

REPORT

OF THE

FORTY-FIRST MEETING

OF THE

BRITISH ASSOCIATION

FOR THE

ADVANCEMENT OF SCIENCE;

HELD AT

EDINBURGH IN AUGUST 1871.

LONDON:

JOHN MURRAY, ALBEMARLE STREET.

1872.

*Report of the Kew Committee of the British Association for the
Advancement of Science for 1870-71.*

The Committee of the Kew Observatory submit to the Council of the British Association the following statement of their proceedings during the past year:—

(A) WORK DONE BY KEW OBSERVATORY UNDER THE DIRECTION OF THE
BRITISH ASSOCIATION.

1. *Magnetic work.*—In their last Report the Committee stated the plan on which they proposed to reduce their Magnetic observations; they now report that with reference to the reduction of the Magnetic Disturbances from January 1865 to December 1869, the period following that which has already been published, the discussion of Declination and Horizontal Force Disturbances is nearly ready for presentation to the Royal Society, and that of the Vertical Force is in progress; when that is completed, the whole period, 1865 to 1869 inclusive, will have been discussed at Kew. The tabular statement, which is herewith presented (see Appendix I.), exhibits the exact state of the reduction.

Two Dipping-needles by Dover and one by Adie have been tested for Mr. Chambers, Superintendent of the Colaba Observatory; and one needle has been procured from Dover and tested for Prof. Jelinek, of Vienna.

A Dip-circle by Dover has been verified and forwarded to Prof. Jelinek, who ordered it on behalf of the K. K. militär-geographisches Institut.

Major-General Lefroy, Governor of Bermuda, having applied for the loan of a Dip-circle, one has now been prepared for his use, and will be forwarded to Bermuda as soon as possible. A Dip-circle has been obtained from Dover, and, after verification, will be forwarded to the Survey Department, Lisbon.

At the request of Prof. Jelinek the Committee have undertaken to examine a Dip-circle by Repsold. It is of a large size and has eight needles, but Prof. Jelinek reports that the results obtained by them are very discordant.

Copies of certain specified magnetograph curves have been made and forwarded to the late Sir J. Herschel, M. Diamilla Müller, of Florence, and Senhor Capello, of Lisbon, at the request of those gentlemen.

The usual monthly absolute determinations of the magnetic elements continue to be made by Mr. Whipple, the Magnetic Assistant.

The Self-recording Magnetographs are in constant operation as heretofore, also under his charge.

2. *Meteorological work.*—The meteorological work of the Observatory continues in the charge of Mr. Baker.

Since the Liverpool Meeting, 113 Barometers (including 17 Aneroids) have been verified, and 2 rejected; 1320 Thermometers and 215 Hydrometers have likewise been verified.

Two Standard Thermometers have been constructed for Owens College, Manchester, one for the Rugby School, one each for Profs. Harkness and Eastmann, of the Washington Observatory, four for Dr. Draper, of the New York Central Park Observatory, one for Major Norton, of the Chief Signal Office, Washington, one for Mr. G. J. Symons, and three for the Meteorological Committee.

Three Thermograph Thermometers have been examined for Mr. Chambers, of the Colaba Observatory, and three for the Meteorological Committee.

Two Standard Barometers have been purchased from Adie, and tested at Kew, one of which has been forwarded to the Chief Signal Office, Washington, and the other to Prof. Jack, of Fredricton, New Brunswick.

Tubes for the construction of a Welsh's Standard Barometer on the Kew pattern, together with the necessary metal mountings, and a Cathetometer, have been made under the superintendence of the Committee for the Chief Signal Office, Washington.

The Committee have likewise superintended the purchase of meteorological instruments for Owens College, Manchester, and for the Observatory attached to the University of Fredricton, New Brunswick.

The Kew Standard Thermometer (M. S. A.), divided arbitrarily by the late Mr. Welsh, and employed for many years past as the standard of reference in the testing of thermometers, was accidentally broken on the 3rd of January. Since then a Kew Standard, of the ordinary construction, made in 1866, and which had been compared on several occasions with M. S. A., has been used to replace it.

Copies of some of the meteorological observations made at Kew during the years 1869 and 1870 have been supplied to the Institution of Mining Engineers at Newcastle-upon-Tyne, and the Editor of Whitaker's Almanac, the cost of the extraction being paid by the applicants in both instances.

A set of self-recording meteorological instruments, the property of the Meteorological Committee, have been erected in the Verification-house, and are now undergoing examination.

The self-recording meteorological instruments now in work at Kew will be again mentioned in the second division of this Report. These are in the charge of Mr. Baker.

3. *Photoheliograph*.—The Kew Heliograph, in charge of Mr. Warren De La Rue, continues to be worked in a satisfactory manner. During the past year 362 pictures have been taken on 205 days. The prints from the negatives alluded to in last Report have been taken to date, and the printing of these has become part of the current work of the establishment. A paper by Messrs. Warren De La Rue, Stewart, and Loewy, embodying the position and areas of sun-groups observed at Kew during the years 1864, 1865, and 1866, as well as fortnightly values of the spotted solar area from 1832 to 1868, has been published in the Philosophical Transactions, and distributed to those interested in solar research. A Table exhibiting the number of sun-spots recorded at Kew during the year 1870, after the manner of Hofrath Schwabe, has been communicated to the Astronomical Society, and published in their 'Monthly Notices.'

