Meteorological Office, part iv., October-December 1873	Ditto.
Instructions in the Use of Meteorological Instruments	Ditto.
Weekly Meteorological and Rainfall Report of Bengal, from 8th August to 4th September 1875	H. F. Blanford, Esq.
Abstracts and Results of Magnetical and Meteorological Observations at the Magnetic Observatory, Toronto, Canada, from 1841 to 1871	G. T. Kingston, Esq., M.A.
Her Majesty's ship <i>Challenger</i> , No. 4 Report on Ocean Soundings and Temperatures, Pacific Ocean, China, and adjacent Seas, 1875	Royal Society.
Hourly Readings from the Self-recording Instruments at the Seven Observatories in connection with the Meteorological Office, April 1875	Meteorological Office.
Annales de l'Observatoire Royal de Bruxelles	Mon. A. Quetelet.
Zodiacallicht-Beobachtungen in den letzten, 29 Jahren 1847-1875	Dr. Edward Heis.
Bulletin of International Meteorological Observations taken simultaneously at 7.35 a.m., 7th February 1875	Albert J. Myer, Esq., Chief Signal Officer, Washington, U. S. A.
The Uranian and Neptunian Systems investigated with the 26-inch Equatorial of the United States Naval Observatory	Simon Newcomb, Esq., LL.D., U. S. Naval Observatory.
Victorian Year-Book for the Year 1874	H. H. Hayter, Esq.
Daily Bulletin of the Signal Service, United States of America, with the Synopsis, Probabilities, and Facts, December 1872, January 1873	Albert J. Myer, Esq., Chief Signal Officer, Washington, U. S. A.
Wellington Meteorological Observations for May, June, July, August, September, October 1875 ; also Extracts from <i>New Zealand Gazette</i> for 17th June, 29th July, 26th August, 9th October, 11th November 1875	Dr. Hector.
Summary of Observations taken at the Meteorological Station, Brisbane, from January to November inclusive, 1875	E. MacDonnell, Esq.
Table of Rainfall of Queensland for the Year 1874	Ditto.
Summaries of Meteorological Observations taken at Somerset, Cape York, for January, February, and March 1875	Ditto.
Summaries of Meteorological Observations taken at Toowoomba during January, February, March, April, May, and June 1875	Ditto.
Summaries of Meteorological Observations taken at Cape Morton during January, February, and March 1875	Ditto.
Quarterly Weather Report of the Meteorological Office, London, part i., January-March 1874 : Official Copy, No. 25	Meteorological Committee.
Report of the Meteorological Committee of the Royal Society for the Year ending 31st December 1874	Ditto.
Weekly Rainfall and Meteorological Report of Bengal, from 5th September to 30th October 1875	H. F. Blanford, Esq.
Address to the Mathematical and Physical Section of the British Association, Bristol, 25th August 1875	Prof. Balfour Stewart.
Annales de l'Observatoire Royal de Bruxelles, Juin, Juillet, Août, et Septembre 1874	Mon. A. Quetelet.
Circular zum Berliner Astronomischen Jahrbuch—	
No. 32, Tolosa (138), 1875	F. Tietjen.
No. 33, Ephemeride for (149)	Ditto.
Amphiorama ou la Vue du Monde des Montagnes de la Sperzia, 1874	F. W. C. Trafford, Esq.
Amphiorama ou la Vue du Monde, 2 ^e Notice la Marée dans la Bassin du Spitzburg et le Flot qui contourne la Tête du Groenland ; aussi l'Arrivée de la Lumière au Pôle, 1875	Ditto.
Astronomische Magnetische und Meteorologische Beobachtungen an der K. K. Sternwarte zu Prag im Jahre 1874, 35 Jahrgang	Carl Hornstein.
Nederlandsch Meteorologisch Jaarboek 1851, 1852, 1855, 1856, 1866 (1867, 1868, and 1869, parts 1 and 2), 1870, 1871, 1872, 1873, and 1874	Dr. Buys Ballot.
