RESULTS

OF THE

MAGNETICAL AND METEOROLOGICAL OBSERVATIONS

MADE AT

THE ROYAL OBSERVATORY, GREENWICH,

IN THE YEAR

1874:

UNDER THE DIRECTION OF

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ASTRONOMER ROYAL.

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1876.

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ROYAL OBSERVATORY, GREENWICH.

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GREENWICH MAGNETICAL AND METEOROLOGICAL OBSERVATIONS, 1874.

Introduction.

§ 1. *Buildings of the Magnetic Observatory.*

In consequence of a representation by the Astronomer Royal, dated 1836, January 12, and a memorial by the Board of Visitors of the Royal Observatory, dated 1836, February 26, addressed to the Lords Commissioners of the Admiralty, an additional space of ground on the south-east side of the former boundary of the Observatory grounds was inclosed from Greenwich Park for the site of a Magnetic Observatory, in the summer of 1837; and the Magnetic Observatory was erected in the spring of 1838. Its nearest angle in its present form is about 174 feet from the nearest point of the S.E. dome, and about 30 feet from the office of Clerk of Works. It is based on concrete and built of wood, united for the most part by pegs of bamboo; no iron was intentionally admitted in its construction, or in subsequent alterations. Its form, as originally built, was that of a cross with four equal arms, very nearly in the direction of the cardinal magnetic points as they were in 1838; the length within the walls, from the extremity of one arm of the cross to the extremity of the opposite arm, was 40 feet, the breadth of each arm 12 feet. In the spring of 1862, the northern arm was extended 8 feet. The height of the walls inside is 10 feet, and the ceiling of the room is about 2 feet higher. The northern arm of the cross is separated from the central square by a partition, so as to form an ante-room. The meridional magnet for observations of absolute declination formerly used also for observations of variations of declination, (placed in its position in 1838), is mounted in the southern arm; and the theodolite by which the magnet-collimator is viewed, and by which circumpolar stars for determination of the astronomical meridian are also observed (for which observation an opening is made in the roof, with proper shutters,) is in the southern arm, near the southern boundary of the central square. The bifilar magnet, for variations of horizontal magnetic force (erected at the end of 1840) was mounted near the northern wall of the eastern arm; and the balance-magnetometer, for variations of vertical magnetic force (erected in 1841) was mounted near the northern wall of the western arm. Important changes have subsequently been made in the positions of these instruments, as will be mentioned below. The sidereal time-clock is in the south arm, near the south-east re-entering angle. The fire-grate (constructed of copper, as far as possible,) is near the north end of the west side of the ante-room. Some of these fixtures may contain trifling quantities of iron, and, as the ante-room is used as a computing room it is impossible to avoid the introduction of iron in small quantities; great care, however, is taken to avoid it as far as possible.

In 1864, a room, called the Magnetic Basement, was excavated below the whole of the Magnetic Observatory except the ante-room; the descent to it is by a staircase close to the south wall of the western arm of the building.

For the theodolite, a brick pier was built from the ground below the floor of the Basement, rising through the ceiling into the south arm of the upper room, and supporting the theodolite in exactly the same position as before.

Instead of a single meridional magnet performing the double functions of "magnet for determining absolute magnetic declination," and "magnet carrying a mirror for photographic register," there are now two meridional magnets, one in the Upper Room and one in the Basement. The upper magnet is in a position about 10 inches north of the former position of the declination-magnet; it carries a collimator, for observation by the theodolite; but, in reversion of position of the collimator, the collimator is always either above or below the magnet, so that the magnet is always in the same vertical. The lower magnet, which is in nearly the same vertical with the upper magnet, carries the mirror for the photographic register of the continual changes of declination. A massive brick pier is built in the south arm of the Basement, covered by a stone slab; upon it is fixed the gun-metal stand carrying the photographic lamp, and the narrow chink through which it shines; from the stone slab rise three smaller piers, upon which crossed slates are placed; and from these rises a small pier through the ceiling, to the height of 18 inches above the upper floor, carrying the suspension of the lower magnet; the skein of silk, which supports the lower magnet, passes through a hole in one of the slates. Upon the tops of the three piers rest the feet of the original wooden stand carrying the suspension of the upper magnet.

The bifilar-magnetometer is in the Basement, in a position vertically below its former position. A massive brick pier, surmounted by a thick slab of stone (upon which the metal stand carrying the photograph lamp and narrow chink is fixed) carries a pier consisting of a back and return-sides, which rises through the ceiling about 2 feet above the upper floor, and is crowned by a slate slab that carries the suspension of the bifilar-magnetometer.

The vertical-force magnetometer is in the Basement, in a position vertically below its former position; it rests upon a brick pier, capped by a thick stone; to which also is fixed the plate of metal with narrow chink through which passes the light of the photographic lamp.

To the theodolite-pier are fixed telescopes for eye-observation of the bifilar and vertical-force magnetometers. They are protected from accidental violence by guards fixed to the floor, first attached on 1871, May 2.

At the south-east re-entering angle of the Basement (which has been rebated for the purpose) is the horizontal photographic cylinder, which receives the traces of the movements of the declination-magnet and the bifilar-magnet. The angle is so far cut away that the straight line joining their suspensions passes at the distance of one foot from the wall, and thus the cylinder receives the light from the concave mirrors carried by both instruments, at right angles to its surface. The vertical cylinder which receives the traces of the movements of the vertical-force-magnet, and of the self-registering barometer near it, is east of the vertical force pier.

In the south-east corner of the eastern arm is placed the apparatus for self-registration of the spontaneous galvanic currents on the wires leading respectively, from Angerstein Wharf to Lady Well Station (on the Mid Kent Railway), and from North Kent Junction (on the Greenwich Railway) to Morden College end of the Blackheath Tunnel (on the North Kent Railway). The straight lines connecting these points intersect each other nearly at right angles, at a point not far distant from the Observatory (see § 13 below).

The mean-time-clock is on the west wall of the south arm of the Basement.

Adjoining the north wall is the table for photographic operations. Much water is used in these operations, and therefore a pump is provided in the grounds at a distance of about 30 feet from the nearest magnetometer, by which the water is withdrawn from the cistern at the east end of the photographic table and at once discharged into a covered drain.

Near the west end of the photographic table and fixed to the north wall is the Sidereal Standard Clock of the Astronomical Observatory, Dent 1906, communicating with the Chronograph Barrel and other clocks by galvanic wires. It was established in this position at the end of May 1871.

The Basement is warmed by a gas-stove, and ventilated by a large copper tube nearly two feet in diameter, receiving the flues from the stove and all the lamps, and passing through the upper room to a revolving cowl above the roof. Each of the arms of the basement has a window facing the south, but in general the window-wells are closely stopped.

The variations in the temperature of the instruments have been greatly reduced by their location within this Basement.

On the outside of the Magnetic Observatory, near the north-east corner of the ante-room, a pole 79 feet in height is fixed, for the support of the conducting wires to the electrometers; the electrometers, &c., are planted in the window-seat at the north-end of the ante-room.

The apparatus for naphthalizing the gas used in the photographic registration is mounted in a small detached zinc-built room, erected in 1863, near the west side of the ante-room. The use of the naphthalizing process, which had been discontinued in the years 1865 to 1870, has since 1871 been restored.

In 1863, a range of seven rooms, usually called the Magnetic Offices, was erected near the southern fence of the grounds. Since the summer of 1863, observations of Dip and Deflexion have been made in the westernmost of these rooms, No. 7. On 1871, December 1, the Watchman's Clock was moved from the Quadrant Passage of the Astronomical Observatory to Magnetic Office No. 3, and on 1872, November 14, it was again moved from Office No. 3 to No. 1.

At the distance of 28 feet south (magnetic) from the south-east angle of the southern arm is a square shed about $10^{ft}\ 6^{in}$ square, supported by four posts at the height 8 feet, with an adjustible opening at the center of the top. Under this shed are placed the large dry-bulb and wet-bulb thermometers, with a photographic cylinder, whose axis is vertical, between them; and external to these are the gas flames, whose light passing through the thermometer-tubes above the quicksilver makes photographic traces upon the paper which covers the cylinder.

For better understanding of these descriptions, the reader is referred to the Descriptions of Buildings and Grounds with accompanying Maps, attached to the Volumes of Astronomical Observations for the years 1845 and 1862.

§ 2. *Upper Declination-Magnet and Apparatus for observing it.*

The theodolite with which the meridional magnet is observed is by Simms: the radius of its horizontal circle is 8·3 inches: it is divided to 5′, and reads to 5″, by three verniers, carried by the revolving frame of the theodolite. The fixed frame stands upon three foot-screws, which rest in brass channels let into the stone pier that stands upon the brick pier rising from the ground of the Magnetic Basement. The revolving frame carries the Y's (with vertical adjustment at one end) for a telescope with transit-axis: the length of the axis is 10½ inches: the length of the telescope 21 inches: the aperture of the object glass 2 inches. The Y's are not carried immediately by the T head which crosses the vertical axis of the revolving frame, but by pieces supported by the ends of that T head, and projecting horizontally from it: the use of this construction is to allow the telescope to be pointed sufficiently high to see δ Ursæ Minoris above the pole. The eye-piece of the telescope carries only one fixed horizontal wire, and one vertical wire moved by a micrometer-screw. The opening in the roof of the building permits the observation of circumpolar stars, as high as δ Ursæ Minoris above the pole, and as low as β Cephei below the pole.

For supporting the magnet, a braced wooden tripod-stand is provided, whose feet, as above described, rest upon brick piers in the Magnetic Basement. Upon the cross-bars of the stand rests a double rectangular box (one box completely inclosed within another), both boxes being covered with gilt paper on their exterior and interior sides. On the southern side of the principal upright piece of the stand is a moveable upright bar, turning in the vertical E. and W. plane, upon a pin in its center (which is fixed in the principal upright), and carrying at its top the pulleys for suspension of the magnet; this construction is adopted as convenient for giving an E. and W. movement (now very rarely required) to the point of suspension, by giving a motion to the lower end of the bar. The top of the upright piece carries a brass frame with two pulleys, whose axes are E. and W., adapted to carry a flat leather strap: one of these pulleys projects beyond the north side of the principal upright, and from it depends that end of the strap to which the suspension skein is attached: the other pulley projects on the south side. The strap, being brought from the magnet up to the north pulley, is carried over it and over the south pulley, and thence downwards to a small windlass, fixed to the lower part of the moveable upright. The height of the two pulleys above the floor is about 11 ft. $3\frac{3}{4}$ in., and the height of the magnet is about 2 ft. 10 in.; the length of the metal carrier which bears the magnet is 1 ft. 3 in.; and the length of strap below the north pulley is about $10\frac{3}{4}$ inches; so that the length of the free suspending skein is about 6 feet 4 inches.

The magnet was made by Meyerstein, of Göttingen: it is a bar 2 feet long, $1\frac{1}{2}$ inch broad, and about $\frac{1}{4}$ inch thick: it is of hard steel throughout. The magnet-carrier was also made by Meyerstein, but it has since been altered by Simms. The magnet is inserted sideways and fixed by a screw in the double square hook which constitutes the lower part of the magnet-carrier. This lower part turns stiffly by a vertical axis with index in a graduated horizontal circle (usually called the torsion-circle) attached to the upper part. The upper part of the magnet-carrier is simply hooked into the skein.

The suspending skein was originally of silk fibre, in the state in which it is first prepared by silk manufacturers for further operations; namely, when seven or more fibres from the cocoon are united by juxtaposition only (without twist) to form a single thread. The skein was strong enough to support perhaps three times the weight of the magnet, &c.

In the summer and autumn of 1864, an attempt was made to suspend the magnet by a steel wire, capable of supporting the weight 15 lbs.; but the torsion force was found to be so large as greatly to diminish the value of the observations; and the skein was finally restored on 1865, January 20. A similar attempt was made for suspension of the lower magnet; the skein, however, was restored on 1865, January 30.

Upon the magnet there slide two brass frames, firmly fixed in their places by means of pinching-screws. One of these contains, between two plane glasses, a cross of delicate cobwebs; the other holds a lens of 13 inches focal length and nearly 2 inches aperture. This combination, therefore, serves as a reversed telescope without a tube: the cross of cobwebs is seen very well with the theodolite-telescope, when the suspension-bar of the magnet is so adjusted as to place the object-glass of the reversed telescope in front of the object-glass of the theodolite, their axes coinciding. The wires are illuminated by a lamp and lens in the night, and by a reflector in the day.

In the original mounting of this magnet the small vibrations were annihilated by a copper oval or "damper," thus constructed: A copper bar, about one inch square, is bent into a long oval form, intended to contain within itself the magnet (the plane of the oval curve being vertical). A lateral bend is made in the upper half of the oval, to avoid interference with the suspension-piece of the magnet. The effect of this damper was, that after every complete or double vibration of the magnet, the amplitude of the oscillation is reduced in the proportion of 5 : 2 nearly.

On mounting the photographic magnetometer in the basement, the damper was removed from its place surrounding the upper magnet, and was adjusted to encircle the photographic magnet. The upper magnet remained unchecked in its vibrations till 1866, January 23, when the lower part of its magnet-carrier was connected with a brass bar which vibrates in water.

OBSERVATIONS RELATING TO THE PERMANENT ADJUSTMENTS OF THE UPPER DECLINATION-MAGNET AND ITS THEODOLITE.

1. Determination of the inequality of the pivots of the theodolite-telescope.

1871, January 17. The theodolite was clamped, so that the transit-axis was at right angles to the astronomical meridian. The illuminated end of the axis of the telescope was first placed to the East: the level was applied, and its scale was read; the level was then reversed, and its scale was again read; it was then again reversed, and again read, and so on successively six times. The illuminated end of the axis was then placed to the West, and the level was applied and read as before. This process was repeated four times, and the result was, that when the level indicates the axis to be horizontal, the pivot at the illuminated end is really too low by $0''\cdot7$.

2. Value of one revolution of the micrometer-screw of the theodolite-telescope.

On 1862, December 26, observations were made, giving for the value of one revolution of the micrometer $1'.\ 33''\cdot85$. On 1865, December 27, the magnet was made to rest on blocks of wood, and its collimator was used as a fixed mark at an infinite distance. The micrometer of the theodolite was placed in different positions, and the telescope of the theodolite was then turned till the micrometer wire bisected the cross. The result of ten comparisons of theodolite-readings with large values and with small values of the micrometer-reading was, that one revolution $= 1'.\ 34''\cdot8$. A similar experiment on 1870, December 29, gave $1'.\ 34''\cdot2$. The value used, however, through the year 1874 is $1'.\ 34''\cdot8$.

3. Determination of the micrometer-reading for the line of collimation of the theodolite-telescope.

1873, December 29. The vertical axis of the theodolite had been adjusted to verticality, and the transit-axis was made horizontal. The declination-magnet was made to rest on blocks, and the cross-wires carried by it were used as a collimator for determining the line of collimation of the telescope of the theodolite. The telescope was reversed after each observation. The mean of 20 double observations was $100^{r}\cdot120$. This value is used throughout the year 1874.

4. Determination of the effect of the mean-time-clock on the declination-magnet.

The observations by which this has been determined are detailed in the volumes for 1840, 1841, 1844, and 1845. It appeared that it was necessary to add $9''\cdot41$ to every reading of the theodolite. The clock was removed to the basement in 1864, having now nearly the same relative position to the lower declination-magnet which formerly it had to the upper. No correction is now applied to the upper declination-magnet.

5. Determination of the compound effects of the vertical-force-magnet and the horizontal-force-magnet on the declination-magnet.

The details applying to the effect of the horizontal-force-magnet and first vertical-force-magnet will be found in the volumes for 1840, 1841, 1844, and 1845. It appeared that it was necessary to subtract $55''\cdot22$ from all readings of the theodolite. In 1848 a new vertical-force-magnet was introduced, and the subtractive quantity was then found to be $42''\cdot2$. A few experiments in 1865 seemed to show that the correction is now $36''\cdot9$. No numerical correction has been applied.

6. Determination of the error of collimation for the plane glass in front of the boxes of the declination-magnet.

1873, December 29. The magnet was made to rest entirely on blocks. The micrometer head of the telescope was to the East. The plane glass has the word "top" engraved on it, and, in ordinary use, this word is always kept east. The cross-wire carried by the collimator of the magnet was observed with the engraved word alternately east and west. The result of 20 double observations was, that in the ordinary position of the glass $18''\cdot9$ is to be added to all readings.

7. Determination of the error of collimation of the magnet-collimator, with reference to the magnetic axis of the magnet.