An apparatus is being constructed under the direction and at the expense of Mr. Warren De La Rue, and it will shortly be erected on the Pagoda in Kew Gardens, in order to be employed in obtaining corrections for optical distortion in the heliographical measurements.

4. *Miscellaneous work*.—Experiments are being made on the heat produced by the rotation of a disk *in vacuo*.

A daily observation has been made with the Rigid Spectroscope, the property of Mr. J. P. Gassiot.

Observations have been made with two of Hodgkinson's Actinometers, the property of the Royal Society, in order to compare them with the Actinometers deposited at the Observatory, for reference, before forwarding them to India.

The Committee have superintended the purchase of optical apparatus, chemicals, &c. for the Observatories at Coimbra and Lisbon.

An inventory has been made of the apparatus, instruments, &c. at present deposited in the Observatory, and forms Appendix III. of the present Report.

In Appendix II. a list is given of the books at present in the Observatory, the property of the British Association.

List B (Appendix II.) is a rough inventory of books, the property of the British Association, which have been transferred from the Observatory to the rooms of the Association in London for the purpose of being catalogued.

(B) WORK DONE AT KEW AS THE CENTRAL OBSERVATORY OF THE METEOROLOGICAL COMMITTEE.

1. *Work done at Kew as one of the Observatories of the Meteorological Committee.*—The Barograph, Thermograph, Anemograph, and Rain-gauge are kept in constant operation. Mr. Baker is in charge of these instruments.

From the first two instruments traces in duplicate are obtained, one set being sent to the Meteorological Office and one retained at Kew. As regards the Anemograph and Rain-gauge, the original records are sent, while a copy by hand of these on tracing-paper is retained. The tabulations from the curves of the Kew instruments are made by Messrs. Page and Rigby.

2. *Verification of Records.*—The system of checks devised by the Kew Committee for testing the accuracy of the observations made at the different Observatories continues to be followed, as well as the ruling of zero lines in the Barograms and Thermograms suggested by the Meteorological Office. Messrs. Rigby and Page perform this work, Mr. Baker, Meteorological Assistant, having the general superintendence of the department.

3. *Occasional Assistance.*—The Meteorological Committee have availed themselves of the permission to have the occasional services of Mr. Beckley, Mechanical Assistant at Kew; and he has lately been visiting the various Observatories of the Meteorological Committee.

The self-recording Rain-gauge, as mentioned in the last Report, has been adopted by the Meteorological Committee, and instruments of this kind have been constructed for the various Observatories.

A series of comparative observations was commenced in April 1870 of two Anemometers erected in the grounds attached to the Observatory, in order to compare the indications of a large and small instrument; but as a discussion of the result showed them to have been greatly affected by the influence of the neighbouring buildings, the instruments were dismantled in January last and re-erected in an open part of the Park, at a distance from the Observatory. Three months' observations were made in this position, and as these proved satisfactory, the instruments have been dismantled. The cost of this experiment has been defrayed by the Meteorological Committee. Owing to his duties in Manchester, and to a railway accident, Dr. Stewart has not been able during the last year to devote much time to the Observatory. During his absence his most pressing duties were discharged by Mr. Whipple in an efficient manner.

The Observatory was honoured on the 9th of July by a visit from the Emperor and Empress of Brazil. Their Majesties were received, on behalf of the Committee, by Sir E. Sabine and Mr. W. De La Rue.

In the unavoidable absence, through illness, of Dr. Balfour Stewart, the Emperor was conducted over the Observatory by the above-named gentlemen, and the various instruments &c. were explained by Mr. Whipple and the other members of the staff of the Observatory.

APPENDIX I.

Tabular statement showing state of Magnetic Reductions at the present date.

Hourly Tabulations from Traces.		Correct Monthly Means.	Disturbances excluded and aggregated.	Lunar Diurnal Variation Tables.	Tables of Secular and Annual Variation.	Solar Diurnal Variation Tables.
By Tabulator.	By Subsidiary Scale.					
Declination.	1865	1865	1865	1865	1865	1865
	1866	1866	1866	1866	1866	1866
	1867	1867	1867	1867	1867	1867
	1868	1868	1868	1868	1868	1868
	1869	1869	1869	1869	1869	1869
	1870	1870*
Horizontal Force.	1865	1865	1865	.....	1865	.....
	1866	1866	1866	.....	1866	.....
	1867	1867	1867	.....	1867	.....
	1868	1868	1868	.....	1868	.....
	1869	1869	1869	.....	1869	.....
	1870	1870*	.....	.....	.....	.....
Vertical Force.	1865	1865	.....	.....	1865	.....
	1866	1866	.....	.....	1866	.....
	1867	1867	.....	.....	1867	.....
	1868	1868	.....	.....	1868	.....
	1869	1869	.....	.....	1869	.....
	1870	1870*	.....	.....	.....	.....

