

*Report of the Kew Committee for the Year ending  
October 31, 1875.*

*Magnetic Work.*—The year has been marked by the recommencement of regular work with the Magnetographs, which had been taken down for examination and repair by Mr. Adie, as described in the last Report. The scale-values having been redetermined, the instruments were set in action on the 1st of January, 1875, and therewith the second series of continuous photographic records of magnetic phenomena was inaugurated.

The monthly observations with the absolute instruments have been continued, as usual, by Mr. G. M. Whipple, who also takes charge of the general magnetic work, in which he has had the assistance of Mr. Cullum and F. Figg. The two Sergeants of the Royal Artillery, formerly in Sir E. Sabine's office at Woolwich, have been in regular attendance at Kew throughout the year.

The principal constants employed in the computations for the Tables used in the reduction of the monthly absolute observations which had been determined by Mr. Welsh have been re-examined. A memorandum containing the results of the observations in question for the twelve months ending Sept. 30, 1875, has been prepared, and is appended to this Report; and it is the intention of the Committee to furnish similar statistics with each of their subsequent Reports.

A paper embodying the results of absolute determinations for the six years ending with March 1875 has been prepared and submitted to the Society; it forms a continuation of the similar paper for the preceding six years, ending March 1869, which was submitted by Dr. B. Stewart, and is printed in the 'Proceedings of the Society,' vol. xviii.

The Magnetic Reductions for the current year have been kept up nearly to date. As regards the arrears of work shown in the tabular statement appended to the Report of the Kew Committee of the British Association for 1870-71, no progress had been made in dealing with any of the elements (with the exception of the tabulation of the Declination curves) up to the month of April last, owing to the insufficiency of the regular staff to deal with such a mass of materials; at that period, however, an extra assistant was engaged to undertake the reduction of these arrears. By this means good progress has been made with the first portion of this work, the preparation of the "fair" and "subsidiary" tabulations for the years 1871-1873.

Magnetic data have been supplied to Sir W. Thomson, LL.D., Dr.

Atkinson, Capt. Ettrick Creak, R.N., Mr. Woodward, and Mr. H. A. Rowland.

The Unifilar and Dip-circle lent to the Rev. S. J. Perry for use at Kerguelen Island on the Transit-of-Venus Expedition, as mentioned in last Report, have been returned by that gentleman. A Unifilar lent from Kew, in the year 1869, to Capt. Elagin, Imperial Russian Navy, was returned by him in February of this year, and at his request the constants were redetermined and the results forwarded to him. He has left a Dip-circle at Kew to be repaired.

*Meteorological Work.*—The several self-recording instruments for the continuous registration respectively of Pressure, Temperature, Humidity, Wind (Direction and Velocity), and Rain have been maintained in regular operation as usual under the care of Mr. T. W. Baker, assisted by T. Gunter. The daily standard eye-observations for the control of the automatic records have been made regularly.

In addition to the regular work of Kew as one of the self-recording Observatories in connexion with the Meteorological Office, the duty of examining and checking the work of all the seven Observatories of the same character has been carried on, in accordance with the method described in the Report of the British Association for 1869. This portion of the work has been performed by Messrs. Cullum, Hawkesworth, and Deane. In the month of August application was made to the Observatory by the Meteorological Office for the services of one of the staff to take temporary charge of the Valencia Observatory, owing to the serious illness of the Superintendent of that Station, the Rev. Thomas Kerr, who has since died. Mr. Cullum at once consented to undertake the duty, and he has remained at Valencia up to the present time. This change has necessarily weakened the working power of Kew in the special department now under consideration; and in consequence a certain amount of arrears have accumulated, but these will be ere long cleared off.

The only change as regards the photographic instruments has been the substitution of copper chimneys for the gas-jets for the glass chimneys formerly in use, an alteration which has proved to be beneficial.

The result of a careful comparison of the thermogram tabulations at the several observatories, obtained by the use of the fiducial lines traced on the curves by photography, with the standard readings, has shown that the original glass scales supplied (the values for which had been determined at Kew in 1868) were not in all instances sufficiently exact, and new scales have accordingly been supplied where requisite.