1873, December 29. Observations were made by placing the declination-magnet in its stirrup, with its collimator alternately above and below, and observing the collimator-wire by the theodolite-telescope; the windlass of the suspending skein being so moved that the collimator in each observation was in the line of the theodolite-telescope. Seven pairs of observations were taken. The mean half excess of reading with collimator above, (its usual position) over that with collimator below was $26'.\ 29''\cdot1$. The value used in the reductions for 1874 is $26'.\ 43''\cdot0$ (the mean of four determinations, made 1871, October 25, December 28, 1873, January 1 and December 29, respectively).

8. Effect of the damper.

In the volume for 1841 observations are exhibited shewing that the oval copper bar, or damper, which then surrounded what is now the upper declination-magnet, had but little or no effect. Repeated observations, of less formal character, in succeeding years, have confirmed this result. The same bar has encircled the lower declination-magnet since the year 1865. The following observations were made in the year 1865, for ascertaining the effect of the damper on the lower declination-magnet under various circumstances.

On 1865, February 8 and 10, and March 2, the time of vibration of the magnet was observed :—

Mean of times with damper in usual position	$23^s\cdot888$
Mean of times with damper reversed end for end......................	$24^s\cdot508$
Mean of times when damper was removed...........................	$23^s\cdot153$

These seem to indicate a repulsion of the magnet by the damper, but the magnet came to rest so rapidly that the observations are very uncertain.

On several days from 1865, April 2 to May 12, observations were made for ascertaining the deflexion of the magnet produced by turning the damper through a small angle round a vertical axis, passing through its center.

DAMPER IN USUAL POSITION.

			′ ″
Damper turned through 2°	N. end towards E.,	increase of western declination	−1. 27
	N. end towards W.,	,, ,, ,, ...	+1. 25
Damper turned through 4°	N. end towards E.,	,, ,, ,, ...	−2. 16
	N. end towards W.,	,, ,, ,, ...	+3. 11
Damper turned through 6°	N. end towards E.,	,, ,, ,, ...	−3. 10
	N. end towards W.,	,, ,, ,, ...	+2. 55
Damper turned through 8°	N. end towards E.,	,, ,, ,, ...	−1. 22
	N. end towards W.,	,, ,, ,, ...	+1. 45

DAMPER REVERSED END FOR END.

Damper turned through 2°	N. end towards E.,	increase of western declination	+0. 12
	N. end towards W.,	,, ,, ,, ...	+0. 20
Damper turned through 4°	N. end towards E.,	,, ,, ,, ...	0. 0
	N. end towards W.,	,, ,, ,, ...	+0. 26
Damper turned through 6°	N. end towards E.,	,, ,, ,, ...	+0. 5
	N. end towards W.,	,, ,, ,, ...	+0. 5
Damper turned through 8°	N. end towards E.,	,, ,, ,, ...	−0. 10
	N. end towards W.,	,, ,, ,, ...	+0. 5

The first series shews clearly that the damper in its usual position drags the magnet; the second shews no certain effect. It seems that the damper possesses two kinds of magnetism, one permanent, the other transiently induced, of nearly equal magnitude; their sum being about $\frac{1}{100}$ part of the terrestrial effect for the same deflexion.

From 1865, July 25 to August 9, observations were made to ascertain whether the effect of an external deflecting cause is the same with the damper present and the damper removed. The observation was extremely difficult, as the magnet was perpetually in vibration when the damper was removed. A small magnet on the east side of the

N. end of the magnetometer, with its north end pointing towards the East (and therefore diminishing the western declination of the magnetometer), was moved to the distance (about five feet) at which it produced a deviation of 5′ nearly. The apparent western declination was observed, damper present, and damper removed. It appeared to be less with damper present than with damper removed, by 0′. 53″. The separate results are very discordant. If the conclusion has any validity, it tends to shew a repulsive power in the damper, opposite to that found in the preceding experiments. This experiment is regarded as inconclusive.

9. Calculation of the constant used in the reduction of the observations of the upper declination-magnet, the micrometer-head of the theodolite-telescope being East.

Micrometer equivalent for reading for line of collimation, $100^{r} \cdot 120$..	−	2°. 38′. 11″·4
Correction for the plane glass in front of the box, in its usual position..........	+	18·9
The collimator above the magnet. Correction for error of collimation	−	26. 43·0
Constant to be used in the reduction of the observations	−	3. 4. 35·5

10. Determination of the time of vibration of the upper declination-magnet under the action of terrestrial magnetism.

On 1873, August 7, it was found to be $31^{s} \cdot 40$; and on 1874, December 31, $31^{s} \cdot 33$.

11. Fraction expressing the proportion of the torsion-force to the earth's magnetic force.

By the same process which is described in the Magnetical Observations 1847, but for the silk skein at present in use, the proportion was found, on 1871, October 25, $\frac{1}{180}$; on 1871, December 28, $\frac{1}{170}$; on 1873, January 1, $\frac{1}{200}$; on 1874, January 8, $\frac{1}{182}$; and on 1874, December 26, $\frac{1}{194}$.

DETERMINATION OF THE READINGS OF THE HORIZONTAL CIRCLE OF THE THEODOLITE CORRESPONDING TO THE ASTRONOMICAL MERIDIAN.

The reading of the circle corresponding to the astronomical meridian is determined by occasional observation of the stars Polaris and δ Ursæ Minoris when near the meridian, either above or below pole. Six measures at least are usually taken on each night of observation.

The error of the level is determined by application of the spirit-level at the time of observation: due regard being paid, in the reduction, to the inequality of pivots already found. One division of the level is considered = 1″·0526. The azimuth-reading is then corrected by this quantity;

Correction = Elevation of W. end of axis × tan. star's altitude.

The readings of the azimuth circle increase as the instrument is turned from N. to E., S., and W.; from which it follows that (telescope pointing to North), the correction must have the same sign as the elevation of the W. end.

The correction for the azimuth of the star observed has been computed independently in every observation, by a peculiar method, of which the principle is fully explained in the volumes for 1840-1841, 1843, 1844, 1845. The formula and table used are the following :—

Let $A_{''}$ = seconds of arc in star's azimuth,
C_s = seconds of time in star's hour-angle,
$a_{''}$ = seconds of arc in star's N.P.D. for the day of observation,
Then $\log. A_{''} = \log. C_s + \log. E + \log. (a_{''} + F) + \log. \cos. \phi$.

The values of log. E, F, and log. cos. ϕ, are given in the following table :—

TABULATED VALUES of LOG. Cos. ϕ, for DIFFERENT VALUES of C_s, and of the QUANTITIES LOG. E and F, for the STARS POLARIS and δ URSÆ MINORIS.

Hour Angle.	Log. Cos. ϕ for			
	Polaris.	δ Ursæ Minoris.	Polaris S.P.	δ Ursæ Min. S.P.
m				
1	9·99999	9·99999	9·99999	9·99999
2	999	999	999	999
3	999	999	999	999
4	998	998	998	998
5	996	996	997	997
6	994	994	996	996
7	992	992	994	995
8	990	989	992	993
9	988	986	990	991
10	985	983	988	989
11	981	979	985	987
12	978	975	982	984
13	974	971	979	981
14	970	966	975	978
15	966	961	972	975
16	961	955	968	971
17	956	950	964	968
18	951	944	959	964
19	945	937	955	960
20	939	930	950	956
21	932	923	945	951
22	926	915	939	946
23	919	908	933	941
24	912	900	928	936
25	904	891	922	930
26	896	882	915	925
27	888	873	909	919
28	880	863	902	912
29	871	853	894	906
30	9·99862	9·99843	9·99887	9·99900
Log. E	6·09721	6·13638	−6·03899	−6·00617
F	−186″·79	−944″·71	+181″·57	+886″·86

Observations for determining the theodolite readings corresponding to the astronomical meridian were made on the following days in 1874 :—January 17 ; February 10, 20 ; March 24 ; April 8, 20, 28, 30 ; May 20 ; July 2, 3, 4, 8, 14, 16 ; August 17, 21, 29 ; October 3, 12 ; December 4. As a check on the continued steadiness of the theodolite, observations of a fixed mark (a small hole in a plate of metal above the Observatory Library) have been taken fifteen times at intervals through the year.

The following is a description of the method of making and reducing the eye observations of the declination-magnet :—

A fine horizontal wire (as stated above) is fixed in the field of view of the theodolite-telescope, and another fine vertical wire is fixed to a wire-plate, moved right and left by a micrometer screw. On looking into the telescope, the cross of the magnetometer is seen ; and during the vibration of the magnet, this cross is seen to pass alternately right and left. The observation is made by turning the micrometer till its wire bisects the image of the magnet-cross at the pre-arranged times, and reading the micrometer. The verniers of the horizontal circle are read.

The mean-time clock is kept very nearly to Greenwich mean time (its error being ascertained each day), and the clock-time for each determination is arranged beforehand. Chronometer M'Cabe 649 has usually been employed for observation.

If the magnet is in a state of disturbance, the first observation is made by the observer applying his eye to the telescope about one minute before the pre-arranged time ; he bisects the magnet-cross by the micrometer wire at 45^s, and again at 15^s before that time, also at 15^s and 45^s after that time. The intervals of these four observations are the same nearly as the time of vibration of the magnet, and the mean of all the times is the same as the Greenwich pre-arranged mean time.

The mean of each pair of adjacent readings of the micrometer is taken (giving three means), and the mean of these three is adopted as the result. In practice, this is done by adding the first and fourth readings to the double of the second and third, and dividing the sum by 6.

Till 1866, January 23, the magnet was usually in a state of vibration ; but, since the introduction of the water-damper on that day, the number of instances of excessive vibration has been very small. When it appears to be nearly free from vibration, two bisections only of the cross are made, one about 15^s before the time recorded, the other about 15^s after that time, (30^s being nearly the time of a single vibration,) and the mean adopted as result. (The lower magnet, furnished with the copper damper, never exhibits any troublesome vibrations.)

The adopted result is converted into arc, supposing $1^r = 1'. 34''\cdot 8$, and the quantity thus deduced is added to the mean of the vernier-readings, from which is subtracted the constant given in article 9 of the permanent adjustments ; the difference between this number and the adopted reading for the Astronomical South Meridian is taken ;

and thus is deduced the magnetic declination, which is used in determining the zero for the photographic register.

§ 3. *General principle of construction of Photographic self-registering Apparatus for continuous Record of Magnetic and other Indications.*

The general principle adopted for all the photographic instruments is the same. For the register of each indication, a cylinder is provided, whose material is ebonite, and which is very accurately turned in the lathe. The axis of the cylinder is placed parallel to the direction of the change of indication which is to be registered. If there are two indications whose movements are in the same direction, both may be registered on the same cylinder; thus, the Declination and the Horizontal Force, whose indications of changes of the respective elements are both made to travel horizontally, can both be registered upon one cylinder with axis horizontal: the same remark applies to the register of two different galvanic Earth-Currents; the Vertical Force and the reading of the Barometer can both be registered upon one cylinder with axis vertical; and similarly the Dry-Bulb Thermometer and the Wet-Bulb Thermometer.

To the ends of each ebonite cylinder there are fixed circular brass plates, that which is near the clock-work having a diameter somewhat greater than that of the cylinder. In the further fittings there is a little difference between those for vertical and those for horizontal cylinders. Each horizontal cylinder has a pivot fixed in the brass plate at each end; these revolve each upon two antifriction wheels of the fixed frame. The vertical cylinders have no pivots; there is a perforation through the center of the lower or larger brass plate which, when the cylinder is mounted, is fitted upon a vertical spindle projecting upwards from the center of a second horizontal brass plate; this second brass plate sustains the weight of the vertical cylinder and turns horizontally, being supported by three antifriction wheels (each in a vertical plane) carried by the fixed frame.

Uniform rotatory motion is given to the cylinders by the action of clock-work, or rather chronometer-work, regulated by either duplex-escapement or chronometer-escapement. For two of the cylinders, which revolve in 24 hours, and for the thermometer-cylinder which revolves in 50 hours, the axis is placed in the center of the chronometer, and a fork at the end of the hour hand takes hold of a winch fixed to the plate of the cylinder, or (in the vertical cylinders) to the plate that sustains the cylinder. In the cylinder for galvanic earth-currents only, the connexion is made by toothed wheels. For the horizontal cylinders, the plane of the chronometer work is vertical; for the vertical cylinders, it is horizontal.

The cylinders employed for the Declination and Horizontal Force registers, for the Vertical Force and Barometer registers, and for the Earth Current registers are $11\frac{1}{2}$

inches high, and $14\frac{1}{4}$ inches in circumference; those for the thermometers are 10 inches high, and 19 inches in circumference.

Each cylinder is covered, when in use, by a tube of glass, which is open at one end, and has at the other end a circular plate of ebonite or brass, perforated at its center. The tube is a little larger than the cylinder; its open end is kept in position by a narrow collar of ebonite, and the opposite end by a circular piece of brass fixed to the smaller brass plate at the end of the cylinder.

To prepare the cylinder for register of indications, it is covered with a sheet of photographic paper; the moisture on the paper usually agglutinates its overlapping ends with sufficient firmness; the glass tube is then slipped over it, and the cylinder thus loaded is placed (if horizontal,) with its pivots in bearing upon its two sets of antifriction wheels, or, (if vertical,) with its end-brass-plate upon the rotating brass plate, and its central perforation upon the spindle of that plate; care is taken to ensure connection with the clock-work, and the apparatus is ready for action.

The trace for each instrument is produced by a flame of coal gas usually charged with the vapour of coal naphtha. For the magnetometers the light shines through a small aperture about $0^{in}\cdot3$ long, and nearly $0^{in}\cdot1$ broad; for the earth current apparatus and for the barometer, the aperture is larger. The arrangements for throwing on the photographic paper of the revolving cylinder a spot of light which shall travel in the direction of the cylinder's axis with every motion of either magnetometer or galvanometer, or with the rise and fall of the mercury in the barometer, are as follows.

For each of the three magnetometers, a large concave mirror of speculum metal is carried by a part of the magnet-carrier; although it has a small movement of adjustment relative to the magnet-carrier, yet in practice it is very firmly clamped to it, so that the mirror receives all the angular movements of the magnet. The lamp above mentioned is placed slightly out of the direction of the straight line drawn from the center of the concave mirror to the center of the cylinder which carries the photographic paper. By the concave mirror, the light diverging from the aperture is made to converge to a place nearly on the surface of the cylinder of photographic paper. The form of the aperture, however, and the astigmatism caused by the inclined reflexion from the mirror, produce this effect, that the image is somewhat elongated and is at the same time slightly curved. To diminish the length there is placed near the cylinder a system of plano-convex cylindrical lenses of glass, with their axes parallel to the axis of the cylinder, and the image is thus reduced to a neat spot of light.

For the registers of galvanic earth-currents, the light, which falls upon a plane mirror carried by each galvanometer, is made to converge to a spot by a system of cylindrical lenses.

For the barometer, the light shines through a small aperture in a plate of blackened mica, which moves with the fluctuations of the quicksilver, and thus forms a spot of light.

For the thermometers, the light shines through the vacant part of the tube, and thus forms a sheet of light.

The spot of light (for the magnets, the earth-currents, and the barometer) or the boundary of the line of light (for the thermometers) moves, with the movements which are to be registered, in the direction of the axis of the cylinder, while the cylinder itself is turned round. Consequently, when the paper is unwrapped from its cylindrical form, there is traced upon it (though not visible till the proper chemical agents have been applied) a curve, of which the abscissa measured in the direction of a line surrounding the cylinder is proportional to the time, while the ordinate measured in the direction parallel to the axis of the cylinder is proportional to the movement which is the subject of measure.

In the instruments for registering the motions of the magnets, the earth-currents, and the barometer, a line of abscissæ is actually traced on the paper, by a lamp giving a spot of light in an invariable position, the effect of which on the revolving paper is to trace a line surrounding the cylinder. For the thermometers this is not necessary, as the thermometer-scales are made to carry and to transfer to the photographic paper sufficient indications of the actual reading of the thermometers.

Every part of the cylinder-apparatus for the declination and horizontal force, except those on which the spots of light fall, is covered with a double case of blackened zinc, having a slit for each moveable spot of light and a hole for the invariable spot; and every part of the path of the photographic light is protected by blackened zinc tubes from the admixture of extraneous light. The cylinder-apparatus for the thermometers is protected in the same manner, except that the whole space including the gas-light is enclosed in a zinc case, blackened internally. The earth-current apparatus is enclosed in a mahogany case, similarly blackened.