* The reduction of the tabulations for the year 1870 is being performed in Sir E. Sabine's office.

Arrears of Work.

Hourly Tabulations from Traces.		Correct Monthly Means.	Disturbances excluded and aggregated.	Lunar Diurnal Variation Tables.	Tables of Secular and Annual Variation.	Solar Diurnal Variation Tables.
By Tabulator.	By Subsidiary Scale.					
Declination.	1858	1858	1858	1858†	1858†	1858†
	1859	1859	1859	1859†	1859†	1859†
	1860	1860	1860	1860†	1860†	1860†
	1861	1861	1861	1861†	1861†	1861†
	1862	1862	1862	1862†	1862†	1862†
	1863	1863	1863	1863	.....	.....
	1864	1864	1864	1864	.....	.....
Horizontal Force.	1858	1858	.....	.....	1858	.....
	1859	1859	.....	.....	1859	.....
	1860	1860	.....	.....	1860	.....
	1861	1861	1861	.....	1861	.....
	1862	1862	1862	.....	1862	.....
	1863	1863	1863	1863	.....	.....
	1864	1864	1864	1864	.....	.....
Vertical Force.	1858	.....	.....	.....	1858	.....
	1859	.....	.....	.....	1859	.....
	1860	1860	.....	.....	1860	.....
	1861	1861	.....	.....	1861	.....
	1862	1862	.....	.....	1862	.....
	1863	1863	.....	.....	1863	.....
	1864	1864	.....	.....	1864	.....

† These have been already published by Sir E. Sabine.

Miller's Elements of Chemistry	2 vols.
Williamson's Chemistry for Students	1 vol.
Elements of Chemistry (Sir R. Kane)	1 „
Mathematics (Royal Military Academy Course)	2 vols.
Euler's Letters on Mathematics and Physics	4 „
Barlow on Magnetic Attraction	1 vol.
Treatise on Electricity (De La Rive)	3 vols.
Woodhouse's Astronomy	1 vol.
The Heavens (Guillemin, edited by Norman Lockyer) ..	1 „
Art of Photography (Lake Price)	1 „
Meteorological Tables, Smithsonian (Guyot)	1 „
Treatise on Mathematical Instruments (Heather)	1 „
Sabine's Pendulum and other Experiments	2 vols.
Chauvenet's Astronomy	2 „
Timbs's Year-Book of Facts, 1861-1871	11 „
Taylor's Scientific Memoirs	2 „
Manual of Surveying for India, by Capts. Smythe and Thuillier	1 vol.
Nichol's Cyclopædia of Physical Science	1 „
Admiralty Manual of Scientific Enquiry	1 „
Dictionary of Terms of Art (Weale)	1 „
Magnetic and Meteorological Observations at:—	
St. Helena	3 vols.
Toronto	5 „
Hobarton	5 „
Cape of Good Hope	1 vol.
Observations during Magnetic Disturbances, 1840-1841..	1 „
Magnetic and Meteorological Observations, Unusual Dis- turbances	1 „
Plates to Magnetic and Meteorological Observations	1 „
Report of the Astronomer Royal to the Board of Visitors..	40 nos.
Theory of Errors of Observations, by Airy	1 vol.
Todhunter's Conic Sections	1 „
Distribution of Heat (Dove)	1 „
Optics (Potter)	1 „
Camus on the Teeth of Wheels	1 „
Simmonds's Meteorological Tables	1 „
Observations of Sun-spots (Carrington)	1 „
Newton's Principia	1 „
Symons's British Rainfall and Meteorological Magazine ..	
Expériences sur les Machines à Vapeur (Regnault)	2 „
Cours Élémentaire de Chimie (Regnault)	4 „

LIST B.

Books to be sent to the London Office, 22 Albemarle Street.

British Association Report, 1831-32	20 vols.
" " 1833	20 "
" " 1834	20 "
" " 1835	20 "
" " 1836	20 "
" " 1837	20 "
" " 1838	20 "
" " 1839	20 "
" " 1840	20 "
" " 1841	20 "
" " 1842	20 "
" " 1843	20 "
" " 1844	20 "
" " 1845	20 "
" " 1846	20 "
" " 1847	19 "
" " 1848	19 "
" " 1849	19 "
" " 1850	18 "
" " 1851	19 "
" " 1852	20 "
" " 1853	21 "
" " 1854	21 "
" " 1855	22 "
" " 1856	23 "
" " 1857	22 "
" " 1858	22 "
" " 1859	22 "
" " 1860	22 "
" " 1861	22 "
" " 1862	22 "
" " 1863	22 "
" " 1864	23 "
" " 1865	22 "
" " 1866	22 "
" " 1867	22 "
" " 1868	22 "
" " 1869	22 "
Lalande's Catalogue (MS. Calculations)	96 "
" " (MS. copy)	3 "
La Place's Celestial Mechanics	1 vol.
Armagh, Places of Stars	1 "
Radcliffe Observatory Catalogue of Stars for 1845	1 "
Paramatta Catalogue of 7358 Stars	1 "
Groombridge's Catalogue of Circumpolar Stars	3 vols.
Edinburgh Astronomical Observations	4 "
Astronomical Observations at the Cape of Good Hope	1 "