Zeilaanwijzingen van Java Naar het Kanaal Uitgegeven door het Tweede Deel, deel i. & ii., 1868 and 1870	Ditto.
Quarterly Journal of the Meteorological Society, vol. ii. : New Series, Nos. 14 and 15, April and July 1875	Meteorological Society.
Nederlandsch Meteorologisch Jaarboek voor 1874	Dr. Buys Ballot.
Les Courants de la Mer et de l'Atmosphère	Ditto.
Annales de l'Observatoire Royal de Bruxelles, Septembre et Octobre 1874	Mon. A. Quetelet.
Circular zum Berliner Astronomischen Jahrbuch, No. 34, Cyrene (133)	F. Tietjen.
No. 35, Elemente des Planeten (150)	Ditto.
Weekly Meteorological and Rainfall Report of Bengal, from 31st October to 27th November 1875	H. F. Blanford, Esq.
Almanaque Nautico Para, 1877, calculado di orden de la Superioridad en el Osservatorio de Marino de lo Ciudad de San Fernando	Cecilio Pujazon.
Observations made at the Magnetical and Meteorological Observatory at St. Helena, vol. ii., 1844 to 1849	St. Helena Observatory.
Annales de l'Observatoire Royal de Bruxelles, Octobre à Decembre 1874	Mon. A. Quetelet.
Circular zum Berliner Astronomischen Jahrbuch, No. 36, 37, 38, and 39	F. Tietjen.

BOOKS, ETC., PRESENTED—*continued.*

Names of Works, &c.	By whom Presented.
Auxiliary Tables for determining the Angle of Position of the Sun's Axis, and the Latitude and Longitude of the Earth referred to the Sun's Equator	Warren De La Rue, Esq., D.C.L., F.R.S., V.P.R.A.S., &c. Meteorological Office.
Hourly Readings from the Self-recording Instruments at the Seven Observatories in connection with the Meteorological Office, May and June 1875	
The Theory of the Causes by which Storms Progress in an Easterly Direction over the British Isles, and why the Barometer does not always indicate real Vertical Pressure	Robert Tennent, Esq.
The School of Mines, Bendigo: Report for the Year ending 30th November 1875; together with prospectus, advertisements, list of donors	Joseph Phillips, Esq.
Assumed Mean R. A. of Clock Stars and Circumpolar Stars, with the Corrections to the Nautical Almanac for 1876, 1st January	Astronomer Royal.
Circular zum Berliner Astronomischen Jahrbuch, No. 40, Planet (158)	F. Tietjen.
Weekly Meteorological and Rainfall Report of Bengal, from 28th November to 25th December 1875	H. F. Blanford, Esq.
Résumé des Observations sur la Météorologie et sur la Physique du Globe, 1874 ...	Mon. A. Quetelet.
Bullettino Meteorologico dell'Osservatorio del R. Collegio Carlo Alberto in Moncalieri, vol. ix., num. 10, 31 Octobre 1874	P. F. Denza.
Bullettino Mensile dell'Osservatorio Meteorico e Magnetico Valerio in Pesaro, Serie II., vol. i., 1875	Luigi Guidi.
Proceedings of the Royal Society, London, Nos. 157 to 163 inclusive, vol. xxiii., 10th December 1874 to 17th June 1875	Royal Society.
Vierteljahrsschrift der Astronomischen Gesellschaft, II. Jahrgang, Erstes Heft, 1875 ...	Dr. A. Winnecke.
Hourly Readings from the Self-recording Instruments at the Seven Observatories in connection with the Meteorological Office, July 1875	Meteorological Office.
Mémoire sur les Occultations d'Etoiles par les Planètes	J. A. Normand, Esq.
On the Diurnal Oscillations of the Barometer, part i., from the Transactions of the Royal Society, Edinburgh, vol. xxvii.	Alexander Buchan, Esq., M.A., F.R.S.E.