In all the instruments, the following method is used for attaching, to the sheet of photographic paper, indications of the time when certain parts of the photographic trace were actually made, and for giving the means of laying down a time-scale applicable to every part of the trace. By means of a small moveable plate, arranged expressly for this purpose, the light which makes the trace can at any moment be completely cut off. An assistant, therefore, occasionally cuts off the light (registering in the proper book the clock-time of doing so), and after a few minutes withdraws the plate (again registering the time). The effect of this is to make a visible interruption in the trace, corresponding to registered times. By drawing lines from these points of interruption parallel to the axis of the cylinder, to meet the photographic line of abscissæ, or an adopted line of abscissæ parallel to it, points are defined upon the line of abscissæ corresponding to registered times. The whole length of the photographic sheet (except where one end, in the cylindrical arrangement, laps over the other) corresponds to the known time of revolution of the cylinder. A scale being prepared beforehand, whose value for the time of revolution corresponds to the circumference of the cylinder, and the scale-reading for the registered time of interruption of light being applied to the foot of the ordinate corresponding to that interruption, the divisions of hours and minutes may be transferred at once from the scale to the line of abscissæ. In practice it is found that the length of the paper is not always the same, and it is necessary, therefore, to use for each instrument several pasteboard scales of different lengths, adapted to various lengths of the photographic sheets.

Since the year 1870 by means of an opening made in the chimney of each of the lamps which throws light on the concave mirror, the light in each instrument falls upon the cylindrical lens, and, if allowed to act for a short time, produces a dark line upon the photographic paper. An apparatus of clock-work, specially arranged by Messrs. E. Dent and Co. for this purpose, uncovers simultaneously the chimney-holes in all the lamps about $2\frac{1}{2}$ minutes before each hour, and covers them all simultaneously about $2\frac{1}{2}$ minutes after each hour. In this manner a good series of hour-lines in the direction of the ordinates is formed. The system of cutting off the trace by hand is still retained, as giving means of correcting any error in the clock, &c.; the correction thus found will be common to all the hour-lines. The accuracy of the time-registers has been much increased by this arrangement.

§ 4. *Lower Declination-Magnet; and Photographic self-registering Apparatus for Continuous Record of Magnetic Declination.*

The lower declination-magnet is made by Simms. It is 2 feet long, $1\frac{1}{2}$ inch broad, $\frac{1}{4}$ inch thick, of hard steel throughout, much harder than the upper declination-magnet.

The magnet-frame consists of an upper piece, whose top is a hook, (to be hooked into the suspension-skein), and which carries a concave mirror used for the photographic record in the manner described above. The lower part of this upper piece turns in a graduated horizontal circle, similar to the torsion circle of the upper magnet, and attached to the lower piece or magnet-carrier proper. The lowest part of the carrier is a double square hook, in which the magnet is inserted and is kept in position by the pressure of three screws.

It has been mentioned in § 1 that a small pier, built upon one of the crossed slates which are laid upon three piers rising from below, carries the suspension-pulleys. The suspension-skein rises to one of these pulleys, passes horizontally over a second pulley about 5 inches south of it, and then descends obliquely to a windlass which is fixed to the stone slab about 2 ft. 3 in. south of the center of the magnet.

The height of the pulley above the floor of the Basement is 10 ft. $4\frac{3}{4}$ in. As the height of the magnet above the floor is 2 ft. $10\frac{1}{2}$ in., and the length of the magnet frame is 1 ft. 3 in., there remains 6 ft. $3\frac{1}{4}$ in. of free suspending skein.

One of the revolving cylinders is used for the photographic record of the Declination-Magnet and the Horizontal Force Magnet. In the preparation of the basement in 1864, as has been stated, the south-eastern re-entering angle was cut away, so that the straight line from the suspending skein of the declination-magnet to the center of those of the bifilar magnet passes through a clear space, in which the registering apparatus is placed.

The concave mirror of the declination-magnet is 5 inches in diameter, and is above the top of the magnet-box. The distance of the light-aperture from the mirror is about 25·3 inches. The bright spot formed by the reflection of light from the mirror is received on the south side of the cylinder, near its west end.

For the declination-magnet, the values, in minutes and seconds of arc, of movements of the photographic spot in the direction of the ordinate, are thus deduced from a geometrical calculation founded on the measures of different parts of the apparatus. The distance of the cylinder from the concave mirror is about 132·11 inches, and a movement of 1° of the mirror produces a movement of 2° in the reflected ray. From this it is found that 1° of movement of the mirror is represented by 4·611 inches upon the photographic paper. A small scale of pasteboard is prepared, (for which a glass scale is now substituted), whose graduations correspond in value to minutes and seconds so calculated. The zero of the ordinate-scale is found in the following manner. The time-scale having been laid down as is already described, and actual observations of the position of the upper declination-magnet having been made with the eye and the telescope, (as has been fully described above), at certain registered times, there is no difficulty (by means of these registered times) in defining the points of the photographic trace which correspond to the observed positions. The pasteboard scale being applied as an ordinate to one of these points, and being slid up and down till the scale reading which represents the reading actually taken by the eye-observation falls on that point, the reading of the scale where it crosses the line of abscissæ is immediately found. This process rests on the assumption that the movements of the upper and lower magnets are exactly similar. The various readings given by different observations, so long as there is no instrumental change, will scarcely differ, and may be combined in groups, and thus an adopted reading for the line of abscissæ may be obtained. From this, with the assistance of the same pasteboard scale, there will be laid down without difficulty a new line, parallel to the line of abscissæ, whose ordinate would represent some whole number of degrees, or other convenient quantity.

§ 5. *Horizontal-Force-Magnet and Apparatus for observing it.*

The horizontal-force-magnet, furnished by Meyerstein of Göttingen, is, like the declination-magnet, 2 feet long, 1½ inch broad, and about ¼ inch thick. For its support (as is mentioned above), a brick pier in the eastern arm of the Magnetic Observatory, built on the ground below the basement floor, rises through the floor of the upper room, and carries a slate slab, to the top of which a brass frame is attached, carrying two brass pulleys (with their axes in the same east and west line) in front of the pier, and two (in a similar position) at the back of the pier; these constitute the upper suspension-piece. A small windlass is attached to the back of the pier at a convenient height. The magnet-carrier consists of two parts. The upper part is a horizontal bar, $2\frac{1}{2}$ inches long, whose ends are furnished with verniers for reading the graduations of the torsion-circle (a portion of the lower part, to be mentioned below). On the upper side of this horizontal bar are two small pulleys with axes horizontal and at right angles to the vertical plane passing through the length of the bar: by these pulleys the apparatus is suspended, as will be mentioned. From the lower side of the horizontal bar, a vertical axis projects downwards through the center of the torsion-circle, in which it turns by stiff friction. The lower part of the magnet-carrier consists, first of the torsion-circle, a graduated circle about 3 inches in diameter: next, immediately below the central part of the torsion-circle, is attached (but not firmly fixed) a circular piece of metal from which projects downwards a frame that, by means of three cramps and screws, carries the photographic concave mirror, with the plane of its front under the center of the vertical axis: this circular piece of metal has a radial arm upon which acts a screw carried by the torsion-circle, for giving to the concave mirror small changes of azimuthal position. Thirdly, there is fixed to the torsion-circle, at the back of the mirror-frame but not touching it, a bar projecting downwards, bent horizontally under the mirror-frame and then again bent downwards, carrying the cramps in which the magnet rests; and, still lower, a small plane mirror, to which a fixed telescope is directed for observing by reflexion the graduations of a fixed scale (to be mentioned shortly). Under the two small pulleys mentioned above passes a skein of silk; its two branches rise up and pass over the front pulleys of the suspension-piece, then over its back pulleys, and then descend and pass under a single large pulley, whose axis is attached to a wire that passes down to the windlass. Supported by the two branches of the skein, the magnet swings freely, but the direction that it takes will depend on the angular position of its stirrup with respect to the upper horizontal bar; it is intended that the index should be brought to such a position on the torsion-circle that the two suspending branches should not hang in one plane, but should be so twisted that their torsion-force will maintain the magnet in a direction very nearly E. and W. magnetic (its marked end being W.); in which state an increase of the earth's magnetic force draws the marked end towards the N., till the torsion-force is sufficiently increased to resist it; or a diminution allows the torsion-force to draw it towards the S. The magnet, with its plane mirror, hangs within a double rectangular box (one box completely inclosed within another) covered with gilt paper, similar to that used for the declination-magnet; in its south side there is one long hole, covered with glass, through which the rays of light from the scale enter to fall on the plane mirror, and the rays reflected by the mirror pass to the fixed telescope. The vertical rod (below the torsion-circle), which carries the magnet-stirrup, passes through a hole in the top of the box. Above the magnet box is the concave mirror above mentioned. The height of the brass pulleys of the suspension-piece above the floor is $11^{ft.}\ 8^{in.}\cdot5$; that of the pulleys of the magnet-carrier is $4^{ft.}\ 2^{in.}\cdot5$; and that of the center of the plane mirror is about $3^{ft.}\ 1^{in.}$. The distance between the branches of the silk skein, where they pass over the upper pulleys, is $1^{in.}\cdot14$; at the lower part the distance between them is $0^{in.}\cdot80$.

An oval copper bar (exactly similar to that for the declination-magnet), embraces the magnet, for the purpose of diminishing its vibrations.

The scale, which is observed by means of the plane mirror, is in a horizontal position, and is fixed to the South wall of the East arm of the Magnetic Basement. The numbers of the scale increase from East to West, so that when the magnet is inserted in the magnet-cell with its marked end towards the West, increasing readings of the scale (as seen with a fixed telescope directed to the mirror which the magnet carries) denote an increasing horizontal force. A normal to the scale from the center of the plane-mirror meets the scale at the division 51 nearly; the distance from the center of the plane-mirror to division 51 of the scale is 90·8 inches.

The telescope is fixed on the east side of the brick pier which supports the stone pier of the declination-theodolite in the upper observing room. The angle between the normal to the scale (which usually coincides nearly with the normal to the axis of the magnet) and the axis of the telescope, is about 38°, and the plane of the mirror is therefore inclined to the axis of the magnet about 19°.

OBSERVATIONS RELATING TO THE PERMANENT ADJUSTMENTS OF THE HORIZONTAL-FORCE-MAGNET.

1. Determination of the times of vibration and of the different readings of the scale for different readings of the torsion-circle, and of the reading of the torsion-circle and the time of vibration when the magnet is transverse to the magnetic meridian.

To render the process intelligible, it may be convenient to premise the following explanation.

Suppose that the magnet is suspended in its stirrup which is firmly connected with the small plane mirror, with its marked end in a magnetic westerly direction (not exactly W., but in any westerly direction between N. and S.), and suppose that, by means of the telescope directed towards that mirror, the scale is read, or (which is the same thing) the position of the plane mirror and of the stirrup, and therefore that of the axis of the magnet, are defined. Now let the magnet be taken out of the stirrup and replaced with its marked end easterly. The terrestrial magnetic power will now act as regards torsion, in the direction opposite to that in which it acted before, and therefore the magnet will not take the same position as before. But by turning the torsion-circle, which changes the amount and direction of the torsion-power produced by the oblique tension of the suspending cords, the magnet may be made to take the same position as at first (which will be proved by the reading of the scale, as viewed in the plane mirror, being the same). The reading of the torsion-circle will be different from what it was. The effect of this operation then is, to give us the difference of torsion-circle-readings for the same position of the magnet-axis with the marked end opposite ways, but it gives no information as to whether the magnet-axis is accurately transverse to the meridian, inasmuch as the same operation can be performed whether the magnet-axis is transverse or not.

But there is another observation which will inform us whether the magnet-axis is or is not accurately transverse. Let the time of vibration be taken in each position of the magnet. Resolve the terrestrial magnetic force acting on the poles of the magnet into two parts, one transverse to the magnet, the other longitudinal. In the two positions of the magnet (marked end westerly and marked end easterly, with axis in the same position), the magnitude of the transversal force is the same, and the changes which the torsion undergoes in a vibration of given extent are the same, and the time of vibration (if there were no other force) would be the same. But there is another force, namely, the longitudinal force; and when the marked end is northerly, this tends from the center of the magnet's length, and when it is southerly it tends towards the center of the magnet's length; and in a vibration of given extent this produces force, in one case increasing that from the torsion and in the other case diminishing it. The times of vibration therefore will be different. There is only one exception to this, which is when the magnet-axis is transverse to the magnetic meridian, in which case the longitudinal force vanishes.

The criterion then of the position truly transverse to the meridian (which position is necessary in order that the indications of our instrument may apply truly to changes of the magnitude of terrestrial magnetic force without regard to changes of direction) is this. Find the readings of the torsion-circle which, with magnet in reversed positions, will give the same readings of the scale as viewed by reflexion in the plane mirror, and will also give the same time of vibration for the magnet. With these readings of the torsion-circle the magnet is transverse to the meridian; and the difference of the readings of the torsion-circle is the difference between the position when terrestrial magnetism acting on the magnet twists it one way, and the position when the same force twists it the opposite way, and is therefore double the angle due to the torsion-force of the suspending lines when they neutralize the force of terrestrial magnetism.

The following table exhibits the elements of the determination made on 1874, January 1:—

1874. Day.	The Marked end of the Magnet. West. Torsion-Circle Reading.	West. Scale Reading.	West. Difference of Scale Readings for 1° of Torsion.	West. Mean of the Times of Vibration.	East. Torsion-Circle Reading.	East. Scale Reading.	East. Difference of Scale Readings for 1° of Torsion.	East. Mean of the Times of Vibration.
	°	div.	div.	s	°	div.	div.	s
Jan. 1	140	16·80	8·53	21·74	223	17·90	7·32	20·00
	141	25·33	8·20	21·52	224	25·22	7·79	20·20
	142	33·53	9·09	21·32	225	33·01	8·03	20·30
	143	42·62	7·82	21·06	226	41·04	7·32	20·40
	144	50·44	8·48	20·84	227	48·36	8·06	20·48
	145	58·92	7·81	20·72	228	56·42	8·18	20·60
	146	66·73	8·67	20·64	229	64·60	9·47	20·74
	147	75·40	7·92	20·52	230	74·07	7·60	20·88
	148	83·32	8·06	20·42	231	81·67	9·11	21·00
	149	91·38		20·28	232	90·78		21·20

The times of vibration and scale readings were sensibly the same, when the torsion-circle read 145°. 20′, marked end West, and 228°. 40′, marked end East, differing 83°. 20′. Half this difference, or 41°. 40′, is the angle of torsion when the magnet is transverse to the meridian.

The mean of several similar determinations gave 41°. 34′·2, and this value was adopted in the reduction of observations through the year 1874.

The reading adopted for the torsion-circle, marked end of magnet west, was 145°. 30′ through the year.

2. Computation of the angle corresponding to one division of the scale, and of the variation of the horizontal force (in terms of the whole horizontal force) which moves the magnet through a space corresponding to one division of the scale.

It was found by accurate measurements, on 1864, November 3, that the distance from $51^{\text{div.}}$ on the scale to the center of the face of the plane mirror is 90·838 inches, and that the length of $30^{\text{div.}}$·85 of the scale is exactly 12 inches; consequently the angle at the mirror subtended by one division of the scale is 14′. 43″·25, or, for change of one division of scale-reading, the magnet is turned through an arc of 7′. 21″·625.

The variation of horizontal force (in terms of the whole horizontal force) for a disturbance through one division of the scale, is computed by the formula, "Cotan. angle of torsion × value of one division in terms of radius." Using the numbers of the last article, the value is found to be 0·002414 through the year 1874.

3. Determination of the compound effect of the vertical-force-magnet and the declination-magnet on the horizontal-force-magnet, when suspended with its marked end towards the West.

The details of the experiments, made while the old vertical-force-magnet was in use, will be found in the volumes for 1841, 1842, 1843, 1844, 1845. The effect was to increase the readings by $0^{\text{div}}\cdot487$. On mounting a new vertical-force-magnet in 1848, similar experiments were made, and the resulting number was $0^{\text{div}}\cdot45$. These quantities are totally unimportant in their influence on the registers of changes of horizontal force. No experiments have been made since the magnets were placed in the basement.

4. Effect of the damper.

In the year 1865, from May 17 to May 25, observations were made for ascertaining the deflection of the magnet produced by turning the damper through a small angle round a vertical axis passing through its center.

DAMPER IN USUAL POSITION.

			div.
Damper turned through 2°	W. end towards S.,	increase of scale-reading	−0·251
	W. end towards N.,	„ „	+0·050
Damper turned through 4°	W. end towards S.,	„ „	−0·34
	W. end towards N.,	„ „	+0·16

DAMPER REVERSED END FOR END.

Damper turned through 2°	W. end towards S.,	increase of scale-reading	−0·15
	W. end towards N.,	„ „	−0·02
Damper turned through 4°	W. end towards S.,	„ „	−0·12
	W. end towards N.,	„ „	+0·08

On 1865, July 25, observations were made to ascertain whether the effect of an external deflecting cause is the same with the damper present and the damper removed. A small magnet was placed with its marked end pointing N. at the distance 4 feet S. of the unmarked end of the horizontal-force-magnet, deflecting the magnet through 1^{div} of the scale, and the scale-readings were observed with the damper in its usual place and the damper away. Three experiments were made, containing twenty-four observations of position. Not the smallest difference of position of the horizontal-force-magnet was produced by the presence or absence of the damper. The observations were very easy, and the result is certain.