(MSS.) Apparent Places of Principal Stars	1 vol.
British Association Catalogue (MS. copy).....	1 „
(MSS.) British Association Catalogue (Calculations)	24 vols.
(MSS.) British Association Catalogues, Synonyms and Notes	23 „
(MSS.) Lacaille's Catalogue (Calculations)	24 „
Lacaille's Catalogue (MS. copy)	1 „
Proceedings of the Royal Institution of Great Britain....	33 nos.
Ordnance Survey, Comparisons of Standards of Length ..	2 vols.
Radcliffe Observatory, Meteorological Observations	3 „
Makerstoun, Meteorological Observations and Tables	10 „
„ Abstracts of Meteorological Observations ..	3 „
Cambridge Observations	8 „
Playfair's Natural Philosophy	2 „
Bland's Algebraical Problems	1 „
Lectures on Quaternions (Sir W. Hamilton)	1 „
Meteorological and Nautical Observations at Melbourne and Victoria	1 „
Mastery of Languages (Prendergast)	1 „
La Place's Analytical Mechanics	1 „
Levelling in England and Wales	1 „
„ „ (Abstract).....	1 „
Levelling in Scotland.....	1 „
„ „ (Abstract)	1 „
Pasley on Measures, Weights, and Money	1 „
Cork Savings-bank Tables.....	1 „
Weld's History of the Royal Society.....	2 „
Bombay Magnetical and Meteorological Observations, 1845	3 „
Meteorological Results, Toronto	8 „
Greenwich Observations	52 „
„ „ (Appendices &c.)	125 „
Catalogue of Reference, Manchester Free Library	1 „
Brisbane's Star Catalogue	2 „
Johnson and Henderson's Star Catalogue.....	2 „
(MSS.) Hartnup Star Catalogue	1 „
Mayer's Star Catalogue	1 „
Wrottesley's Star Catalogue	1 „
Taylor's „ „	8 „
Everest's Survey of India	2 „
Ordnance Survey	6 „
Extension of Triangulation into Belgium and France....	2 „
Verification and Extension of Lacaille's Arc of Meridian ..	2 „
Schlagintweit's India and High Asia	2 „
Proceedings of Institution of Mechanical Engineers	8 „
„ „ „ „	70 nos.
Modern Geology Exposed	1 vol.
Melbourne Magnetic and Meteorological Observations ...	3 vols.
Extracts from the Great Trigonometrical Survey of India	5 „
Madras Meteorological Observations.....	2 „
Sydney „ „	38 nos.
Calcutta Hourly Meteorological Observations	7 „
Bengal Meteorological Reports.....	5 „

Statistics of New Zealand	9 nos.
Tide Tables for English and Irish Ports	7 "
Reports and Transactions of the Devonshire Association . .	3 vols.
Annual Reports of the Royal Polytechnic Society	17 "
Transactions of the Historic Society of Lancashire and Cheshire	17 "
Transactions of the Royal Scottish Society of Arts	10 "
Results of Trials on H.M. Ships	5 "
Trigonometrical Survey of England and Wales	3 "
Determination of Longitudes of England and Wales	2 "
La Place's Mathematical Works	6 "
Lagrange's " "	6 "
Euler's Mathematical Works	4 "
Simpson's " "	2 "
Dupin's " "	1 vol.
Carnot's " "	1 "
Shipbuilding, by Rankine	1 "
Dublin Magnetical and Meteorological Observations	1 "
Maxima and Minima (Ramchundra)	1 "
Meteorological Results Toronto, 1862	1 "
Army Meteorological Register	1 "
Mathematical Tracts from Library of the late Mr. Christie	
Magnetical and Meteorological Observations at Lake Athabasca.	
Sundries (English Pamphlets).	
U. S. Coasts Survey, Report of Superintendent	25 vols.
Annals of the Dudley Observatory	4 "
Transactions of the Albany Institute	5 "
Proceedings of the American Geological and Statistical Society	10 "
Reports of the National Academy of Sciences	5 "
Documents of the U. S. Sanitary Commission	5 "
State Transactions of the Historic Society of Wisconsin . .	6 "
Report of Geological Reconnaissance of Arkansas	2 "
Proceedings of the Boston Society of Natural History	45 "
" of the American Association for the Advance- ment of Science	12 "
Monthly Report of the Commissioners of the Revenue of U. S. A.	5 "
Proceedings of the American Academy of Arts and Sciences	20 "
Proceedings of the American Philosophical Society	50 "
Papers relating to Harvard College	60 "
Proceedings of the Academy of Natural Sciences, Phila- delphia	71 "
Smithsonian Miscellaneous Collections	20 "
" Contributions to Knowledge	26 "
Memoirs of the American Academy	9 "
Washington Astronomical and Meteorological Observa- tions	9 "
Maury's Sailing Directions	3 "
Transactions of the American Philosophical Society	6 "