*Electrometer.*—The Self-recording Electrometer continues in operation. Some imperfection, of which the cause was not clearly ascertained, interrupted the continuity of the action of the instrument in August; but this was overcome and the record resumed. Experiments for obtaining the scale-value have been made by the use of a battery of 100 Bunsen's cells.

Mr. Ellis, Superintendent of the Meteorological and Magnetic De-

partment at the Royal Observatory, Greenwich, has visited Kew, by direction of the Astronomer Royal, in order to examine the instrument, in the view of the possible procuring of a similar apparatus for Greenwich.

*Photoheliograph.*—The instrument which, in February 1873, was transferred to Greenwich for the use of the Astronomer Royal has been reported by him to be ready for immediate return to Kew.

The re-examination of the measurements of the Kew sun-pictures, as noticed in the last Report, has been steadily carried on throughout the year (at the expense of Mr. De La Rue, D.C.L.) by Mr. Whipple, assisted by Mr. M'Laughlin, who has been temporarily engaged for this purpose.

The eye-observations of the sun, after the method of Hofrath Schwabe, have been made daily by Mr. Foster, when possible, as described in the Report for 1872, in order, for the present, to maintain the continuity of the Kew record of sun-spots.

*Extra Observations.*—The experiments with a Photometer for measuring the total intensity of daylight, which has been designed by Prof. H. E. Roscoe, Ph.D., have been continued during the year, as mentioned in last Report. The original instrument provided by Prof. Roscoe having proved defective, it was replaced by another, which remains on trial.

The observations with Thermometers at different levels on the Pagoda in Kew Gardens were resumed in November 1874, after an interval of a few months, and were continued until March, when the experiments were concluded, having lasted over nearly two years. The results have been sent to the Meteorological Office, at the expense of which Department the investigation was conducted.

A commencement has been made of the observation of Solar Radiation at Kew; and Thermometers for that purpose ("Black bulbs *in vacuo*" by different makers) have been placed in the grounds and read regularly.

The Registering Sundial invented by Mr. J. F. Campbell, F.G.S., which has been in operation for several years at the Office of the Local Government Board, 8 Richmond Terrace, Whitehall, has been transferred to Kew, and is in action at the Observatory. It consists of a glass sphere and wooden bowl, and the effect is measured by the amount of wood charred by the sun's action in the course of six months. Experiments are in progress to obtain a satisfactory daily record of the duration of the sun's heating-action by a similar method.

*Verifications.*—This department of the Observatory continues to exhibit increased activity, and, in more than one respect, important steps have been taken with the view of augmenting its efficiency.

The following magnetic instruments were verified:—

2 Unifilers for the Arctic Expedition.

2 Declinometers for the Arctic Expedition.

- 2 Barrow's Dip-circles for the Arctic Expedition.
- 3 Fox's Circles for the Arctic Expedition.
- 1 Fox's Circle for Staff-Commander Creak.
- 1 Dip-needle for H.M.S. 'Challenger.'

Constants were determined for 3 Magnets for the Admiralty.

The set of Magnetographs ordered by Capt. C. Pujazon for the Marine Observatory of San Fernando, near Cadiz, have been constructed, and, after verification at Kew, have been forwarded.

A similar set of Magnetographs has been ordered by Dr. Vogel for the new Astrophysical Observatory at Potsdam, near Berlin.

A Unifilar and Dip-circle have been obtained for Padre F. Denza, of the Observatory of Moncalieri, and have been forwarded to him after verification.

The following meteorological instruments have been verified, this portion of the work being entrusted to Mr. T. W. Baker, assisted by Messrs. Foster, Constable, and Welsh :—

Barometers, Standards .....	67
"    Marine and Station .....	126
	193
Aneroids .....	21
Thermometers, ordinary Meteorological .....	1238
"    Boiling-point Standards .....	64
"    Mountain .....	20
"    Clinical .....	1439
	2761

In addition, 272 Thermometers have been tested at the melting-point of mercury.