No experiments on the damper have been made since 1865.

5. Determination of the correction for the effect of temperature on the horizontal-force-magnet.

In the Introduction to the volume of Magnetical and Meteorological Observations for 1847 will be found a detailed account of observations made in the years 1846 and 1847 for determination of this element. The principle adopted was that of observing the deflection which the magnet (to be tried) produces on another magnet; the magnet (to be tried) being carried by the same frame which carries the telescope that is directed to the plane mirror attached to the other magnet, and which also carries the scale that is viewed in these experiments by reflection in that plane mirror. The rotation of the frame was measured by a graduated circle about 23 inches in diameter. The magnet (to be tried) was always on the eastern side of the other magnet. It was enclosed in a copper trough, which was filled with water at different temperatures. One end of the magnet (to be tried) was directed towards the other magnet. The values found for correction of the results as to horizontal force determined with the magnet at temperature t° in order to reduce them to what they would have been if the temperature of the magnet had been 32°, expressed as multiples of the whole horizontal force, were,*

When the marked end of the magnet (to be tried) was West,

$$0{\cdot}00007137\ (t-32) + 0{\cdot}000000898\ (t-32)^2.$$

When the marked end of the magnet (to be tried) was East,

$$0{\cdot}00009050\ (t-32) + 0{\cdot}000000626\ (t-32)^2.$$

The mean, or

$$0{\cdot}00008093\ (t-32) + 0{\cdot}000000762\ (t-32)^2$$

has been embodied in tables which have been used in the computation of the "Reduction of Magnetic Observations 1848–1857," attached to the Volume of Observations 1859, and in the computation for "Days of Great Magnetic Disturbance 1841–1857," attached to the volume for 1862. The same formula has been employed in the Reduction of Magnetic Observations 1858–1863, published in the volume for 1867.

In the year 1864 observations were made for ascertaining the temperature-coefficient by heating the magnet by hot air. The magnet, whose variation of power in different temperatures was to be determined, was placed in a copper box planted upon the top of a copper gas-stove, whose heat could be regulated by manipulation of a tap, and from which rose a stream of heated air (not the air vitiated by combustion) through a large opening in the bottom of the box. The stove used for this purpose was the same which is now used for warming the Magnetic Basement. It was placed in the Magnetic Office, No. 7, in a position magnetic south of the deflexion-apparatus used in the operation for ascertaining the absolute measure of horizontal magnetic force. The hot air which rose through the opening in the center of the bottom was discharged by adjustible openings near the extreme ends of the top. Three windows were provided for reading three thermometers. The box, and the magnet which it inclosed, were placed in a magnetic E. and W. position. The needle whose deflection exhibited the power of the magnet was that which is employed in the ordinary use of the deflexion-apparatus. The proportion of the power of the magnet (under definite circumstances) to the earth's directive horizontal power was expressed by the tangent of the angle of deviation. Observations were made with temperatures both ascending and descending.

* By inadvertence in printing the Introduction 1847, the letter t has been used in two different senses.

The intervals of observation at different temperatures were sufficiently small to permit the assumption that the earth's force had not sensibly changed. The following is an abstract of the principal results:—

Omitting some days of less perfect series, satisfactory series of observations were made on 1864, February 21, 22, 23, and March 10. The tangents of angle of deflection were as follows:—

13 observations	with marked end E	at mean temperature	36°·8	Fahrenheit	gave	0·403711
13 "	" W					
21 "	marked end E	"	61·3	"		0·400836
25 "	" W					
17 "	marked end E	"	90·3	"		0·400579
16 "	" W					

From these it was inferred that the tangent of angle of deflection could be represented by—

$$0{\cdot}404559 \times \left\{1 - 0{\cdot}0004610 \times (t - 32) + 0{\cdot}000005061 \times (t - 32)^2\right\}$$

On comparing the quantity within the bracket (which expresses the law of magnetic power as depending on temperature) with that found in 1847, which, as above stated, is—

$$\left\{1 - 0{\cdot}00008093 \times (t - 32) - 0{\cdot}000000762 \times (t - 32)^2\right\}$$

it will be seen that the difference is great. The second terms differ greatly in magnitude, and the third terms in sign.

Possibly some light may be thrown on the difference by the following remark. The two formulæ give the same values for $t = 32°$ and for $t = 97°{\cdot}3$. And they give equal degrees of change per degree when $t = 65°$. It would seem therefore that the real discordance is in the experimental values for the mean temperatures only, or principally; and that it is probable that there is some error in the hot-air process for the middle temperatures.

I insert here (although not applying to the observations of the present volume) the results of a similar examination of the Old Vertical Force Magnet, which was in use from 1848 to the beginning of 1864. Omitting less perfect series, observations made on 1864, February 21 and 24, gave the following values for tangents of angles of deflection:—

7 observations	with marked end E	at mean temperature	34°·2	Fahrenheit	gave	0·279985
7 "	" W					
9 "	marked end E	"	57·0	"		0·275111
11 "	" W					
7 "	marked end E	"	86·5	"		0·270778
7 "	" W					

From these it was inferred that the tangent of angle of deflection could be represented by—

$$0{\cdot}280526 \times \left\{1 - 0{\cdot}00088607 \times (t - 32) + 0{\cdot}0000045594 \times (t - 32)^2\right\}$$

The expression found in 1847 for the law of force in the original Vertical Force Magnet was—

$$\left\{1 - 0{\cdot}00015816 \times (t - 32) - 0{\cdot}000001172 \times (t - 32)^2\right\}$$

giving a discordance of the same kind as that found for the horizontal force, but still larger. The formulæ agree only when $t = 32°$ and when $t = 159°{\cdot}0$. The discordance cannot be removed by a supposition similar to that made above.

Returning now to the temperature-correction of the Horizontal Force Magnet. The unsatisfactory character of the comparisons just given induced me at the beginning of 1868 to try the method of heating the air of the Magnetic Basement generally (by means of the gas-stove), leaving the magnets in all respects in their ordinary state, and comparing their indications as recorded in the ordinary way, but at different temperatures.* Experiments were at first made at intervals of a few hours in the course of one day, but it was soon found that the magnet did not acquire the proper temperature; moreover, the result was evidently affected by diurnal inequality. After this, an entire day was in each case devoted to the effects of each temperature (high or low, as the case might be). The principal series of observations were made with the horizontal force magnet in its ordinary position, or marked end to the west; but a few were made with the marked end to the east. In some instances, the numbers given are the result each of several observations; but in other instances, the result is that of a single observation, taken when all the apparatus had acquired unusual steadiness. The following are the results:—

RESULTS OF TEMPERATURE EXPERIMENTS UPON THE HORIZONTAL FORCE MAGNET, MARKED END WEST.

1868. MONTH and DAY. (Civil.)	Temperature.	Scale Reading.	Change of Temperature.	Change of Scale Reading.	Change of Scale Reading reduced to Parts of the whole Horizontal Force.	Change of H.F. corresponding to a change of 1° of Temperature (in Parts of the whole Horizontal Force).
	°	div.	°	div.		
January 3	56·8	60·82	6·3	0·65	0·001579	0·000250
3	50·5	61·47				
4	49·5	61·47	6·0	0·12	·000292	·000049
4	55·5	61·35				
6	59·3	60·91	10·0	0·71	·001725	·000172
7	49·3	61·62	7·4	0·57	·001385	·000187
9	56·7	61·05				
10	58·9	60·91	7·6	0·80	·001943	·000256
11	51·3	61·71	8·0	0·53	·001288	·000161
12	59·3	61·18				

* This method was first used for magnets, so far as I am aware, at the Kew Observatory. It had been used for pendulums by General Sir Edward Sabine and by myself.

RESULTS OF TEMPERATURE EXPERIMENTS UPON THE HORIZONTAL FORCE MAGNET, MARKED END WEST—*continued.*

1868. Month and Day. (Civil.)		Temperature.	Scale Reading.	Change of Temperature.	Change of Scale Reading.	Change of Scale Reading reduced to Parts of the whole Horizontal Force.	Change of H.F. corresponding to a change of 1° of Temperature (in Parts of the whole Horizontal Force).
		°	div.	°	div.		
January	13	59·5	61·26	5·6	0·16	0·000389	0·000070
	14	53·9	61·42				
	14	55·2	61·74	2·7	0·31	·000753	·000279
	16	52·5	62·05	9·0	1·27	·003086	·000343
	17	61·5	60·78	8·0	0·46	·001118	·000143
	18	53·5	61·24	6·1	0·31	·000753	·000123
	19	59·6	60·93				
January	31	60·7	58·63	10·1	0·31	·000753	·000075
February	4	50·6	58·94	9·7	0·88	·002138	·000220
	5	60·3	58·06	9·2	0·80	·001943	·000211
	7	51·1	58·86	8·5	0·82	·001992	·000234
	10	59·6	58·04				
	14	59·7	58·64	9·6	0·82	·001992	·000208
	16	50·1	59·46	9·7	0·49	·001190	·000123
	18	59·8	58·97	11·6	0·48	·001166	·000100
	20	48·2	59·45	10·6	0·43	·001045	·000099
	21	58·8	59·02				
Mean . . .		..	..	..	..	....	0·000174

RESULTS OF TEMPERATURE EXPERIMENTS UPON THE HORIZONTAL FORCE MAGNET, MARKED END EAST.

1868. Month and Day. (Civil.)		Temperature.	Scale Reading.	Change of Temperature.	Change of Scale Reading.	Change of Scale Reading reduced to Parts of the whole Horizontal Force.	Change of H.F. corresponding to a change of 1° of Temperature (in Parts of the whole Horizontal Force).
		°	div.	°	div.		
January	21	60·2	60·73	9·7	1·42	0·003449	0·000355
	22	50·5	59·31				
	24	58·6	62·56	7·3	1·02	·002477	·000339
	24	51·3	61·54	8·0	0·32	·000777	·000097
	27	59·3	61·86	10·3	0·35	·000850	·000083
	29	49·0	61·51	11·9	0·30	·000729	·000061
	31	60·9	61·81				
Mean . . .		..	...	..	..	....	0·000187

These results do not differ greatly from those which are given by application of the formula found in 1847. It is important to observe that they include the entire effects of temperature upon all the various parts of the mounting of the magnet, as well as on the magnet itself; and for this reason I think them deserving of great confidence. Still I have thought it prudent, at present, to omit application of corrections for temperature.

The method of observing with the horizontal-force-magnet is the following:—

A fine vertical wire is fixed in the field of view of the telescope, which is directed to the plane mirror carried by the magnet. On looking into the telescope, the graduations of the fixed scale, mentioned in pages *xix* and *xx*, are seen; and during the oscillations of the magnet, the divisions of the scale are seen to pass alternately right and left across the wire. The clock-time, for which the position of the magnet is to be determined, is the same as that for the observation of declination. The first observation is made by the observer applying his eye to the telescope 40^s before that time, and, if the magnet is in a state of vibration, he observes the next four extreme points of vibration of the scale, and the mean of these is adopted in the same manner as for the declination-observations; but if it appears to be at rest, then at 10^s before the pre-arranged time, he notes the reading of the scale; and 10^s after the pre-arranged time he notes whether the reading continues the same, and if it does, that reading is adopted as the result. If there is a slight difference in the readings, the mean is taken.

The number of instances when the magnet was observed in a state of vibration during the year 1874 is very small.

Outside the double box is suspended a thermometer which is read on every week day, at 21^h, 22^h, 23^h, 0^h, 1^h, 2^h, 3^h, and 9^h. A few readings are taken on Sunday. Self-registering maximum and minimum thermometers placed outside the box were formerly read twice every day, but in consequence of the very small diurnal range of temperature, these observations have not been continued.

§ 6. *Photographic self-registering Apparatus for Continuous Record of Magnetic Horizontal Force.*

Referring to the general description of photographic apparatus, the following remarks apply more particularly to that which is attached to the horizontal-force-magnet. A concave mirror of speculum-metal, 4 inches in diameter, is carried by the magnet-carrier. The light of a gas-lamp shines through a small aperture $0^{in.}\cdot 3$ high, and $0^{in.}\cdot 01$ broad (which is supported by the solid base of the brick pier carrying the magnet-support), at the distance of about 21·25 inches from the concave mirror, and is made to converge to a point, on the north surface and near the east end of the same revolving cylinder which receives the light from the concave mirror of the declination-magnet. A cylindrical lens parallel to the axis of the cylinder receives the somewhat elongated image of the source of light, and converts it into a well-defined spot. The motions of this spot parallel to the axis represent the angular movements of the magnet which are produced by an increase of terrestrial magnetic force overcoming more completely the torsion-force of the bifilar suspension, or by a diminution of terrestrial force yielding to the torsion-force.

As the spot of light from the horizontal-force-mirror falls on the side of the cylinder opposite to that on which the light from the declination-mirror falls, the same time-scale will not apply to both; it is necessary to prepare a time-scale independently for each.

The following is the calculation by which the scale of horizontal force on the photographic sheet is determined. The distance between the surface of the concave mirror and the surface of the cylinder is 134·436 inches; consequently, one degree of angular motion of the magnet, producing two degrees of angular motion of the reflected ray, moves the spot of light through 4·6927 inches. For the year 1874 the adopted value of variation of horizontal force for one degree of angular motion of the magnet is sin. $1^\circ \times$ cotan. $41^\circ. 17'\!\cdot\!1 = 0\cdot019679$; and the movement of the spot of light for 0·01 part of the whole horizontal force is 2·385 inches. With this fundamental number, the graduations of the pasteboard scale for measure of horizontal force have been prepared.

§ 7. *Vertical-Force-Magnet, and Apparatus for observing it.*

The vertical-force-magnet in use to 1848 was made by Robinson; that in use from 1848 to 1864, January 20, was by Barrow. The magnet now in use is by Simms. Its length is $1^{\text{ft.}}\ 6^{\text{in.}}$; it is pointed at the ends. After some trials, it was re-magnetized by Mr. Simms on 1864, June 15. Between 1864, August 27, and September 27, a new knife-edge was attached to it, to remedy a defect which, as was afterwards found, arose from a cause that had no relation to the knife-edge. Its supporting frame rests upon a solid pier, built of brick and capped with a thick block of Portland stone, in the western arm of the magnetic basement. Its position is as nearly as possible symmetrical with that of the horizontal-force-magnet in the eastern arm. Upon the stone block is fixed the supporting frame, consisting of two pillars (connected at their bases) on whose tops are the agate planes upon which vibrate the extreme parts of the knife-edge (to be mentioned immediately). The carrier of the magnet is an iron frame, to which is attached, by clamps and pinching screws, a steel knife-edge, about 8 inches long. The steel knife-edge passes through an aperture in the magnet. The axis of the magnet is as nearly as possible transverse to the meridian, its marked end being E. The axis of vibration is as nearly as possible N. and S. To the southern end of the iron frame, and projecting further south than the end of the knife-edge, is fixed a small plane mirror, whose plane makes with the axis of the magnet an angle of $52\frac{3}{4}^{\circ}$ nearly. The fixed telescope (to be mentioned) is directed to this mirror, and by reflexion at the surface of the mirror it views a vertical scale (to be mentioned shortly). The height of this mirror above the floor is about $2^{ft.}\ 10^{in.}\cdot 6$. Before the introduction of the photographic methods, the magnet was placed in a perforation of a brass frame midway between its knife-edges. But since the photographic method was introduced, the magnet has been placed excentrically; the distance of its southern face from the nearest end of the southern knife-edge being nearly 2 inches, and a space of $4\frac{1}{2}$ inches in the northern part of the iron frame being left disposable. In this disposable space there is attached to the iron frame by three clips a concave mirror of speculum-metal, with its face at right angles to the length of the magnet; it is used in the photographic system (shortly to be described). Near the north end of the iron frame are fixed in it two screw-stalks, upon which are adjustible screw-weights; one stalk is horizontal, and the movement of its weight affects the position of equilibrium of the magnet (which depends on the equilibrium between the moments of the vertical force of terrestrial magnetism on the one hand and of the magnet's center of gravity on the other hand); the other stalk is vertical, and the movement of its weight affects the delicacy of the balance, and varies the magnitude of its change of position produced by a change in the vertical force of terrestrial magnetism.

The whole is inclosed in a rectangular box. This box is based upon the stone block above mentioned; and in it, in a space separated from the rest by a thin partition, the magnet can vibrate freely in the vertical plane. In the south side of the box is a hole covered by glass, through which pass the rays of light from the scale to the plane mirror, and through which they are reflected from the plane mirror to the telescope. And at the east end is a large hole covered by glass, through which passes the light from the lamp to the concave mirror, and through which it is reflected to the photographic cylinder (to be described hereafter).