Meteorologische Beobachtungen Aufgezeichnet auf Christiania Observatorium	3 vols.
Beretning om en Botanisk Reise af H. L. Lorensen	6 „
Index Scholarum in Universitate Christiania	18 „
Sundries. (Norwegian Pamphlets.)	
Sitzungsberichte der Mathematisch Naturwissenschaftliche Classe der Akademie der Wissenschaften	280 „
Sitzungsberichte der K. B. Akademie der Wissenschaften	78 „
Mittheilungen der Naturforschenden Gesellschaft in Bern	11 „
Monatsberichte der K. P. Akademie der Wissenschaften zu Berlin	80 „
Annalen für Meteorologie und Erdmagnetismus	6 „
Beobachtungen Meteorologische an der Wiener Sternwarte	22 „
Verhandlungen der Allgemeinen Schweizerischen Gesellschaft der Naturwissenschaften	16 „
Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie	130 „
Reise der Oesterreichischen Frigate Novara, Magnetische Beobachtungen	3 „
Magnetische Beobachtungen in Wien	4 „
Tageblatt der 32 Versammlung der N. W. A. in Wien, 1856	9 „
Jahrbucher der K.-K. Central Anstalt für Meteorologie und Erdmagnetismus in Wien. 1856-1859, 1 of each, 1866-1869, 2 of each	10 nos.
Det Kongelige Norske Universitets Aarberetning, 1856 to 1858	8 vols.
Travaux de la Commission pour fixer les mesures et les poids de l'Empire de Russie	3 „
Abhandlungen der Math-Physikal Classe der K. B. Akademie der Wissenschaften	4 „
Bulletin der Akademie der Wissenschaften der München.	47 „
Sundries. (German Pamphlets.)	
Annaes do Observatorio do Infante D. Luiz	46 „
Trabalhos „ „ „ „	5 „
Mémoires de Académie Reale de Sciences de Lisboa	8 „
Annaes da Academia das Sciencias Lisboa	12 „
Coimbra, Observacoes Meteorologicas	21 „
Sundries. (Portuguese Pamphlets.)	
Russian Nautical Magazine	63 „
Harmonia Mensuram.	
Ædes Hartwellianæ	1 vol.
Speculum Hartwellianum	1 „
Diverse Machine (Ramelli)	1 „
Memorie dell' I. R. Istituto Lombardo	5 vols.
Memorie della Società Italiana delle Scienze	5 „
Memorie dell' Osservatorio del Collegio Romano	10 „
Memorie del Reale Istituto Lombardo	41 „
Atti dell' Accademia Pontificia de' Nuovi Lincei	90 „
Atti del Reale Istituto Lombardo	29 „

Atti della Reale Accademia delle Scienze di Napoli.....	7 vols.
Bulletino Meteorologico dell' Osservatorio del Collegio Romano	9 „
Giornale dell' I. R. Istituto Lombardo.....	44 „
Rendiconti del Reale Istituto Lombardo	112 „
Sundries. (Italian Pamphlets.)	

APPENDIX III.

Inventory of Apparatus and Instruments at present in the Kew Observatory, with the names of Owners or Funds by which they were purchased. May 1871.

[Abbreviations adopted in col. 2:—Brit. Assoc. for British Association; Don. Fund for Donation Fund; Gov. Grant for Government Grant Fund; Met. Com. for Meteorological Committee; Par. Ex. Fund for Paris Exhibition Fund; Roy. Ast. Soc. for Royal Astronomical Society; Royal Soc. for Royal Society.]

<i>Entrance Hall.</i>	Property of, or Purchased by, Royal Soc.
Bird's Mercurial Thermometer	
Captain Kater's Hygrometer, by Robinson	„
Dr. Lind's Portable Wind Gauge	„
Huygens's Aerial Telescope (twelve parts).....	„
Huygens's Object-glass	„
Huygens's Object-glass, with two Eye-glasses by Scarlet	„
Flamsteed's Object-glass (Venetian)	„
Dollond's 42-inch Transit, with a cast-iron stand ..	„
Short's 36-inch Reflecting Telescope, with an Object- glass Micrometer by Dollond (nine parts)	„
Kater's Convertible Pendulum, with the Agate Planes	„
Captain Sabine's Cylindrical Pendulum, vibrating on Planes; with the Knife-edges	„
Apparatus, with Leaden Balls, by Paull of Geneva (ten parts)	„
Nairne and Blunt's 12-inch Dipping Needle (two parts)	„
A 12-inch Variation Needle.....	„
Dr. Godwin Knight's Battery of Magnets	„
Air-Pump, with Double Barrel	„
Nairne's Air Condenser (three parts)	„
Ramsden's Great Theodolite, with other Instruments and Apparatus employed by Major-General Roy in the Trigonometrical Survey (sixty-six parts, in four cases), incomplete	„