The Committee are glad to say that this department of the operations at Kew shows a very satisfactory increase in utility, as is proved by the following statement, showing the fees paid for the verification of Barometers and Thermometers during the three years 1873-75 :—

	Barometers.			Thermometers.			Total.		
	£	s.	d.	£	s.	d.	£	s.	d.
1873 ....	72	5	0	110	17	6	183	2	6
1874 ....	55	10	0	157	16	0	213	6	0
1875 ....	88	7	0	214	17	0	303	4	0

The increase has been mainly under the head of instruments received from opticians.

The Committee have it in contemplation to improve the utility of Kew for the verification of instruments by opening an office in London for

their receipt, so as to relieve opticians from the trouble of sending the instruments to Kew and fetching them back again.

13 Standard Thermometers have been calibrated and divided at Kew.

The following is the list of miscellaneous instruments which have been verified :—

Hydrometers .....	150
Rain-gauges .....	3
Dial Anemometers (Robinson's).....	6

A Thermograph has been tested and its scale-values determined for the Mauritius Observatory.

A double box Sextant, together with a Transit-Theodolite, has been obtained, verified, and forwarded to Major Knight in India.

The apparatus devised by Mr. F. Galton for facilitating the verification of Thermometers, which was mentioned in the last Report, has been erected at Kew, and has been found of great service, especially in the way of affording means of maintaining high temperatures for a considerable length of time.

A number of tubes of exceptional range, for the construction of Standard Thermometers, have been added to those at present in stock.

With reference to the testing of Anemometers, as mentioned in last Report, with the hope that the experiments with artificial rotation would be resumed on a future occasion, it has been found that the large expense which would be entailed to provide a suitable apparatus for use at Kew would exceed the resources of the Observatory. These investigations have therefore not been carried out hitherto.

It has appeared desirable to replace the Cathetometer used in connexion with the Standard Barometer by a new instrument; and accordingly such an apparatus is in process of construction. As soon as this is completed it is intended to institute a comparison between the Standard Barometers at Kew and Greenwich, the Astronomer Royal having most readily consented to such an operation.

Information on meteorological results has been supplied to Mr. G. J. Symons, the Secretary of the Northern Institute of Mining Engineers, Mr. K. J. Marks, and the Editor of the 'Illustrated London News.'

*Pendulum Apparatus.*—In the use made of the Kew pendulum vacuum-chamber by Capt. Heaviside, R.E., in the course of the year 1874, it was found that a certain amount of deterioration in the joints had taken place. These have since been newly ground and rendered air-tight so as to be ready for use.

Mr. C. J. Peirce, of the United States Coast Survey, having made through the Admiralty an application to the Royal Society to be allowed to swing his pendulums at Kew, has at once received permission, and the experiments will be undertaken in the course of the ensuing year.

Two Iron Tripods, which had been formerly used for swinging invariable pendulums, and had remained in store at Kew, were granted by the Committee to the Hydrographer for the service of the Arctic Expedition. They were repaired at the expense of the Admiralty; and while one of them still remains at Kew, the other has been supplied to the Expedition, together with the wooden clock-supports; at the same time an Astronomical Clock (Shelton, No. 35) was also supplied to the Hydrographic Office.

*Chronometer Testing.*—It has been under deliberation during the year whether or not it would be advisable to institute at Kew an Office for the testing and rating of Chronometers, of a similar character to that conducted at Bidston Observatory by Mr. J. Hartnup.

The President and Council of the British Horological Institute have expressed themselves favourably to the proposal in a scientific point of view; but as yet no decision has been arrived at by the Committee.

*Instruction given.*—Four Officers from the Arctic Expedition attended at Kew for instruction in the use of Magnetic instruments, and two others for instruction in the swinging of pendulums and in the use of the Transit-Instrument. The final observations of these gentlemen were recorded for making Kew a base station. Certain modifications in the absolute Magnetic instruments, designed by Mr. Whipple for adaptation for use in high latitudes, have been effected to the satisfaction of the Hydrographer.

Lieut. Wille, of the Norwegian Navy, received instruction in the use of Magnetic instruments.

Mr. H. F. Blanford, Meteorological Reporter to the Government of India, received instruction in the general working of Meteorological instruments, Mr. Northcote in the use of Astronomical, and the Rev. Charles J. Taylor in the use of Meteorological instruments.