The telescope is fixed to the west side of the brick pier which supports the stone pier in the upper room carrying the declination-theodolite. Its position is symmetrical with that of the telescope by which the horizontal-force-magnet is observed; so that a person seated in a convenient position can, by an easy motion of the head left and right, observe the vertical-force and horizontal-force-magnets.

The scale is vertical: it is fixed to the pier which carries the telescope, and is at a very small distance from the object-glass of the telescope. The wire in the field of view of the telescope is horizontal. The telescope being directed towards the mirror, the observer sees in it the divisions of the scale passing upwards and downwards over the fixed wire as the magnet vibrates. The numbers of the scale increase from top to bottom; so that, when the magnet is placed with its marked end towards the East, increasing readings (as seen with the fixed telescope) denote an increasing vertical force.

OBSERVATIONS RELATING TO THE PERMANENT ADJUSTMENTS OF THE VERTICAL-FORCE-MAGNET.

1. Determination of the compound effect of the declination-magnet, the horizontal-force-magnet, and the iron affixed to the electrometer pole, on the vertical-force-magnet.

The experiments applying to the magnets are given in the volumes for 1840–1841 to 1845: and those applying to the electrometer pole in the volume for 1842. It appeared that no sensible disturbance was produced on the magnet formerly in use. No experiments have been made with the new magnet.

2. Determination of the time of vibration of the vertical-force-magnet in the vertical plane.

In the year 1874, vibrations of the vertical-force-magnet were observed on 166 different days, and with readings of various divisions of the scale. The mean time of vibration adopted for the year was $15^{s}\cdot43$.

3. Determination of the time of vibration of the vertical-force-magnet in the horizontal plane.

1873, January 17–18. The magnet with all its apparatus was suspended from a tripod in Magnetic Office, No. 5, its broad side being in a plane parallel to the horizon; therefore, its moment of inertia was the same as when it is in observation. A telescope, with a wire in its focus, was directed to the reflector carried by the magnet. A scale of numbers was placed on the floor of the room, at right angles to the long axis of the magnet, or parallel to the mirror. The magnet was observed only at times when it was swinging through a small arc. From 1,300 vibrations, the mean time of one vibration $=16^{s}\cdot158$. This number is used through the year 1874.

4. Computation of the angle through which the magnet moves for a change of one division of the scale; and calculation of the disturbing force producing a movement through one division, in terms of the whole vertical force.

The distance from the scale to the mirror is 186·07 inches, and each division of the scale $=\frac{12}{30\cdot85}$ inches. Hence the angle which one division subtends, as seen from the mirror, is $7'.\ 11''\cdot19$; and therefore the angular movement of the normal to the mirror, corresponding to a change of one division of the scale, is half this quantity, or $3'.\ 35''\cdot60$.

But the angular movement of the normal to the mirror is not the same as the angular movement of the magnet; but is less in the proportion of unity to the cosine of the angle which the normal to the mirror makes with the magnet, or in the proportion of unity to the sine of the angle which the plane of the mirror makes with the magnet. This angle has been found to be $52\frac{3}{4}^\circ$; therefore, dividing the result just obtained by sine $52\frac{3}{4}^\circ$, we have, for the angular motion of the magnet corresponding to a change of one division of the scale, $4'. 30''\cdot85$.

From this, the value, in terms of the whole vertical force, of the disturbing force, producing a change of one division, is to be computed by the formula, "Value of Division in terms of radius $\times$ cotan. dip $\times \frac{T'^2}{T^2}$"; where T' is the time of vibration in the horizontal plane, and T the time of vibration in the vertical plane.

For the year 1874, T' was assumed $= 16^s\cdot158$, $T = 15^s\cdot43$, dip $= 67^\circ. 43'. 36''$. From these numbers, the change of the vertical force, in terms of the whole vertical force, corresponding to one division of the scale, is found $= 0\cdot0005898$.

5. Investigation of the temperature-correction of the vertical-force-magnet.

The new vertical-force-magnet was subjected to experiments by inclosing it in a copper box, and warming it by an injection of hot air, and observing the amount of deviation which it produced on the suspended magnet used in the deflexion-apparatus for absolute measure of horizontal force, at the same time and in the same manner as were the horizontal-force-magnet and the old vertical-force-magnet, in the experiments described in pages *xxiv* to *xxvi*. Observations made on 1864, February 20, 25, March 3, 9, gave, for the tangents of the angles of deflection,—

16 observations with marked end E		at mean temperature	$36^\circ\cdot6$	Fahrenheit,	gave	0·172352
18 ,, ,, W						
33 ,, marked end E		,,	62·2	,,		0·171657
29 ,, ,, W						
26 ,, marked end E		,,	93·3	,,		0·171389
27 ,, ,, W						

From these it appeared that the angle of deflection might be represented by—

$$0\cdot172522 \times \left\{1 - 0\cdot0002233 \times (t - 32) + 0\cdot000001894 \times (t - 32)^2\right\}$$

The quantity within the brackets (which represents the variation of magnetic power in terms of the whole power of the magnet) shows the same peculiarities as those found for the other magnets; that the third term is large, and has a sign opposite to that of the second term.

The factor of variation for 1° of Fahrenheit, when $t = 62^\circ$, is $- 0\cdot0001097$.

After these observations, the new vertical-force-magnet was re-magnetized by Mr. Simms, on 1864, June 15.

In the beginning of 1868, observations were made in the method already described for the horizontal-force-magnet, by heating the magnetic basement to different temperatures, and observing the scale-reading in the ordinary way. The results are as follows :—

RESULTS OF TEMPERATURE EXPERIMENTS UPON THE VERTICAL-FORCE-MAGNET.

1868. Month and Day.		Temperature.	Scale Reading.	Change of Temperature.	Change of Scale Reading.	Change of Scale Reading reduced to Parts of the whole Vertical Force.	Change of V.F. corresponding to a change of 1° of Temperature (in Parts of the whole V.F.)
		°	div.	°	div.		
January	3	56·0	56·45				
	4	48·2	46·52	7·8	9·93	0·006482	0·000831
	5	59·6	61·49	11·4	14·97	·009772	·000857
January	6	59·6	61·73				
	7	49·0	46·84	10·6	14·89	0·009720	·000917
	10	59·5	61·62	10·5	14·78	·009648	·000919
	11	49·7	48·70	9·8	12·92	·008434	·000861
	12	62·0	64·40	12·3	15·70	·010249	·000833
	13	53·4	53·33	8·6	11·07	·007226	·000840
	14	55·4	55·72	2·0	2·39	·001560	·000780
	16	52·3	50·79	3·1	4·93	·003218	·001038
	17	63·7	66·13	11·4	15·34	·010014	·000878
	18	52·4	53·26	11·3	12·87	·008402	·000743
	20	60·7	62·19	8·3	8·93	·005829	·000702
	22	50·6	47·82	10·1	14·37	·009381	·000929
	23	59·6	59·60	9·0	11·78	·007690	·000854
	25	49·6	46·67	10·0	12·93	·008441	·000844
	26	60·5	60·62	10·9	13·95	·009107	·000836
	29	49·3	44·78	11·2	15·84	·010340	·000923
	31	63·1	64·55	13·8	19·77	·012906	·000935
February	4	51·0	47·11	12·1	17·44	·011385	·000941
	5	62·3	64·02	11·3	16·91	·011039	·000977
	6	50·6	46·43	11·7	17·59	·011483	·000981
	7	53·3	49·10	2·7	2·67	·001743	·000646
	8	50·6	45·55	2·7	3·55	·002317	·000858
	10	62·1	62·76	11·5	17·21	·011235	·000977
February	14	60·6	57·70				
	16	49·0	36·75	11·6	20·95	·011298	·000974
	18	61·9	58·85	12·9	22·10	·011919	·000924
February	18	61·9	58·05				
	20	50·0	41·96	11·9	16·09	·011749	·000987
	21	62·6	56·82	12·6	14·86	·010851	·000861
Mean . .		..	..	..	..	...	0·000880

The coefficient of temperature-correction given by these experiments is enormously greater than any that has been found in any previous experiments. Yet I conceive that there can be no doubt of its accuracy. And it is easy to see that an instrument, subjected to the effects of gravity working differentially on its two ends, is liable to great changes depending on temperature which have no connexion with magnetism. For instance, if the point, at which the magnet is grasped by its carrier, is not absolutely coincident with its center of gravity, a great change of position may be produced by a small change of temperature. There appears to be no way of avoiding these evils but by maintaining almost uniform temperature; a condition which has been almost perfectly preserved in the year 1874.

The method of observing with the vertical-force-magnet is the following:—

A fine horizontal wire is fixed in the field of view of the telescope, which is directed to the small plane mirror carried by the magnet. On looking into the telescope, the graduations of the fixed vertical scale are seen; and during the oscillations of the magnet, the divisions of the scale are seen to pass alternately upwards and downwards across the wire. The clock-time, for which the position of the magnet is to be determined, is the same as that for the other two magnets. The observer applies his eye to the telescope about two vibrations before the arranged time, and if the magnet is in motion he observes its places at four extreme vibrations; and the mean of these is taken as for the horizontal-force-magnet. But if the magnet is apparently at rest, then at one-half time of vibration before the arranged time, and at an equal interval after the arranged time, the reading of the scale is noted; if the reading continues the same that reading is adopted, if there is a slight difference, the mean is taken.

The number of instances in 1874 in which the magnet was found in a state of vibration is very small.

Outside the box is placed a thermometer, which is read on every week day at 21^h, 22^h, 23^h, 0^h, 1^h, 2^h, 3^h, and 9^h. A few readings are taken on Sunday. Self-registering maximum and minimum thermometers were formerly read twice daily, but in consequence of the very small diurnal range of temperature these observations have not been continued.

§ 8. *Photographic self-registering Apparatus for Continuous Record of Magnetic Vertical Force.*

The concave mirror which is carried by the vertical-force-magnet is 4 inches in diameter; its mounting has been described in the last article. At the distance of about 22 inches from that mirror, and external to the box, is the horizontal aperture, about $0^{in}\cdot3$ in length and $0^{in}\cdot01$ in breadth, carried by the same stone block which carries the supports of the agate planes. The lamp which shines through this aperture is carried by a wooden stand. The light reflected from the mirror passes through a cylindrical lens with its axis vertical, very near to the cylinder carrying the photographic paper, and finally forms a well-defined spot of light on the cylinder of paper, at the distance of 100·18 inches from the mirror. As the movements of the magnet are vertical, the axis of the cylinder is vertical. The cylinder is about $14\frac{1}{4}$ inches in circumference, being of the same dimensions as those used for the declination and horizontal-force magnets, and for the earth-currents. The forms of the exterior and interior cylinders, and the method of mounting the paper, are in all respects the same as for the declination and horizontal-force magnets; but the cylinder is supported by being merely planted upon a circular horizontal plate (its position being defined by fitting a central hole in the metallic cap of the cylinder upon a central pin in the plate), which rests on anti-friction rollers and is made by watchwork to revolve once in twenty-four hours. The trace of the vertical-force-magnet is on the west side of the cylinder.

On the east side, the cylinder receives the trace produced by the barometer (to be described hereafter). A pencil of light from the lamp which is used for the barometer shines through a fixed aperture with a small cylindrical lens, for tracing a photographic base-line upon the cylinder of paper, similar to that for the cylinder of the declination and horizontal-force magnets.

The scale for the ordinates of the photographic curve of the vertical force is thus computed. Remarking that the radius which determines the range of the motion of the spot of light is double the distance 100·18 inches, and is therefore = 200·36 inches, the formula used in the last section, when applied to $\frac{\text{disturbing force}}{\text{whole vertical force}} = 0{\cdot}01$, gives value of division $= 200{\cdot}36 \times \text{tan. dip.} \times \left(\frac{\mathrm{T}}{\mathrm{T}'}\right)^2 \times 0{\cdot}01$. The value of the ordinate of the photographic curve for $\frac{\text{disturbing force}}{\text{whole vertical force}} = 0{\cdot}01$, thus obtained, is, for the year 1874, = 4·461 inches. With this value, the pasteboard scales, used for measuring the photographic ordinates, have been prepared.

§ 9. *Dipping Needles, and Method of observing the Magnetic Dip.*

The instrument with which all the dips in the year 1874 have been observed, is that which, for distinction, is called Airy's instrument. The following description will probably suffice to convey an idea of its peculiarities :—

The form of the needles, the form of their axes, the form of the agate bearings, and the general arrangement of the relieving apparatus, are precisely the same as those in Robinson's and other needles. But the form of the observing apparatus is greatly modified, in order to secure the following objects :—

I. To obtain a microscopic view of the points of the needles, as in the instruments introduced by Dr. Lloyd and General Sir E. Sabine.

II. To possess at the same time the means of observing the needles while in a state of vibration.

III. To have the means of observing needles of different lengths.

IV. To give an illumination to the field of view of each microscope, directed from the side opposite to the observer's eye, so that the light may enter past the point of the needle into the object glass of the microscope, forming a black image of the needle-point in a bright field of view.

V. To give facility for observing by day or night.

With these views, the following form is given to the apparatus :—

The needle, and the bodies of the microscopes, are inclosed in a square box. The base of the box, two vertical sides, and the top, are made of gun-metal (carefully selected to insure its freedom from iron); but the sides parallel to the plane of vibration of the needle are of glass. Of the two glass sides, that which is next the observer is firmly fixed; it is hereafter called "the graduated glass-plate." The other glass side can be withdrawn, to open the box, for inserting the needle, &c.

An axis, whose length is perpendicular to the plane of vibration of the needles, and is as nearly as possible in the line of the axis of the needle, supported on two bearings (of which one is cemented in a hole in the graduated glass-plate, the other being upon a horizontal bar near to the agate support of the needle-axis), carries a transverse arm, about 11 inches long, or rather two arms, projecting about $5\frac{1}{2}$ inches on each side of the axis. Each of these projecting arms carries three fixed microscopes on each side, adapted in position to the lengths of the needles to be mentioned shortly.

The microscope-tube thus carried is not the entire microscope, but so much as contains the object-glass and the field-glass. Upon the plane side of the field-glass (which is turned towards the object-glass), a series of parallel lines is engraved by etching with fluoric acid. The object-glass is so adjusted that the image of the needle-point is formed upon the plane side of the field-glass; and thus the parallel lines can be used for observing the needle in a state of vibration; and, one of them being adopted as standard, the lines can be used for reference to the graduated circle (to be mentioned). All this requires that there be an eye-glass also for the microscope.

The axis of which we have spoken is continued through the graduated glass-plate, and there it carries another transverse arm parallel to the former, and generally similar to it, in which are fixed three sockets and eye-glasses. Thus, reckoning from the observer's eye, there are the following parts:—

(1.) The eye-glass.

(2.) The graduated glass-plate (its graduations, however, not intervening in this part of the glass, the graduated circle being so large as to include, within its circumference, all the microscopes).

(3.) The field-glass, on the further surface of which the parallel lines are engraved.

(4.) The object-glass.

(5.) The needle.

(6.) The removeable glass side of the box.

(7.) The illuminating reflector, to be described hereafter.

The optical part of the apparatus being thus described, we may proceed to speak of the graduated circle.

The graduations of the circle (whose diameter is about $9\frac{3}{4}$ inches) are etched on the inner surface of the graduated glass-plate. These divisions (as well as the parallel lines on the field glasses of the microscopes) are beautifully neat and regular, and are, I think, superior to any that I have seen on metal. The same piece of metal, which carries the transverse arms supporting the microscope bodies, carries also two arms with verniers for reading their graduations. These verniers (being adapted to transmitted light) are thin plates of metal, with notches instead of lines. The reading of the verniers is very easy. The portion of the axis which is external to the graduated glass-plate (towards the observer), and which has there, as already stated, two arms for carrying the microscope eye-glasses, has also two arms for carrying the lenses by which the verniers and glass-plate graduations are viewed. These four arms are the radii of a circle, which can be fixed in position by a clamp, attached to the gun-metal casing of the graduated glass-plate, and furnished with the usual slow-motion screw.

The entire system of the two arms carrying the microscope-bodies, the two arms carrying the microscope eye-glasses, the two arms carrying the verniers, and the two arms carrying the reading-glasses for the verniers, is turned rapidly by means of a button on the external side of the graduated glass-plate, or is moved slowly by means of the slow-motion screw just mentioned.