Cary's Large Levelling Instrument (twenty-one parts)	Royal Soc.
Troughton and Simms's Large Levelling Instrument (twenty parts)	}
Adams's 5-inch Theodolite (two parts)	
Bowles's Trigonometer (four parts)	"
Troughton's Repeating Circle, of 1 foot diameter . .	"
Ramsden's 10-inch Protractor, with Vernier to 1' . .	"
Bird's 12-inch Astronomical Quadrant (fifteen parts)	"
Fordyce's Hydrometer	"
Cole's Orrery, explanatory of Eclipses	"
Two Miner's Compasses	"
Armed Loadstone	"
Le Cerf's Brass Instrument	"
Curious Steel Callipers for very accurate measurement, by Paul of Geneva: 1777	}
Rowning's Universal Constructor of Equations	
Chronometer Stove, for ascertaining the Influence of Temperature on the Rate of Chronometers (six parts)	}
Wedgewood's Pyrometer; or Thermometer for measuring high degrees of heat (sixty-six parts)	
Two strong Brass Pulleys	"
Bird's 4-foot Refracting Telescope	"
Dicas's Hydrometer	"
Hadley's Metal for a Newtonian Reflector, with several wooden Eyepieces, but without Tube or Mounting	}
Troughton and Simms's 6-inch Circular Protractor . .	
Baily's Pendulum, No. 2	Roy. Ast. Soc.
Standard Wrought-iron bar used in Mallet's Experiments, 1838-1842	}
Observing Telescope used by Schlagintweit.		Brit. Assoc.
Experimental Tubes employed in the construction of Welsh's Standard Barometers	}
Six 39-inch Glass Slabs.		Gov. Grant.
Sixty Lamp Chimneys	Brit. Assoc.
Eight 14-inch Magnets.	
Sundry Lamps, Plate Boxes, Daguerotypes and Apparatus employed with Ronalds's Self-recording Barograph and Magnetograph	}
Sundry Chemical Apparatus used with Addams's Carbonic acid Gas Generators . . . . .		Donat. Fund.
Three large Magnetometers with Marble Slabs, Pillars, Reading Telescopes, &c.	Gov. Grant.
Two Thermometer Testing-jars (damaged)	Brit. Assoc.
Two 6-inch Bull's-eye Lenses.	
Sir W. Thomson's Portable Atmospheric Electrometer	}
Sir W. Thomson's Recording Atmospheric Electrometer . . . . .		Prof. Sir W. Thomson.
Various pieces of Electrical Apparatus	"
Sundry Lenses.	Sir F. Ronalds.

Galton's Dial Anemometer, with Battery, &c.	Met. Com.
Artificial Horizon	Sir E. Sabine.
Heliostats and Reflectors used in Mr. Galton's Sextant Testing Apparatus	} Geogr. Soc.
Apparatus for Trisecting an Arc.	
Saussure's Hygrometer	Sir F. Ronalds.
Seven-inch Protractor, by Jones.	
Marine Barometer.	
Two Patent Compensated Barometers, by Harris.	
One 30-inch Steel Bar.	
Two Kriehl's Self-recording Barometers, with Spare Tubes	} Brit. Assoc.
Tube of Ronalds's Photo-barograph	
Glass Receiver (damaged).	Gov. Grant,
Model of Sheerness Tide-gauge	Royal Soc.
Mallet's Model of the Descent of Glaciers.	
Several Models, not named.	
Appold's Automatic Hygrometer	Royal Soc.
Appold's Automatic Temperature Regulator	"
Lindley's Patent Central Thermometer.	
Lindley's Model of Fire Escape.	
Perspective Instrument	Sir F. Ronalds.
Barrow's Dip Circle, No.	Sir E. Sabine,
Robinson's 6-inch Circle	"
Two Uniflars and a Declinometer, by Gibson	"
Seven Tripods	"
Balance of Torsion.	
A Watchman's Clock.	
Oertling's Balance	Gov. Grant.
Two Aspirators	"
Wooden Wind-pressure Gauge	"
Altazimuth, by Cary	Sir E. Sabine.
Ronalds's Atmospheric Electrical Apparatus	Gov. Grant.
Model of Mr. De La Rue's Tower for supporting Huyghen's Aerial Telescope-lenses	Par. Ex. Fund.
Model of a design for Photoheliograph Mounting ..	Brit. Assoc.
Leyden Jars	Mr. Gassiot.

Testing Room.

Six frames exhibiting Kew and Lisbon Magnetic Curves	} Brit. Assoc.
Two Welsh's Standard Barometers	
Cathetometer	Gov. Grant.
Receiver for testing Barometers, with Air-Pump, &c.	"
Apparatus for testing Thermometers	"
Newman's Standard Barometer, No. 34	"
Brass Mural Quadrant	Observatory.
Spare Tubes for Standard Barometer construction ..	Gov. Grant.
Thomson's Galvanometer and Apparatus employed by Dr. Stewart in Rotating Disk experiments	} "
Siemens's Air-Pump	
Sprengel's Air-Pump	"

Parts of Ronalds's Magnetographs	Gov. Grant.
Air-Thermometer (incomplete)	"
MSS., Books, Papers, Documents, and Correspondence referring to Meteorological work.	

Transit Room.