Waxed paper has been supplied to

The Radcliffe Observatory.  
Zi-ka-Wei, China.  
Vienna.  
San Fernando.

The Mauritius.  
Bombay Observatory.  
Armagh.  
The Meteorological Office.

A collection of apparatus, principally electrical, which had belonged to the late Sir Francis Ronalds, and had remained in store at Kew from the time of his resigning the superintendence of the Observatory, was most kindly presented to the Committee by his executors in the month of April.

The several pieces of Mechanical Apparatus, such as the Whitworth Lathe and Planing-Machine, procured by Grants from either the Government-Grant Fund or the Donation-Fund, for the use of the Kew Observatory, have been kept in thorough order; and many of them are in constant and others in occasional use at the Observatory.

*Library.*—The usual Donations of Scientific Periodicals, both English and Foreign, have been received at Kew.

*Observatory and Grounds.*—H.M. Commissioners of Woods and Forests have supplied a Stove for erection in the Verification Room.

Application has been made to the same Office for the formation of a gravelled footway across the Old Deer Park to the Observatory, and for certain internal repairs to the Building.

The detached houses within the Observatory-enclosure, used respectively for Magnetic Observations, workshop, and store-house, have been thoroughly cleaned and painted.

*Staff.*—The Staff employed at Kew are as follows:—Mr. Samuel Jeffery, Superintendent; G. M. Whipple, B.Sc., First Assistant; T. W. Baker, Second Assistant; J. E. Cullum, J. W. Hawkesworth, J. Foster, F. Figg, A. B. Deane, E. Constable, G. A. Henniker, T. Gunter, and P. Welch.

Mr. Robert H. Scott continues to act as Honorary Secretary to the Committee.

*Visitors.*—The Observatory has been honoured by the presence, among others, of:—

Prof. J. C. Adams, LL.D., of Cambridge.

Dr. C. Borgen, Marine Observatory, Wilhelmshaven.

Señor Da Souza, of Coimbra.

Dr. Adolph Hirsch, Neufchâtel.

British Horological Institute, a Deputation from.

Capt. Hoffmann, Wilhelmshaven.

Prof. H. M'Leod, F.C.S., and the Students of the Royal Indian C.E. Coll., Cooper's Hill.

M. Redier, Paris.

Dr. Ruhlmann, of Hanover.

Mr. H. C. Russell, of Sydney.

Prof. Sporer, of Anclam.

Dr. H. Vogel, Sonnenwarte, Potsdam.

The following is the Balance Sheet of the Observatory for the year; and it will be seen from it that the finances are in a fairly satisfactory condition:—



## APPENDIX.

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*Magnetic Observations made at the Kew Observatory, Lat. 51° 28' 6" N.,  
Long. 0<sup>h</sup> 1<sup>m</sup> 15<sup>s</sup>.1 W., for the year October 1874 to September 1875.*

The observations of Deflection and Vibration given in the annexed Tables were all made with the Collimator Magnet marked K C 1, and the Kew 9-inch Unifilar Magnetometer by Jones, the property of the Magnetic Office, directed by General Sir E. Sabine.

The Declination observations have also been made with the same Magnetometer, Collimator Magnet N E being employed for the purpose.

The Dip observations were made with Dip-circle No. 33, the needles 1 and 2 only being used; these are 3½ inches in length.

The results of the observations of Deflection and Vibration give the values of the Horizontal Force, which, being combined with the Dip observations, furnish the Vertical and Total Forces.

These are expressed in both English and metrical scales—the units in the first being one foot, one second of mean solar time, and one grain; and in the other one millimetre, one second of time, and one milligramme, the factor for reducing the English values to metric values being 0.46108.

The moment of inertia of the magnet with its stirrup was determined in 1858 by the late Mr. Welsh, as were also the coefficients applied in corrections for temperature variations and terrestrial induction.

The value of  $\log \pi^2 K$  employed in the reduction is 1.64457 at temperature 60°.

The induction-coefficient  $\mu$  is 0.000194.