It now remains only to describe the illuminating apparatus. On the outside of the removeable glass plate, there are supports for the axis of a metallic circle turning in a plane parallel to the plane of needle-vibration. This circle has four slotted radii, which support eight small frames carrying prismatic glass reflectors, each of which can turn on an axis that is in the plane of the circle but transverse to the radius. Two of these reflectors are for the purpose of sending light through the verniers, and therefore are fixed at the same radial distance as the verniers; the other six are intended for sending light past the ends of the needle through the six microscopes, and are therefore fixed at distances corresponding to the fixed microscopes. The circle was originally turned by a small winch near the observer's hand; at present, the winch is removed, as its axis was found to be slightly magnetic. At each observation, it is necessary to turn the circle which carries the reflectors; but this is the work of an instant.

The light which illuminates the whole is a gas-burner, in the line of the axis of rotation. Its rays fall upon the glass prisms, and each of these is adjusted, by turning on its axis, to throw the reflected light in the required direction.

The whole of the apparatus, as thus described, is planted upon a horizontal plate admitting of rotation in azimuth: the plate is graduated in azimuth, and verniers are fixed to the gun-metal tripod stand. The gas-pipe is led down the central vertical axis, and there communicates by a rotatory joint with the fixed gas-pipes.

The needles adapted for use with this instrument are—

B_1, a plain needle	each 9 inches long.
B_2, a plain needle	
B_3, a loaded needle with adjustible load	
B_4, a needle whose plane passes through the axis of the needle	
C_1, a plain needle	each 6 inches long.
C_2, a plain needle	
C_3, a loaded needle with adjustible load	
C_4, a needle whose plane passes through the axis of the needle	
D_1, a plain needle	each 3 inches long.
D_2, a plain needle	
D_3, a loaded needle with adjustible load	
D_4, a needle whose plane passes through the axis of the needle	

The needles constantly employed are B_1, C_1, D_1, B_2, C_2, D_2.

In discussing carefully the observations taken with this instrument (as well as with other dip-instruments), great trouble was sometimes experienced in determining the zenith-point (or reading of the vertical circle when the points of the needle are in the same vertical). To remedy this, a "zenith-point-needle" was constructed under my instructions by Mr. Simms; and it has since been used as need required. It is a flat bar of brass; with pivots similar to those of the dip-needles; and with three pairs of points corresponding to the three lengths of needles used; loaded at one end so as to take a position perfectly definite with respect to the direction of gravity; observed with the microscopes, and reversed for another observation, exactly as the dip-needles. For each of the different lengths of dip-needles, the zenith-point is determined by observation of that pair of points of the zenith-point-needle whose interval is the same as the length of the dip-needle.

The Dip Instrument and all the needles are examined, at the close of each year, and at other times if thought desirable, by Mr. Simms.

§ 10. *Observations for the absolute Measure of the Horizontal Force of Terrestrial Magnetism.*

In the spring of 1861, a Unifilar Instrument, similar in all respects (as is understood) to those used in and issued by the Kew Observatory, was procured by the courteous application of General Sir Edward Sabine, from the makers, Messrs. J. T. Gibson and Son; and after having been subjected to the usual examinations, at the Kew Observatory, for determination of its constants (for which I am indebted to the kindness of Balfour Stewart, Esq.), was mounted at the Royal Observatory. Observations with this instrument were commenced on 1861, June 11, and the instrument is still in use.

The deflected magnet (whose use is merely to ascertain the proportion which the power of the deflecting magnet at a given distance bears to the power of terrestrial magnetism) is 3 inches long, carrying a small plane mirror. The deflecting magnet is 4 inches long; it is a hollow cylinder, carrying in its internal tube a collimator, by means of which its time of vibration is observed in another apparatus. The frame which supports the suspension-piece of the deflected magnet carries also the telescope directed to the magnet-mirror; it rotates round the vertical axis of a horizontal graduated circle whose external diameter is 10 inches. The deflecting magnet is always placed on the E. or W. side of the deflected magnet, with one end towards the deflected magnet. In the reduction of the observations, the precepts contained in the Skeleton Form prepared at the Kew Observatory have received the strictest attention.

The following is the explanation of the method of reduction.

The distance of the centers of the deflected and deflecting magnet being known, it is supposed (from observations made at Kew, of which the details have not reached me) that the magnetism of the deflecting magnet is so altered by induction that the following multipliers ought to be used in computing the Absolute Force:—

At distance 1·0 foot, factor is	1·00031
1·1	1·00023
1·2	1·00018
1·3	1·00014
1·4	1·00011
1·5	1·00009

The correction of the magnetic power for temperature t_0 of Fahrenheit, reducing all to 35° of Fahrenheit, is

$$0·00013126\,(t_0-35)+0·000000259\,(t_0-35)^2$$

A_1 is $\frac{1}{2}(\text{distance})^3\times$ sine deflection, corrected by the two last-mentioned quantities, for distance 1 foot; A_2 is the similar expression for distance 1·3 foot; A'_2 is $\frac{A_2}{(1·3)^2}$; P is $\frac{A_1-A_2}{A_1-A'_2}$. A mean value of P is adopted from various observations; then $\frac{m}{X}=A_1\times\left(1-\frac{P}{1}\right)$ for smaller distance, or $=A_2\times\left(1-\frac{P}{1·69}\right)$ for larger distance. The mean of these is usually adopted for the true value of $\frac{m}{X}$.

For computing the value of mX from observed vibrations, it is necessary to know K, the moment of inertia of the magnet as mounted. The value of log. π^2K furnished by Mr. Stewart is 1·66073 at temperature 30°, and 1·66109 at temperature 90°. Then putting T for the time of the magnet's vibration as corrected for induction, temperature, and torsion-force, the value of mX is $=\frac{\pi^2K}{T^2}$. From the combination of this value of mX with the former value of $\frac{m}{X}$, m and X are immediately found.

It appears, from a comparison of observations given in the Introduction to the *Magnetical and Meteorological Observations*, 1862, that the determinations with the Old Instrument (in use to 1861) ought to be diminished by $\frac{1}{117}$ part, to make them comparable with those of the Kew Unifilar.

The computation of the values of m and X has, to the year 1857, been made in reference to English measure only, using the foot and the grain as the units of length and weight; but, for comparison with foreign observations of the Absolute Intensity of Magnetism, it is desirable that X should be expressed also in reference to Metric measure, in terms of the millimètre and milligramme. If an English foot be supposed equal to α times the millimètre, and a grain be equal to β times the milligramme, then it is seen that, for the reduction of $\frac{m}{X}$ and mX to Metric measure, these must be multiplied by α^3 and $\alpha^2\beta$ respectively. Hence X^2 must be multiplied by $\frac{\beta}{\alpha}$, and X by $\sqrt{\frac{\beta}{\alpha}}$. Assuming that the mètre is equal to 39·37079 inches, and the gramme equal to 15·43249 grains, log. $\sqrt{\frac{\beta}{\alpha}}$ will be found to be $=9·6637805$, and the factor for reducing the English values of X to Metric values will be 0·46108 or $\frac{1}{2·1689}$. The values of X in Metric measure thus derived from those in English measure are given in the proper table.

§ 11. *Explanation of the Tables of Reductions of the Magnetic Observations (excluding the days of great Magnetic Disturbance).*

The Indications, on which the reductions of this section and the next are founded, are derived entirely from the measures of the ordinates of the Photographic Curves.

The first step taken was to divide the days of observation into two groups; in one of which the magnetism was generally so tranquil that it appeared proper to use those days for determination of the laws of diurnal inequality; while in the other group the movements of the magnetic instruments were so violent, and the photographic curves traced by them so irregular, that it appeared impossible to employ them, except by the exhibition of every motion of the magnet during the day. A similar division into groups had been made in two Memoirs printed in the Philosophical Transactions. For the year 1874, the following days, five in number, were selected as exhibiting practically the same amount of irregularity which had been considered as defining the class of Days of Great Disturbance in the Memoirs to which I have alluded:—

February 4; March 7; April 1; October 3 and 4.

These days being separated, the photographic sheets for the remaining days were thus treated. Through each photographic curve a pencil line was drawn, representing, as well as could be judged, the general form of the curve without its petty irregularities. These pencil curves only were then used; and their ordinates were measured, with the proper pasteboard scales, at every hour. The methods of forming from these the various tables of this section require no special explanation.

The temperature of the Magnetometers was maintained in so great uniformity through each day that no apprehension is entertained of the slightest appreciable error in the diurnal inequalities of horizontal force and vertical force, as a consequence of the omission of temperature-correction. But it was impossible to maintain perfect uniformity of temperature through all the seasons. I have, therefore, exhibited, in the Tables of Mean Force in each month, the mean temperature of the month. It will be borne in mind, therefore, that the numbers exhibited are *not* corrected for temperature, but require the correction corresponding to the printed mean temperatures.

§ 12. *Explanation of the Tables of Indications of Magnetometers on five days of Great Magnetic Disturbance.*

Telescope-observations of the Magnetometers have usually been made four times every day, except on Sundays, on which days three observations have usually been taken; but, though these observations are employed in forming the base lines on the photographic sheets, their immediate results are not given in the Tables.

For each photographic record, a new base-line, representing a convenient reading in round numbers of the element to which it applies, has been drawn on the sheet. Then the Assistant, who is charged with the translation of the curve-ordinates into numbers, remarks the salient points of the curve, or the points which if connected by straight lines would produce a polygon not sensibly differing from the photographic curve; to each of these he applies the scale of pasteboard or glass proper for the element under consideration; the base of the scale determines the time on the time-scale, and the reading of the scale for the point of the photographic curve gives the quantity which is to be added to the value of the new base-line. The ordinate-reading so formed is printed without alteration in the Tables. It is particularly to be remarked that the indications for horizontal force and vertical force are *not corrected for temperature.*

It has been the custom, in preceding volumes of the Greenwich Magnetical and Meteorological Results, to exhibit the varying Declination in the sexagesimal divisions of the circle, and the variable parts of the Horizontal Force and the Vertical Force in terms of the whole Horizontal Force and whole Vertical Force respectively. This custom is still retained; but in the year 1872 an addition was made, carrying out the principle suggested by C. Chambers, Esq., Superintendent of the Bombay Observatory, that all the variable inequalities should be expressed in terms of Gauss's Magnetic Unit. In applying this principle, I have adopted the reference to metrical units of measure and weight instead of British units; a change from the first proposal, which, I believe, has received the assent of Mr. Chambers. The formulæ for converting the original numbers into the new numbers are the following:—

$$\frac{\text{Variations of H. F. in metrical measure}}{\text{H. F. in metrical measure}} = \frac{\text{Variation in former measure}}{\text{Whole value in former measure}}$$

from which,

$$\text{Variation of H. F. metrical} = \frac{\text{H. F. metrical}}{\text{Former H. F.}} \times \text{former variation.}$$

The mean value, for the year, of $\frac{\text{H. F. metrical}}{\text{Former H. F.}} = 1{\cdot}795$; and this therefore is the factor to be employed for transformation.

Similarly,

$$\text{Variation of V. F. metrical} = \frac{\text{V. F. metrical}}{\text{Former V. F.}} \times \text{former variation.}$$

The Former V. F. (in the same manner as Former H. F.) $= 1$; but the V. F. metrical $=$ H. F. metrical $\times$ tan. dip. The factor is therefore $1{\cdot}795 \times \tan. 67^\circ.43'.36'' = 4{\cdot}3825$.

The values given at the bottom of the page, for the adopted zeros of the variable forces, are formed by multiplying these factors by 0·86 and 0·96 respectively.

For Variation of Declination, expressed in minutes, the metrical factor is $1{\cdot}795 \times \sin. 1' = 0{\cdot}0005221$.

In preceding years, allusion has been made to the occasional dislocations of the curve of Vertical Force. No instance of such dislocation has presented itself in 1874.

It is believed that these dislocations were produced by bringing a magnet into the proximity (though not very close) of the magnetometer; and this supposed cause of error has, in late years, been carefully avoided.

§ 13. *Wires and Photographic self-registering Apparatus for continuous Record of Spontaneous Terrestrial Galvanic Currents.*

In order to obtain an exhibition of the spontaneous galvanic currents which in some measure are almost always discoverable in the earth, and which occasionally are very powerful, it was necessary to extend two insulated wires from an earth connexion at the Royal Observatory, in two directions nearly at right angles to each other, to considerable distances, where they would again make connexion with the earth. By the kindness of the Directors of the South Eastern Railway Company, to whom the Royal Observatory has on several occasions been deeply indebted, two connexions were made; one to a station near Dartford, at the direct distance $9\frac{3}{4}$ miles nearly, in azimuth (measured from North, to East, South, West), 102° astronomical or 122° magnetical, the length of the connecting wire being about $15\frac{5}{8}$ miles; the other to a station near Croydon, at the direct distance 8 miles, in azimuth, 209° astronomical, or 229° magnetical, the length of the connecting wire being about $10\frac{1}{2}$ miles. At these two stations connexion was made with earth. The details of the course were as follows. The wires were soldered to a water pipe in the Magnetic Ground at the Royal Observatory. Thence they entered the Magnetic Basement, and passed through the photographic self-registering apparatus (to be shortly described). From it they were led up the electrometer mast to a height exceeding 50 feet, and thence they were swung across the grounds to a chimney above the Octagon Room. They descended thence, and were led to a terminal board in the Astronomical Computing Room, to which an intermediate galvanometer could be attached for eye-observation of the currents. From this point they were led to the "Battery Basement," and, with other wires, passed under the Park to the Greenwich Railway Station, and thence upon the telegraph poles of the South Eastern Railway. One wire branched off at the junction with the North Kent Railway to Dartford, the other at the junction with the main line of railway to Croydon. At both places their connexion with earth was made by soldering to water-pipes, as at the Royal Observatory.

These wires remained in the places described till the end of 1867. It had been discovered in experience that a much smaller separation of the extreme points of earth-connexion would suffice, and it was conjectured that advantage might arise from making the two earth-connexions of each wire on opposite sides of the Observatory and nearly equidistant from it, instead of making one earth-connexion of each within the Observatory grounds. In 1868, therefore, the following wire-courses were substituted. One wire is connected with earth, by a copper plate, at the Lady Well station of the Mid-Kent Railway; it is thence led to the North Kent Junction with the Greenwich Railway, to the Royal Observatory (for communication with the self-registering apparatus), back to the North Kent Junction, then by North Kent Railway and Angerstein Branch to the Angerstein Wharf, where it is connected with earth by a copper plate. The other wire is connected with earth by a copper plate at the North Kent Junction, then passes to the Royal Observatory and back to the Junction, and then along the North Kent Railway to the Morden College end of the Blackheath Tunnel, where it is connected with earth in the same manner. The straight lines connecting the extreme points of the wires cross each other near the middle of their lengths and near the Royal Observatory; the length of the first line is nearly 3 miles, and its azimuth 56° N. to E. (magnetic); that of the second line is nearly $2\frac{1}{2}$ miles, and its azimuth 136°. But, in the circuitous courses above described, the length of the first wire is about $10\frac{3}{8}$ miles, and that of the second $6\frac{1}{4}$ miles. These wires were established and brought into use on 1868, August 20. The names and connexions of the Observatory ends of the four branches were identified in 1870, in 1871, June, again in 1872, on 1873, April 17, and 1874, April 15.

The apparatus for receiving the effects of the galvanic currents consists essentially of two magnetic needles (one for each wire), each suspended by a hair so as to vibrate horizontally within a double galvanic coil, exactly as in an ordinary galvanometer (supposed to be laid horizontally); these coils being respectively in the courses of the two long wires. The number of folds of the wire in each coil was 150 (or 300 in the double coil) through the year 1874. A current of one kind, in either wire, causes the corresponding needle to turn itself through an angle nearly proportioned to the strength of the current, in one direction; a current of the opposite kind causes it to turn in the opposite direction. These turnings are registered by the following apparatus.

To the carrier of each magnet is fixed a small plane mirror, which receives all the azimuthal motions of the magnet. The light of a gas-lamp passes through a minute aperture, and shines upon the mirror; the divergent pencil is converted into a convergent pencil by refraction through crossed cylindrical lenses (with axes vertical before the pencil reaches the mirror, and with axes horizontal where the pencil is received from the mirror), which, under the circumstances, were more convenient than spherical lenses. A spot of light is thus formed upon the photographic paper wrapped upon a cylinder of ebonite, which is covered by a glass cylinder, and made to rotate in twenty-four hours by clock-work, exactly as for the register of the magnetic elements. As in the case of declination and horizontal-force, the two earth currents make their registers upon opposite sides of the same barrel, and upon different parts of the sheet; the same gaslight serving for the illumination of both.

A portion of a base-line for either record is obtained at any time by simply breaking the galvanic communication.

The photograph records were regularly made, with the wires in the first position, from 1865, March 15, to the end of 1867. Fifty-three days, on which the magnetic disturbances were active, were selected for special examination; and for these the equivalent galvanic currents in the north and west directions were computed, and their effects in producing apparent magnetic disturbances in the west and north directions were inferred. They correspond almost exactly with those indicated by the magnetometers. Then the records for all the days of tranquil magnetism were reduced in the same manner, not for comparison with the magnetometer-results, but for ascertaining the diurnal laws of the galvanic currents. These laws were found to be very different from the laws of magnetic diurnal inequalities. These discussions have been communicated to the Royal Society in two papers, printed respectively in the Philosophical Transactions for 1868 and 1870.