Circular zum Berliner Astronomischen Jahrbuch, Nos 41 and 42, Planet (158) Koronis No. 43, Planet (152) Atala	F. Tietjen. Ditto.
Bullettino Meteorologico dell'Osservatorio del R. Collegio Carlo Alberto in Moncalieri, vol. ix., num. 11 e 12, 30 Novembre e 31 Dicembre 1874	P. F. Denza.
Weekly Meteorological and Rainfall Report of Bengal, 26th December 1875 to 19th February 1876	H. F. Blanford, Esq.
Report of the Kew Committee for the Year ending 31st October 1875	Kew Committee.
Nuove Osservazioni ed Orbita della Stella Doppia γ Coronæ Australis, 23 Dec. 1875 ...	G. V. Schiaparelli.
Meteorological Observations in New Zealand during the Year 1874, from the Annual Volume of Statistics of New Zealand, 1874, and Extracts from <i>Government Gazettes</i> Nos. 4, 11, 17, and 64, 1875-6; and Meteorological Observations of Wellington for November and December 1875, January and February 1876	Dr. James Hector.
Circular zum Berliner Astronomischen Jahrbuch, No. 44, and Correspondenz über Planetenbeobachtungen No. 7	F. Tietjen.
Weekly Meteorological and Rainfall Report of Bengal, 20th February to 18th March 1876	H. F. Blanford, Esq.
Observaciones Magneticas y Meteorologicas del Colegio de Belen de la Compañia de Jesus en la Habana, Año de 1873	Benito Viñes, S.J.
Greenwich Observations, 1873	Astronomer Royal.
Greenwich Astronomical Results, 1873	Ditto.
Greenwich Magnetical and Meteorological Observations, 1873	Ditto.
Report of the Forty-fourth Meeting of the British Association for the Advancement of Science, held at Belfast in August 1874	British Association.
Quarterly Journal of the Meteorological Society, vol. ii., New Series, No. 16, October 1875	Meteorological Society.
Memoirs of the Royal Astronomical Society, vol. xlii., 1873 to 1875, with two plates ...	Royal Astronomical Society.
Patents and Patentees, vol. viii.: Indexes for the Years 1873-1875	Richard Gibbs, Esq.
Proceedings of the American Academy of Arts and Sciences, No. ix: On some Physical Observations of the Planet Saturn, read by Wm. A. Rogers, 14th December 1875; No. iii.: On the Veiled Solar Spots, read by Wm. A. Rogers, 12th October 1875 ...	American Academy of Arts and Sciences.
Quarterly Weather Report of the Meteorological Office, part ii., April-June 1874 ...	Meteorological Office.
Jahrbücher der K. Ung. Central-Anstalt für Meteorologie und Erdmagnetismus, iii., Jahrgang 1873, Budapest	Dr. Guido Schenzl.
Quarterly Journal of the Meteorological Society, and List of Fellows of the Meteorological Society, January 1876	Meteorological Society.
Monthly Notices of the Royal Astronomical Society, with the Annual Report of the Council, vol. xxxvi., No. 4, February 1876	Royal Astronomical Society.
Journal of the Scottish Meteorological Society (with Tables for the Half-year ending 30th June 1875), July to October 1875, New Series, Nos. xlvii. and xlviii.	Scottish Meteorological Society.
Annales de l'Observatoire Royal de Bruxelles, Janvier-Février 1876	Mon. A. Quetelet.
Circular zum Berliner Astronomischen Jahrbuch, Nos. 45-46	F. Tietjen.
Bullettino Meteorologico dell'Osservatorio del R. Collegio Carlo Alberto in Moncalieri, vol. vii., num. 8; vol. x., num. 1	P. F. Denza.
Weekly Meteorological and Rainfall Report of Bengal, from 19th March to 15th April 1876	H. H. Blanford, Esq.