The correction of the magnetic power for temperature  $t_0$  to an adopted standard temperature of 35° Fahr. is

$$0.0001194(t_0 - 35) + 0.000,000,213(t_0 - 35)^2.$$

The true distances between the centres of the deflecting and deflected magnets, when the former is placed at the divisions of the deflection-bar marked 1.0 ft. and 1.3 ft., are 1.000075 ft. and 1.300097 ft. respectively.

The times of vibration given in the Table are each derived from the mean of 12 or 14 observations of the time occupied by the magnet in making 100 vibrations, corrections being applied for the torsion-force of the suspension-thread subsequently.

No corrections have been made for rate of chronometer or arc of vibration, these being always very small.

The value of the constant P, employed in the formula of reduction  $\frac{m}{X} = \frac{m'}{X'} \left( 1 - \frac{P}{r_0^2} \right)$ , is -0.00192.

In each observation of absolute Declination the instrumental readings have been referred to marks made upon the stone obelisk erected about

a quarter of a mile north of the Observatory as a meridian mark, the orientation of which, with respect to the Magnetometer, was determined by the late Mr. Welsh, and has since been carefully verified.

The observers' initials refer—W to Mr. G. M. Whipple, C to Mr. J. E. Cullum, P to Mr. C. O. L. Power, and F to Mr. F. G. Figg.

Observations of Deflection for Absolute Measure of Horizontal Force.

Month.	G. M. T.	Distances of Centres of Magnets.	Tempe- rature.	Observed Deflection.	Log $\frac{m}{X}$ Mean.	Observer.
1874.	d h m	foot.				
October .....	21 12 33 P.M.	1·0	59·7	15 49 41		W.
		1·3	.....	7 8 23	9·13650	"
	2 17 "	1·0	59·8	15 44 4		"
		1·3	.....	7 8 14		"
November .....	27 12 24 P.M.	1·0	36·5	15 53 22		W.
		1·3	.....	7 10 19	9·13726	"
	2 14 "	1·0	39·2	15 52 52		"
		1·3	.....	7 9 38		"
December .....	22 1 7 P.M.	1·0	32·8	15 54 13		W.
		1·3	.....	7 10 9	9·13647	"
	2 31 "	1·0	33·1	15 51 16		"
		1·3	.....	7 8 24		"
1875.		1·0		15 52 7		W.
January .....	26 11 56 A.M.	1·3	42·6	7 9 11	9·13678	"
		1·0	.....	43·8		"
	12 24 P.M.	1·3	.....	7 8 46		"
February .....	24 2 8 P.M.	1·0	40·2	15 49 48		C.
		1·3	.....	7 8 24	9·13602	"
	2 37 "	1·0	41·8	15 50 10		"
		1·3	.....	7 8 35		"
March .....	22 12 48 P.M.	1·0	51·6	15 46 45		W.
		1·3	.....	7 8 3	9·13586	"
	2 18 "	1·0	52·3	15 48 38		"
		1·3	.....	7 7 22		"
April .....	26 12 38 P.M.	1·0	62·8	15 48 44		C.
		1·3	.....	7 7 50	9·13655	"
	2 8 "	1·0	65·9	15 47 7		"
		1·3	.....	7 6 47		"
May .....	24 1 40 P.M.	1·0	71·4	15 46 7		C.
		1·3	.....	7 6 48	9·13620	"
	2 36 "	1·0	71·1	15 45 43		"
		1·3	.....	7 6 20		"
June .....	23 12 40 P.M.	1·0	69·5	15 47 46		C.
		1·3	.....	7 6 46	9·13629	"
	2 16 "	1·0	73·8	15 44 55		"
		1·3	.....	7 6 10		"
July .....	28 1 34 P.M.	1·0	74·6	15 46 1		C.
		1·3	.....	7 8 19	9·13649	"
	2 38 "	1·0	75·8	15 43 39		"
		1·3	.....	7 5 44		"
August .....	18 12 21 P.M.	1·0	73·6	15 44 24		C.
		1·3	.....	7 5 45	9·13549	"
	2 39 "	1·0	77·8	15 43 8		"
		1·3	.....	7 5 12		"
September .....	21 12 noon.	1·0	67·4	15 47 25		W.
		1·3	.....	7 7 8	9·13617	"
	1 56 P.M.	1·0	69·0	15 44 58		"
		1·3	.....	7 6 26		"