The records with the wires in the new positions have been regularly made since 1868, August 20, but have not yet been discussed.

§ 14. *Standard Barometer.*

The Barometer is a standard, by Newman, mounted in 1840. It is fixed on the South wall of the West arm of the Magnetic Observatory. The tube is $0^{in.}565$ in diameter; the cistern is of glass. The graduated scale which measures the height of the mercury is made of brass, and to it is affixed a brass rod, passing down the inside of one of the upright supports, and terminating in a conical point of ivory; this point in observation is made just to touch the surface of the mercury in the cistern, and the contact is easily seen by the reflected and the actual point appearing *just* to meet each other. The rod and scale are made to slide up and down by means of a slow-motion screw. The scale is divided to $0^{in.}05$.

The vernier subdivides the scale divisions to $0^{in.}002$; it is moved by a slow-motion screw, and in observation is adjusted so that the ray of light, passing under the back and front of the semi-cylindrical plate carried by the vernier, is a tangent to the highest part of the convex surface of the mercury in the tube.

At the bottom of the instrument are three screws, turning in the fixed part of the support, and acting on the piece in which the lower pivot of the barometer-frame turns, for adjustment to verticality: this adjustment is examined occasionally.

The readings of this barometer, until 1866, August 20^d, 0^h, are considered to be coincident with those of the Royal Society's flint-glass standard barometer. On that day a change was made in the barometer. It had been remarked that the slow-motion-screw at the bottom of the sliding rod (for adjusting the ivory point to the surface of the mercury in the cistern) was partly worn away: and on August 20 the sliding rod was removed from the barometer by Mr. Zambra to remedy this defect. It was restored on 1866, August 30^d, 3^h. Before the removal of the sliding rod, barometric comparisons had been made with a standard barometer the property of Messrs. Murray and Heath, and with two barometers, Negretti and Zambra, Nos. 646 and 647. While the sliding rod of the Greenwich standard was removed, Negretti and Zambra 647 was used for daily observations. After the new equipment of the standard barometer, another series of comparisons with the same barometers was made: from which it was found (the three auxiliaries giving accordant results) that the readings of the barometer, in its new state, required a correction of $- 0^{in}{\cdot}006$. This is applied in the printed observations commencing with 1866, August 30.

The height of the cistern above the mean level of the sea is 159 feet. This element is founded upon the determination of Mr. Lloyd, in the *Phil. Trans.*, 1831; the elevation of the cistern above the brass piece inserted in a stone in the transit-room (to which Mr. Lloyd refers) being $5^{ft}.2^{in}$.

The barometer has been read at 21^h, 0^h, 3^h, 9^h (astronomical), on every day, excepting on Sundays, and on Good Friday and Christmas Day, on which days fewer observations have been taken. Every reading has been reduced to the reading which would have been obtained at the temperature 32° of the mercury and scale, by application of the correction given in Table II. (pages 82 to 87) of the Report of the Committee of Physics of the Royal Society. The mean of the reduced readings has then been taken for each civil day, and finally converted into mean daily reading, by application of the correction inferred from Mr. Glaisher's paper in the *Philosophical Transactions*, 1848, Part I, Table I, page 127.

In the printed record of the barometrical and all other meteorological observations, the day is to be understood, generally, as defined in civil reckoning.

§ 15. *Photographic self-registering Apparatus for continuous Record of the Readings of the Barometer.*

The Photographic self-registering Apparatus for continuous Record of Magnetic Vertical Force is furnished (as has been stated) with a vertical cylinder covered with photographic paper and revolving in 24 hours. North of the surface of this cylinder, at the distance of about 30 inches, is a large syphon barometer, the bore of the upper and lower extremities of its arms being about 1·1 inch. A glass float partly immersed in the mercury of the lower extremity is partially supported by a counterpoise acting on a light lever, leaving a definite part of the weight of the float to be supported by the mercury. This lever is lengthened to carry a vertical plate of opaque mica with a small aperture, whose distance from the fulcrum is nearly eight times the distance of the point of attachment of the float wire, and whose movement, therefore, is nearly four times the movement of the column of a cistern-barometer. Through this aperture the light of a lamp, collected by a cylindrical lens, shines upon the photographic paper.

The scale of time is established by means of occasional interruptions of the light, and the scale of measure is established by comparison with occasional eye-observations.

This barometer was brought into use in 1848, but its indications were not satisfactory till the mercury was boiled in the tube by Messrs. Negretti and Zambra on 1853, August 18, since which time they have appeared unexceptionable. A table showing the *Maxima and Minima of the Barometer* throughout the year, as extracted from the photographic record, is given near the end of the Meteorological Results.

A discussion of the photographic records of the Barometer from 1854 to 1873 is in progress.

§ 16. *Thermometers for ordinary Observation of the Temperature of the Air and Evaporation.*

The Dry-Bulb Thermometer, the Wet-Bulb Thermometer, the Maximum Self-Registering Thermometers, both dry and wet, and the Minimum Self-Registering Thermometers, dry and wet, all for determination of the temperature of the air and of evaporation, are mounted on a revolving frame whose fixed vertical axis is planted in the ground. From the year 1846 to 1863 the post forming the vertical axis was about 23 feet south (magnetic) of the S.S.E. angle of the south arm of the Magnetic Observatory; in 1863 it was moved to a position about 35 feet south (astronomical) of the south angle. A frame revolves on this post, consisting of a horizontal board as base, of a vertical board projecting upwards from it connected with one edge of the horizontal board, and of two parallel inclined boards (separated about three inches) connected at the top with the vertical board, and at the bottom with the other edge of the horizontal board. The outer inclined board is covered with zinc. The air passes freely between all these boards.

The dry and wet-bulb thermometers are attached to the outside, and near the center of the vertical board; the maximum and minimum thermometers for air towards one vertical edge, and those for evaporation towards the other vertical edge, with their bulbs at almost the same level, and near to those of the dry and wet-bulb thermometers; their bulbs are about 4 feet above the ground and projecting from 2 inches to 3 inches below the horizontal board. Above the thermometers is a small projecting roof to protect them from rain. The frame is always turned with the inclined side towards the sun. It is presumed that the thermometers are thus sufficiently protected.

The graduations of all the thermometers used in the Royal Observatory rest fundamentally upon those of a Standard Thermometer, the property of Mr. Glaisher, which derives its authority from comparison with original thermometers constructed by the late Rev. R. Sheepshanks about the years 1840–1843, in the course of his preparations for the construction of the National Standard of Length. The whole of the radical determinations of Freezing Point, Boiling Point, and Subdivision of Volume of Tube, were made by Mr. Sheepshanks with the utmost care: it is believed that these were the first original thermometers that had been constructed in England for many years. Mr. Glaisher's thermometer has been adopted as the standard of reference for all the thermometers used in the Royal Observatory since 1840.

The Dry-Bulb Thermometer is by Newman. The corrections required for its readings, as found by comparison with the standard above-mentioned, are as follows:—

Between 8° and 11°	subtract 0°·4
12 and 19	0·5
20 and 24	0·6
25 and 30	0·7
31 and 37	0·8
38 and 44	0·9
45 and 52	1·0
53 and 59	1·1
60 and 64	1·2
65 and 68	1·3
69 and 71	1·4
72 and 74	1·5
75 and 77	1·6
78 and 79	1·7
80 and 82	1·8
83 and 84	1·9
85 and 86	2·0
87 and 90	2·1
91 and 95	2·2
96 and 100	2·3
101 and 104	2·4

The wet-bulb thermometer is by Negretti and Zambra, and is in every respect similar to the dry-bulb thermometer. The corrections required to the readings of this thermometer are—

Between 32° and 49°	0°·0
50 and 81	add 0·2
82 and 91	0·0
92 and 105	subtract 0·2

Dry-bulb and wet-bulb thermometers, with pea-bulbs and porcelain scales, Negretti and Zambra 1179, are also mounted on the roof of the library, 4 feet above the leads and 22 feet above the ground. No corrections for index error are applied to the readings of these thermometers.

On 1869, September 30, dry-bulb and wet-bulb thermometers were mounted on the roof of the cabinet containing the registering mechanism of Robinson's Anemometer, but below the revolving cups, at the height 4 feet above the flat roof and 50 feet above the ground. No corrections for index errors are applied to their readings.

The eye-readings of the dry-bulb and wet-bulb thermometers have usually been taken at the hours (astronomical reckoning) 21^h, 0^h, 3^h, 9^h, and corrected by application of the numbers given above. The mean daily value of Dry Thermometer given in the printed results is found by combining the observations taken at these hours with the observations of daily maximum and minimum, as explained at page *xlix*. No results of the observations of the thermometers mounted on the roof of the Library or at Robinson's Anemometer are printed in the present volume.

The dew-point has been inferred exclusively from the simultaneous observations of the dry-bulb and wet-bulb thermometers, by multiplying the difference between the readings of these thermometers by a factor peculiar to the temperature of the air, and subtracting the product from the reading of the dry-bulb thermometer. These factors have been found by Mr. Glaisher from the comparison of a great number of dew-point determinations, obtained by use of Daniell's hygrometer, with simultaneous observations of dry-bulb and wet-bulb thermometers. The first part of this investigation was published in full, in the volume of *Magnetical and Meteorological Observations* for 1844, pages 67–72; it was based upon all the observations made up to that time. Subsequently, the comparison was extended to include all the simultaneous observations of these instruments made at the Royal Observatory, Greenwich, from 1841 to 1854, with some observations taken at high temperatures in India, and others at low and medium temperatures at Toronto. The results at the same temperature were found to be the same at these different localities, so far as the climatic circumstances permitted comparison. (See Glaisher's Hygrometrical Tables, 5th Edition). The following table exhibits the result of the entire comparison; it has been used in forming the dew-points in the present volume.

TABLE OF FACTORS by which the DIFFERENCE of READINGS of the DRY-BULB and WET-BULB THERMOMETERS is to be MULTIPLIED in order to PRODUCE the DIFFERENCE between the READINGS of the DRY-BULB and DEW-POINT THERMOMETERS.

Reading of Dry-bulb Thermometer.	Factor.	Reading of Dry-bulb Thermometer.	Factor.	Reading of Dry-bulb Thermometer.	Factor.	Reading of Dry-bulb Thermometer.	Factor.
°		°		°		°	
10	8·78	33	3·01	56	1·94	79	1·69
11	8·78	34	2·77	57	1·92	80	1·68
12	8·78	35	2·60	58	1·90	81	1·68
13	8·77	36	2·50	59	1·89	82	1·67
14	8·76	37	2·42	60	1·88	83	1·67
15	8·75	38	2·36	61	1·87	84	1·66
16	8·70	39	2·32	62	1·86	85	1·65
17	8·62	40	2·29	63	1·85	86	1·65
18	8·50	41	2·26	64	1·83	87	1·64
19	8·34	42	2·23	65	1·82	88	1·64
20	8·14	43	2·20	66	1·81	89	1·63
21	7·88	44	2·18	67	1·80	90	1·63
22	7·60	45	2·16	68	1·79	91	1·62
23	7·28	46	2·14	69	1·78	92	1·62
24	6·92	47	2·12	70	1·77	93	1·61
25	6·53	48	2·10	71	1·76	94	1·60
26	6·08	49	2·08	72	1·75	95	1·60
27	5·61	50	2·06	73	1·74	96	1·59
28	5·12	51	2·04	74	1·73	97	1·59
29	4·63	52	2·02	75	1·72	98	1·58
30	4·15	53	2·00	76	1·71	99	1·58
31	3·70	54	1·98	77	1·70	100	1·57
32	3·32	55	1·96	78	1·69		

For the mean daily value of dew point, the usual process is to take the mean of the dew points deduced, in the manner explained in the preceding paragraph, from the observations of the dry-bulb and wet-bulb thermometers, and to apply a correction which is the mean of the corrections in Mr. Glaisher's Table VIII. for the several hours of observation. Sometimes this process does not give harmonious results, and in such cases the following method is used. The correction for diurnal range applicable to the mean of the eye-observations of the dry-bulb thermometer having been found (as is described above), this correction is multiplied by a fraction, whose numerator is the mean of corrections to wet bulb thermometer in Table VII. for the hours of observations, and whose denominator is the mean of corrections to dry-bulb thermometer in Table II. for the same hours; and thus a correction is found which is applied to the mean of the eye-observations of wet bulb thermometer, to form the mean wet-bulb for the day. Then by use of the mean dry bulb reading for the day and the mean wet bulb reading for the day and the table of factors above, the mean dew point for the day is formed.

The self-registering maximum thermometers are by Negretti and Zambra. Their construction is as follows.

There is a small detached piece of glass in the tube, just above a bent part of the tube (near the bulb), through which the piece of glass cannot pass down. The column of mercury in rising lifts the glass up and passes freely; but in descending it is unable to pass the glass, and the lower mass of mercury descends, leaving a vacant space below the glass, and leaving a portion of the mercury above it. The piece of glass operates as an efficient valve. The corrections to the readings of the thermometer for the temperature of the air are as follows:—

Between 32° and 54°	subtract	0°·3
54 and 72		0·2
72 and 80		0·1
80 and 93		0·0
93 and 96	add	0·1
96 and 99		0·2
99 and 102		0·4

There is a similar thermometer for the maximum wet-bulb reading: no corrections have been applied to its readings.

The minimum self-registering thermometers are alcohol thermometers, of the construction known as Rutherford's. A sliding glass index allows the alcohol in rising to pass above it, but is drawn down by the peculiar action of the bounding surface of the fluid when it sinks. The readings of that which gives the minimum temperature of the air require no correction. The minimum wet-bulb thermometer required a correction of + 1°·0.

The mean daily values of dry thermometer in the printed columns are found by combining as has been mentioned two results derived from different sources. The first and simpler result is the mean of the maximum and minimum, corrected by a small quantity peculiar to the day, but depending fundamentally on the corrections for the month, given in Table III. of Mr. Glaisher's paper in the *Philosophical Transactions*, 1848, page 130. The second result is formed by taking the means of the four eye-observations at 21^h, 0^h, 3^h, 9^h, and applying a correction thus investigated. The daily range being found by taking the difference between the maximum and minimum, this daily range is multiplied by the mean of the factors in Table IV. of Mr. Glaisher's paper before mentioned corresponding to the hours of observation; the application of this correction to the mean of the eye-observations gives the second result. (It is evident that this process is applicable to any number of eye-observations.) These two results are then combined to form a mean, weights being given proportional to the number of observations contributing to each result.

§ 17. *Photographic self-registering Apparatus for continuous Record of the Readings of the Dry-Bulb and Wet-Bulb Thermometers.*

About 28 feet south (magnetic) of the south-east angle of the south arm of the Magnetic Observatory, and about 25 feet east of the thermometers for eye-observations, is a shed 10 ft. 6 in. square, standing upon posts 8 feet high, under which are placed the photographic thermometers, the dry-bulb thermometer towards the east, and the wet-bulb thermometer towards the west. The bulbs of the thermometers are 8 inches in length, and 0·4 inch internal bore, and their centers are about 4 feet above the ground. The bulb of one of the thermometers is covered with muslin throughout its whole length, which is kept moist by means of capillary passage of water along cotton wicks leading from a vessel filled with water.

There are small adjustments admitting the raising or dropping of the thermometers, so that the register of their changing readings may fall on a convenient part of the paper. The thermometer frames are covered by plates having longitudinal apertures, so narrow, that any light which may pass through them is completely, or almost completely, intercepted by the broad flat column of mercury in the thermometer-tube. Across these plates a fine wire is placed at every degree; and at the decades of the degrees, and also at 32°, 52°, and 72°, a coarser wire is placed. A gas lamp is placed about 9 inches from each thermometer (east of the dry bulb and west of the wet bulb), and its light, condensed by a cylindrical lens, whose axis is vertical, shines through the thermometer-tube above the surface of the mercury, and forms a well-defined line of light upon the photographic paper, which is wrapped around the cylinder. The axis of this cylinder is vertical; its mounting is in all respects similar to that of the Vertical Force cylinder. As the cylinder, covered with photographic paper, revolves under the light, which passes through the thermometer-tube, it receives a broad sheet of photographic trace, whose breadth (in the direction of the axis of the cylinder) varies with the varying height of the mercury in the thermometer-tube. The light in its passage is intercepted by the wires placed across the tube at every degree, and there are, therefore, left upon the paper corresponding lines in which there is no photogenic action.