Thermometer-waxing Apparatus	Brit. Assoc.
Photographic Paper Waxing Apparatus	"
Thomson's Atmospheric Recording Electrometer ..	Met. Com.
Thermograph	"
Chronometer, Arnold	Gov. Grant.
Invariable Pendulum	Royal Soc.
Pendulum, No. 8	"
Dip Circle, by Jordan	Sir E. Sabine.
Declinometer, by Robinson and Barrow	"
Five Daniell's Hygrometers	"
Four Declinometers (various makers)	"
Artificial Horizon	"
Four Thermometers	"
Three Herschel's Actinometers	"
10-inch Azimuth Compass	"
Vertical Force Magnetometer	"
Standard Yard	"
Three Dip Circles and one Fox's Circle	"
Several old Observing Telescopes and incomplete } Magnetic Apparatus	"
Photographic Paper, waxed and unwaxed	Brit. Assoc.
Sundry Bottles, Chemicals, and Apparatus employed in the ordinary work of the Observatory	"

Computing Room.

Dividing Engine by Perreux, and Apparatus employed in the construction of Standard Thermometers	Gov. Grant.
Standard Thermometers, divided and undivided	Brit. Assoc.
Evaporation Gauge (exhibited at Paris)	Par. Ex. Fund.
Portable Barometer, by Newman	Sir E. Sabine.
Gay-Lussac Barometer, by Bunter.	
Troughton and Simms's Mercurial Standard Thermometer	Royal Soc.
Newman's Spirit Thermometer for very low Temperatures	"
Jones's Hygrometer	"
Set of Bar Magnets (six)	"
Pair of Levelling Staves, by Jones	"
Sundry old Thermometers.	
Thermometer, by Greiner	Sir E. Sabine.
Dry and Wet Thermometer, from Hobarton.	
Thermometer, No. 2, from Greenwich Observatory.	
Actinometer Tube	{ Rev. C. Hodgkinson.

Actinometer Tube	Royal Soc.
Two Actinometers	{ Rev. C. Hodg- kinson.
Three Actinometers .....		Royal Soc.
Ten Hydrometers.	
Spirit-level used in Pendulum experiments	Gov. Grant.
Small Boiling-point Apparatus	Par.Ex.Fund.
Two Mountain Thermometers.	
One Regnault's Hygrometer	Gov. Grant.
One Daniell's Hygrometer.	
Several Declinometers, by various makers	Sir E. Sabine.
Several Uniflars, by various makers	"
Several Dip Circles, by various makers	"
Two Altazimuth Instruments	Admiralty.
Repeating Circle, by Dollond	Sir E. Sabine.
Vertical Force Magnetometer	"
Sundry Magnets, Dip Needles, Magnet Fittings, In- ertia Bars, Rings, &c., belonging to various instru- ments	{ "
Magnets and Needles in use at the Observatory....	
Standard Yard	Gov. Grant.
Standard Weights.....	"
Jars and Standard Solutions used in Hydrometer- testing!	Brit. Assoc.
Chemicals and Chemical Apparatus used in the Ob- servatory	{ "
Apparatus employed by Prof. Clerk Maxwell.	
Telescope support, by Goloz.....	Royal Soc.
Several Tripods	"
Surveying Rods	"
6-inch Globe	"
Model of Hydraulic Anemometer	Mr. Galton.
Several Rules and Scales in use	Brit. Assoc.
Box of Ozonometer Papers.	
Magnetograph Curves	Brit. Assoc.
Magnetic Observation-books	"
MS. Papers of Magnetic Reductions	"
MS. Papers on various subjects	"
Surplus copies of Publications issued by Observatory	{ Roy. Soc. and Brit. Assoc.
Wood Engravings of Magnetograph Drawings ....		Brit. Assoc.

South Hall.

Cooke's Sextant Testing Apparatus.....	Gov. Grant.
Shelton's Astronomical Regulator, with Gridiron Pen- dulum	{ Royal Soc.
Gas Governors and Regulators .....		Don. Fund.

Magnetograph Room.

Magnetographs	Gov. Grant.
Earthenware Stove	Brit. Assoc.