## Vibration Observations for Absolute Measure of Horizontal Force.

Month.	G. M. T.	Temperature.	Time of one Vibration.	Log <i>mX</i> . Mean.	Value of <i>m</i> .	Observer.
1874.	d h m	°	secs.			
October .....	21 11 48 A.M.	57·8	4·6185			W.
	2 51 P.M.	59·2	4·6191	0·31512	0·53188	"
November .....	27 11 47 A.M.	33·8	4·6098			"
	2 44 P.M.	39·6	4·6125	0·31527	0·53243	"
December .....	22 12 26 P.M.	30·8	4·6156			"
	3 20 "	32·0	4·6148	0·31438	0·53140	"
1875.						
January.....	26 11 20 A.M.	41·2	4·6131			"
	12 50 P.M.	45·0	4·6130	0·31548	0·53227	"
February .....	24 1 20 P.M.	36·9	4·6081			C.
	4 18 "	48·6	4·6173	0·31553	0·53183	"
March .....	22 12 24 P.M.	50·7	4·6250			W.
	2 50 "	51·8	4·6194	0·31427	0·53096	"
April .....	26 11 46 A.M.	60·8	4·6261			C.
	2 45 P.M.	68·5	4·6189	0·31577	0·53230	"
May .....	24 1 0 P.M.	71·7	4·6276			"
	3 8 "	71·5	4·6253	0·31540	0·53186	"
June .....	23 11 48 A.M.	68·0	4·6291			"
	3 14 P.M.	73·7	4·6281	0·31480	0·53154	"
July .....	28 11 59 A.M.	73·0	4·6283			"
	3 13 P.M.	75·8	4·6305	0·31485	0·53170	"
August .....	18 11 29 A.M.	73·9	4·6293			"
	3 17 P.M.	77·5	4·6293	0·31488	0·53111	"
September.....	21 11 12 A.M.	64·4	4·6280			W.
	2 21 P.M.	69·2	4·6275	0·31465	0·53139	"

Dip observations.					Magnetic Intensity. (Metrical measures in old-faced figures.)		
Month.	G. M. T.	Needle.	Dip.	Observer.	X, or Horizontal Force.	Y, or Vertical Force.	Total Force.
1874.	d h m		°				
October...	22 2 27 P.M.	1	67 50·00	W.			
	2 30 "	2	47·46	"			
"	23 2 28 "	1	50·06	P.	3·8843	9·5269	10·2881
	3 3 "	2	48·87	"	1·7910	4·3927	4·7437
	Mean.....		67 49·10				
November	23 2 35 P.M.	1	67 49·24	P.			
	2 36 "	2	49·68	"			
"	26 2 34 "	1	51·44	W.	3·8815	9·5275	10·2880
	2 31 "	2	49·84	"	1·7897	4·3930	4·7436
	Mean.....		67 50·05				
December	23 2 40 P.M.	1	67 53·00	"			
	2 40 "	2	48·34	"			
"	24 2 40 "	1	52·06	"	3·8811	9·5065	10·2881
	2 38 "	2	47·78	"	1·7895	4·3833	4·7438
	Mean.....		67 50·30				

Table (continued).

Dip observations.					Magnetic Intensity. (Metrical measures in old-faced figures.)		
Month.	G. M. T.	Needle.	Dip.	Observer.	X, or Horizontal Force.	Y, or Vertical Force.	Total Force.
1875.	d h m		°				
January	22 3 10 P.M.	1	67 49-68	P.			
	3 10 "	2	47-56	"			
"	27 0 15 "	1	67 51-06	W.	3-8846	9-5284	10-2899
	0 16 "	2	48-47	"	1-7911	4-3934	4-7445
	Mean.....	.....	67 49-19				
February	23 2 49 P.M.	1	67 50-06	W.	3-8882	9-5348	10-2970
	2 35 "	2	47-73	"	1-7928	4-3963	4-7478
	Mean.....	.....	67 48-89				
March ...	23 2 19 P.M.	1	67 49-78	W.			
	2 19 "	2	46-75	"	3-8833	9-5179	10-2794
	24 3 36 "	1	[49-88]	F.	1-7905	4-3885	4-7397
	Mean.....	.....	67 48-23				
April.....	27 2 48 P.M.	1	67 51-12	C.	3-8870	9-5398	10-3015
	2 45 "	2	48-72	"	1-7922	4-3987	4-7499
	Mean.....	.....	67 49-92				
May .....	26 2 41 P.M.	1	67 47-37	C.			
	2 43 "	2	46-81	"			
	27 3 5 "	1	48-34	F.	3-8869	9-5203	10-2830
	3 6 "	2	47-40	"	1-7922	4-3897	4-7413
	Mean.....	.....	67 47-48				
June .....	24 2 36 P.M.	1	67 48-31	C.			
	2 40 "	2	48-03	"			
	25 2 54 "	1	48-37	F.	3-8837	9-5183	10-2802
	2 56 "	2	48-03	"	1-7907	4-3887	4-7400
	Mean.....	.....	67 48-18				
July .....	26 3 17 P.M.	1	67 47-53	"			
	3 15 "	2	47-22	"			
	29 2 42 "	1	51-31	W.	3-8831	9-5188	10-2804
	2 43 "	2	47-75	"	1-7904	4-3889	4-7401
	Mean.....	.....	67 48-45				
August ...	19 2 44 P.M.	1	67 48-00	C.			
	2 45 "	2	47-65	"			
	20 3 4 "	1	50-56	F.	3-8877	9-5291	10-2915
	3 6 "	2	47-09	"	1-7926	4-3937	4-7453
	Mean.....	.....	67 48-32				
September	20 3 8 P.M.	1	67 49-81	F.			
	3 9 "	2	48-68	"			
	23 2 44 "	1	50-94	W.	3-8836	9-5247	10-2861
	2 51 "	2	46-65	"	1-7907	4-3917	4-7427
	Mean.....	.....	67 49-02				

## Declination Observations.

Month.	G. M. T.	Uncorrected.		Corrected for torsion.		Observer.
		Observation.	Monthly Mean.	Observation.	Monthly Mean.	
1874.	d. h. m.	° ′ ″	West.	° ′ ″	West.	
October .....	22 12 27 P.M.	19 45 20		19 50 1		W.
	23 12 30 "	19 49 9	19 47 14	19 49 9	19 49 35	"
November .....	25 12 25 P.M.	19 51 39		19 48 0		P.
	26 12 35 "	19 45 49		19 45 49		W.
	28 12 32 "	19 44 35	19 47 21	19 44 35	19 46 8	"
December .....	23 11 53 A.M.	19 41 46		19 41 46		"
	24 12 noon	19 40 5	19 40 55	19 40 52	19 41 19	"
1875.						
January .....	25 12 29 P.M.	19 53 9		19 53 9		P.
	26 10 53 A.M.	19 42 40	19 47 54	19 42 40	19 47 54	"
February .....	25 12 28 P.M.	19 48 13		19 48 13		W.
	26 2 5 "	19 47 45	19 47 59	19 47 45	19 47 59	"
March .....	23 12 31 P.M.	19 46 45		19 46 45		W.
	24 12 56 "	19 46 37	19 46 41	19 46 37	19 46 41	"
April .....	27 12 18 P.M.	19 45 16		19 45 16		C.
	28 10 25 A.M.	19 40 3	19 42 39	19 40 3	19 42 39	"
May .....	26 12 21 P.M.	19 40 14		19 43 34		"
	27 12 21 "	19 45 20	19 42 47	19 45 20	19 44 27	"
June .....	24 11 58 A.M.	19 40 56		19 38 22		"
	25 12 9 P.M.	19 41 28	19 41 12	19 41 28	19 39 55	"
July .....	29 12 36 P.M.	19 39 5		19 36 32		W.
	30 12 25 "	19 43 35	19 41 20	19 41 1	19 38 46	"
August .....	19 12 20 P.M.	19 40 10	19 40 10	19 42 37	19 42 37	C.
September .....	23 12 33 P.M.	19 42 23		19 37 55		W.
	24 12 33 "	19 34 31	19 38 27	19 37 43	19 37 49	"