Deflecting Apparatus	Brit. Assoc.
Barograph	Met. Com.
Rigid Spectroscope	Mr. Gassiot.
<i>Pendulum Room.</i>	
Vacuum Chamber and Vibrating Apparatus	Admiralty.
Observing Telescope	"
Shelton's Astronomical Regulator	Royal Soc.
<i>Transit House.</i>	
Portable Transit Instrument	Sir E. Sabine.
Apparatus for determining Scale value of Levels ..	Mr. Adie.
<i>Lower Photographic Room.</i>	
Baths, Dishes, Bottles, and Chemical Apparatus....	Gov. Grant.
Chemicals and Paper	Brit. Assoc.
Printing Frames	"
<i>Meteorological Room.</i>	
Globe	Brit. Assoc.
Barograph, Thermograph, and Anemograph Curves..	Met. Com.
Ditto (duplicates)	Brit. Assoc.
Tabulations of ditto (duplicates).	
Scales, Rules, &c., employed in tabulating Curves..	Met. Com.
Post Cases, MSS. and Documents in connexion with the Meteorological Committee's work	"
Working Drawings of Instruments.	
Observatory Correspondence.	
Furniture and Fittings	Met. Com.
<i>Sun Room.</i>	
Sun Pictures (Negatives)	Gov. Grant.
Sun Pictures (Prints)	"
Thirty-seven Vols. Schwabe's Observations (MSS.)..	Roy. Ast. Soc.
Sundry Papers connected with Solar Research.	
Sundry Volumes of Kew Electrical and Meteorological Observations (MSS.).	
Surplus Lithographed and Engraved copies of Kew Magnetic Curves	} Gov. Grant.
Photo-galvanographed Plates of Curves, by Paul Pretsch	
Spare Magnets for Magnetographs	Mr. Adie.
One Magnetic Tabulator	Brit. Assoc.
Two Magnetic Tabulators	{ Brit. Assoc., Mr. Gassiot.
<i>Lofts.</i>	
Old Observing Clock.	
Parts of old Electrical and Meteorological Apparatus	Brit. Assoc.
Parts of old Royal Society Apparatus	Royal Soc.
<i>Solar Photographic Room.</i>	
Anemograph with Blank sheets	Met. Com.
Baths, Dishes, Printing-frames, Bottles, Paper, Che-	

micals, Glass, &c., used in connexion with the Photoheliograph Gov. Grant.

Dome.

Photoheliograph Don. Fund.
Robinson's Registering Anemometer (dismounted) Brit. Assoc.

Roof.

Old Pressure Anemometer (incomplete) Brit. Assoc.
Old Rain-gauge (incomplete) "

Magnetic Observatory.

Declinometer } Sir E. Sabine.
Dip Circles }
Sundry Apparatus employed in Magnetic Determinations } "
Stone Pillars "

Workshop (No. 1).

Whitworth Lathe } Don. Fund.
Planing Machine }
Holtzapffel Lathe Sir F. Ronalds.
Forge Don. Fund.
Forge Brit. Assoc.
Surfaces and Straight Edges Gov. Grant.
Grindstone Brit. Assoc.
Vices "
Castings and Tools "

Workshop (No. 2).

Electro-magnet and Battery Sir E. Sabine.
Carbonic-acid Gas Generators Gov. Grant.
Ronalds's Barograph (incomplete) "
Gas-holder Mr. Atkinson.
Glass-blowing Table Gov. Grant.
Still "
Sundry Packing-cases.

Enclosure.

Self-recording Rain-gauge Met. Com.
Rain-gauge (ordinary) Brit. Assoc.
Two Dial Anemometers Met. Com.
Mowing Machine and sundry other Garden Tools Brit. Assoc.

Verification House.

Stone Pillars for erecting Self-recording Magnetographs } Don. Fund.
Self-recording Barograph, Thermograph, and Anemograph (undergoing examination) } Met. Com.

In the Custody of B. Loewy, Esq., 11 Leverton Street, N.W.

Mr. De La Rue's Micrometer for measuring Astronomical Photographs (in use for measuring the photographs obtained with the heliograph).

Accounts of the New Committee of the British Association from September 15, 1870, to August 2, 1871.

RECEIPTS.		PAYMENTS.	
	£	s.	d.
Received from the General Treasurer	600	0	0
For the verification of Meteorological Instruments:—			
From the Meteorological Office.....	54	4	0
From Opticians and others	71	12	9
For the verification of Magnetical Instruments	125	16	9
For the construction of Standard Thermometers	5	10	0
From the Meteorological Office:—			
Allowance for 10 months as one of the Observatories of the Meteorological Committee, at £250 per annum....	208	6	8
Extra allowance to Kew as Central Observatory, ten months, at £400 per annum	333	6	8
For ruling Fiducial lines on curves.....	68	3	6
For services of Assistant	12	10	0
Balance of grant received from the Royal Society by Professor Balfour Stewart, available for and applied to Magnetic reductions	96	6	1
Profit from sundry commissions	12	1	1
Balance	40	16	3
	£1514	7	0
	<hr/>		
	853	6	0
Apparatus, Materials, Tools, &c.	52	7	1
Ironmonger, Carpenter, Mason, &c.	9	15	3
Printing, Stationery, Books, Postage, &c.	35	5	5
Gas and Coals	61	8	9
House Expenses, Chandlery, &c.	66	14	7
Porterage and petty expenses	30	14	8
Meteorological work done at extra hours.....	44	7	0
Magnetical tabulations done at extra hours and by supernumerary assistants	349	8	3
Rent of Land attached to Observatory.....	11	0	0
	£1514	7	0
	<hr/>		
	40	16	3
Balance due to Prof. Balfour Stewart			

Examined with the vouchers and found correct, the balance due to Prof. Balfour Stewart being forty pounds sixteen shillings and threepence.

14th July 1871.

WARREN DE LA RUE.

Outstanding Liabilities, July 18, 1871.

	£	s.	d.
Balance as above	40	16	3
Due on open Accounts	71	18	10
Accruing Salaries.....	75	0	0
	£197	15	1