The cylinder was at first made to revolve in 48 hours; the daily photographic traces of the two thermometers were thus simultaneously registered on opposite sides of the cylinder, sometimes slightly intermixing. The length of the glass cylinder used till 1869, March, is $13\frac{1}{2}$ inches, and its circumference is about 19 inches. On 1869, March 5, an ebonite cylinder was introduced, whose length is 10 inches, and circumference about 19 inches; and at a later time the cylinder was made to revolve in 50 hours instead of 48 hours, to insure the separation of the records of the two thermometers.

The photographic records of the dry-bulb and wet-bulb thermometers have been discussed from 1848 to 1868. The results exhibit the diurnal inequality of the temperature of the air and of evaporation, as grouped by months, as grouped by periods of high and low temperature, as grouped by periods of high and low atmospheric pressure, as grouped by cloudless or overcast sky, and as grouped by directions of the wind. These results will be printed when the discussion of the Barometer records spoken of at page *xlvi* is complete.

§ 18. *Thermometers for Solar Radiation and Radiation to the Sky.*

The thermometer for Solar Radiation, which to the end of the year 1864 was placed in an open box about 10 feet south of the south-west angle of the south arm of the Magnetic Observatory, is now laid on the grass, near the same place.

The thermometer is a self-registering maximum mercurial thermometer of Negretti and Zambra's construction; its bulb is blackened, and enclosed in a glass sphere from which the air has been exhausted. Its graduations are correct, and the numbers inserted in the tables are those read from the instrument without alteration. The thermometer is read at 9^h a.m., noon, 3^h p.m., and 9^h p.m.; the highest of these readings is adopted as the maximum for the day.

The use of a thermometer with blackened bulb not inclosed in an exhausted sphere was discontinued at the end of 1865.

The thermometer for radiation to the sky is placed near to the Solar Radiation thermometer, with its bulb resting on short grass, and fully exposed to the sky. It is a self-registering minimum spirit thermometer of Rutherford's construction, made by Negretti and Zambra. Its graduation is correct, and the numbers inserted in the table are those read from the scale without alteration. It is read every day at 9^h a.m., and occasionally at 9^h p.m.

§ 19. *Thermometers sunk below the Surface of the Soil at different Depths.*

These thermometers were made by Messrs. Adie of Edinburgh, under the immediate superintendence of the late Professor J. D. Forbes. The graduation was made by Professor Forbes himself.

The thermometers are four in number. They are all placed in one hole in the ground, the diameter of which in its upper half is 1 foot, and in its lower half about 6 inches. Each thermometer is attached in its whole length to a slender piece of wood, which is planted in the hole with it. The place of the hole is 20 feet south of the extremity of the south arm of the Magnetic Observatory, and opposite the center of its south front.

The soil consisted of beds of sand; of flint-gravel with a large proportion of sand; and of flints with a small proportion of sand, cemented almost to the consistency of pudding-stone. Every part of the gravel and sand extracted from the hole was perfectly dry.

The bulbs of the thermometers are cylindrical, 10 or 12 inches long and 2 or 3 inches in diameter. The bore of the principal part of the tubes, from the bulb to the graduated scale, is very small. In that part to which the scale is attached, the tube is larger.

The thermometer No. 1 was dropped into the hole to such a depth that the center of its bulb was 24 French feet (25·6 English feet) below the surface: then dry sand was poured in till the hole was filled to nearly half its height. Then No. 2 was dropped in till the center of its bulb was 12 French feet below the surface; No. 3 and No. 4 till the centers of their bulbs were respectively 6 and 3 French feet below the surface; and the hole was then completely filled with dry sand. The upper parts of the tubes, carrying the scales, were left projecting above the surface: No. 1 by 27·5 inches, No. 2 by 28·0 inches, No. 3 by 30·0 inches, and No. 4 by 32·0 inches. Of these lengths, the parts 8·5, 10·0, 11·0, and 14·5 inches, respectively, are tube with narrow bore.

The projecting parts of the tubes are protected by a wooden case or box fixed to the ground; the sides of the box are perforated with numerous holes, and it has a double roof. In the North face of this box is a large plate of glass through which the thermometers are read. Within the box are two smaller thermometers, one (No. 5) whose bulb is sunk one inch in the ground, and one (No. 6) whose bulb is in the free air nearly in the center of the box.

The fluid of the four long thermometers is alcohol tinged with a red colour.

The lengths of 1° on the scales of Nos. 1, 2, 3 and 4, are respectively $2^{in.}$, $1^{in.}1$, $0^{in.}9$, and $0^{in.}55$; and the ranges of the scales, as first mounted, were, $43°·0$ to $52°·7$, $42°·0$ to $56°·8$, $39°·0$ to $57°·5$, and $34°·2$ to $64°·5$.

These ranges for Nos. 2, 3, and 4, were found to be insufficient in some years, particularly those of Nos. 3 and 4, or the thermometers sunk to the depth of 6 feet and 3 feet.

In 1857, June 22, Messrs. Negretti and Zambra removed from Nos. 3 and 4 a quantity of fluid corresponding to the extent of 5° on their scales, and the scales of these two thermometers were then lowered by that linear extent, making the readings the same as before.

In subsequent years it was found that the amount of fluid removed was somewhat too great, for at the lower end of the scale the 6-foot thermometer sometimes fell below the limit of its scale or 44°; and the 3-foot thermometer below 39°·0; in which cases the alcohol sank into the capillary tube.

The readings at the early part of the series were at times defective at high temperatures, but always complete at low temperatures; afterwards, they were generally complete at high temperatures, and at times defective at low temperatures. The two combined, however, will enable us to complete all readings.

On 1869, July 21, Mr. Zambra removed fluid from No. 1 to the amount of 2°·7, and from No. 2 to the amount of 1°·5, and inserted in No. 4 fluid to the amount of 1°·5. The scales were re-engraved, to make the reading at every temperature the same as before.

The ranges of the scales are now,—for No. 1, 46°·0 to 56°·0; for No. 2, 43°·0 to 58°·0; for No. 3, 44°·0 to 62°·0; and for No. 4, 37°·0 to 67°·5.

These thermometers are read once a day, at noon, and the readings appear in the printed volumes as read from their scales without correction.

The observations of these thermometers from 1846 to 1859 have been elaborately reduced by Professor Everett; the results are printed as an Appendix to the Greenwich Observations for 1860. Abstracts of the observations of these thermometers (giving mean monthly temperatures) for the period 1847 to 1873 have since been prepared, and will be printed with the results of the discussion of the dry and wet bulb thermometer records, spoken of at page *li*.

§ 20. *Thermometers immersed in the Water of the Thames.*

The self-registering maximum and minimum thermometers for determining the highest and lowest temperatures of the water of the Thames are by Messrs. Negretti and Zambra, and are observed every day at 9^h a.m.

The thermometers were originally attached to the side of the "Dreadnought" hospital ship. Commencing with 1871, January 12, they were attached to the Police Ship "Scorpion," moored in Blackwall Reach.

A strong wooden trunk is firmly fixed to the side of the "Scorpion" Police Ship, about 5 feet in length, and closed at the bottom; the bottom and the sides, to the height of 3 feet, are perforated with a great number of holes, so that the water can easily flow through; the thermometers are suspended within this trunk so as to be about 2 feet below the surface of the water, and 1 foot from the bottom of the trunk. In the month of May 1874, the wooden trunk was shifted from the "Scorpion" to the "Royalist," moored in the same place. The first readings with the thermometers in the new position were taken 1874, May 5.

The observations have been made by the Resident Inspector on board, by permission of Lieut.-Col. Henderson, R.E., C.B., Commissioner of Metropolitan Police.

The index-error corrections to the thermometers are:—

For the maximum thermometer, till December 1,		subtract $\bar{1}$·4
" " "	from December 5 to 31,	subtract 1·6
For the minimum thermometer, throughout the year		0·0

§ 21. *Osler's Anemometer.*

This anemometer is self-registering: it was made by Newman, on a plan furnished by A. Follett Osler, Esq., F.R.S., but has received several changes since it was originally constructed. A large vane, which is turned by the wind, and from which a vertical spindle proceeds down nearly to the table in the north-western turret of the ancient part of the Observatory, gives motion by a pinion upon the spindle to a rack-work carrying a pencil. This pencil makes a mark upon a paper affixed to a board which is moved uniformly in a direction transverse to the direction of the rack-motion. The movement of the board is effected by means of a second rack connected with the pinion of a clock. The paper has lines printed upon it corresponding to the positions which the pencil must take when the direction of the vane is N., E., S., or W.; and also has transversal lines corresponding to the positions of the pencil at every hour. The first adjustment for azimuth was obtained by observing from a certain point the time of passage of a star behind the vane-shaft, and computing from that observation the azimuth; then on a calm day drawing the vane by a cord to that position, and adjusting the rack, &c., so that the pencil position on the sheet corresponded to that azimuth.

This construction originally arranged by Mr. Osler was in use till the middle of 1866, when the following modifications were made in it by Mr. Browning:—

The vane-shaft was made to bear upon anti-friction-rollers running in a cup of oil. For elucidation of the following description of the apparatus which it carries, I refer to Figure 3 on the engraving at the end of the Introduction to the volume of 1866. To the vane-shaft is attached a rectangular frame C, which rotates with the vane. To this frame are firmly attached the ends of four strong springs D, which rise from the point of attachment in a vertical direction, are then bent so as to descend below the frame C, and are then bent upwards so as to rise a short distance, where they terminate, each of them thus forming a large hook. To the interior of each strong spring, near to its upper bend, is affixed a very weak spring, which descends free into the lower bend or hook of the strong spring, so that its lower end may be moved by a light pressure till it reaches and takes bearing against the bent-up part of the strong spring, after which it cannot be further moved without moving the strong spring, and will therefore require much greater pressure. The four ends of these four light springs carry the circular pressure-plate A by the following connexions. The two which are farthest from A, or which are below the wide part of the vane, are united by a light horizontal cross-bar G; and from the ends of these springs proceed four light bars E, which are attached to points of the pressure-plate A, near its circumference. The two ends of light springs which are nearest to A are also united by a light horizontal cross bar, which is attached to a projection from the center of the plate A. (The diagonal lines upon A, in the diagram, represent indistinctly two strengthening edge-bars upon the pressure-plate, and the projection above-mentioned is fixed to their intersection.) The weight of the pressure-plate thus rests entirely on the slender springs; it is held steadily in position, as regards the opposition to the wind, and it moves without sensible friction. A light wind drives it through a considerable space, until the ends of one pair of light springs touch their large hooks; then for every additional pound of pressure the movement is smaller, till the ends of the other pair of light springs touch their large hooks; after this the movement for every additional pound of pressure is still further diminished. This apparatus was arranged by Mr. Browning. The communication with the pencil below is similar to that in the first construction: the cord and pulley are omitted in the drawing to avoid confusion.

The pressure-pencil below is carried by a radial bar, whose length is parallel to the scale of hours; it is brought to zero by a light spring.

The surface of the pressure-plate is 2 square feet, or double that in the old construction. The scale of indications on the recording-sheet was determined experimentally as in the old instrument; yet it was remarked that the pressures of wind per square foot appeared generally greater than formerly. It was suspected that the inertia of the tension-weight acting against the pressure-spring, and that of the pencil-weight, may have produced an injurious effect: both these weights were replaced by springs, 1872, February 21.

The scale for small pressures is much larger, and their indications much more certain than formerly. A pressure of an ounce per square foot is clearly shown.

A rain gauge of peculiar construction is carried by this instrument, by which the fall of rain is registered with reference to the time of the fall. It is described in § 23.

A fresh sheet of paper is applied to this instrument every day at 22^h mean solar time.

§ 22. *Robinson's Anemometer.*

In the latter part of the year 1866, a new instrument, on the principles described by Dr. Robinson in the Transactions of the Royal Irish Academy, vol. xxii., adapted to give a continuous record of the velocity of the wind, was mounted by Mr. Browning, of which the principal parts are represented in Figures 1 and 2 of the engraving in the Introduction 1866. The motion is given (as in the former instrument) by the pressure of the air on four hemispherical cups, the distance of the center of each from the axis of rotation being 15·00 inches. The foot of the axis is a hollow flat cone bearing upon a sharp cone which rises up from the base of a cup of oil. The horizontal arms are connected with a vertical spindle, upon which is an endless screw, working in a toothed wheel connected with a train of wheels, furnished with indices capable of registering one mile and decimal multiples of a mile up to 1,000 miles. A pinion C upon the axis of one of the wheels (which, in the figure, occupies a place too high) acts in a rack J, drawing it upwards by the ordinary motion of the revolving cups. The rack is pressed to the pinion by a spring, and, when it has been drawn up, it can be pressed by hand in opposition to the spring so as to release it from the pinion, and can then be pushed down, again to be raised by the action of the wheel-work. The rack is connected at the bottom with a sliding rod D, which passes down into the chamber below, where it draws up the sliding pencil-carrier E. The pencil F, which it carries, traces its indications upon the sheet of paper wrapped round a barrel, whose axis is vertical, and which by spindle connexion with the clock H is made to revolve in 24 hours. The revolving cups and wheel-work are so adjusted that a motion of the pencil upwards of one inch represents a motion of the air through 100 miles. The curve traced upon the barrel exhibits, therefore, the aggregate of the air's movements, and also the air's velocity, at every instant of the day.

In the year 1860, on July 3, 4, and 13, experiments were made in Greenwich Park, with the instrument then in use, to ascertain the correctness of the theory of Robinson's anemometer; the point to be verified being that the scale of the instrument, founded on the supposition that the horizontal motion of the air is about three times the space described by the centers of the cups, is correct.

A post about 5 feet high with a vertical spindle in the top was erected, and on this spindle turned a horizontal arm, carrying at the extremity of its longer portion Robinson's anemometer, and on its shorter portion a counterpoise. The distance from the vertical spindle of the post to the vertical axis of the anemometer was $17^{ft.}\ 8^{in.}{\cdot}7$. The reading of the dial was taken, and then the arm was made to revolve in the horizontal plane 50 or 100 times, an attendant counting the number of revolutions, and the reading of the dial was again taken. In this manner 1,000 revolutions were made in the direction N.E.S.W.N., and 1,000 revolutions in the direction N.W.S.E.N. In some of the experiments the air was sensibly quiet, and in others there was a little wind; the result was,

For a movement of the instrument through one mile,

Beam revolving N.E.S.W. (opposite to the direction of rotation of the Anemometer-cups)	1·15 was registered.
Beam revolving N.W.S.E. (in the same direction as the Anemometer-cups)	0·97 was registered.

The results from rapid revolutions and from slow revolutions were sensibly the same.

This may be considered as confirming in a very high degree the accuracy of the theory.

§ 23. *Rain Gauges.*

The rain-gauge connected with Osler's anemometer is 50 feet 8 inches above the ground, and 205 feet 6 inches above the mean level of the sea. It exposes to the rain an area of 200 square inches (its horizontal dimensions being 10 by 20 inches).

The collected water passes through a tube into a vessel suspended in a frame by spiral springs, which lengthen as the water increases, until 0·25 of an inch is collected in the receiver; it then discharges itself by means of the following modification of the syphon. A copper tube, open at both ends, is fixed in the receiver, in a vertical position, with its end projecting below the bottom. Over the top of this tube a larger tube, closed at the top, is placed loosely. The smaller tube thus forms the longer leg, and the larger tube the shorter leg, of a syphon. The water, having risen to the top of the smaller tube, gradually falls through it into the uppermost portion of a tumbling bucket, fixed in a globe under the receiver. When full, the bucket falls over, throwing the water into a small pipe at the lower part of the globe; the water completely fills the bore of the pipe; its descent causes an imperfect vacuum in the globe, sufficient to cause a draught in the longer leg of the syphon, and the whole contents run off. After leaving the globe, the water is carried away by a waste-pipe attached to the building. The springs then shorten and raise the receiver. The ascent and descent of the water-vessel move a radius-bar which carries a pencil; and this pencil makes a trace upon the paper carried by the sliding board of the self-registering anemometer. As the trace is rather long in proportion to the length of the radius-bar, the bar has now been furnished by Mr. Browning with a "parallel motion," which makes the trace sensibly straight.

The scale of the printed paper was adjusted by repeatedly filling the water-vessel until it emptied itself, then weighing the water, and thus ascertaining its bulk, and dividing this bulk by the area of the surface of the rain receiver.

A second gauge, with an area 77 square inches nearly, is placed close to the preceding, the receiving surface of both being on the same horizontal plane.

A third gauge is placed on the roof of the Octagon room, at 38 feet $4\frac{1}{2}$ inches above the ground, and 193 feet $2\frac{1}{2}$ inches above the mean level of the sea. It is a simple cylinder gauge, 8 inches in diameter and about $50\frac{1}{4}$ square inches in area. The height of the cylinder is $13\frac{1}{2}$ inches; at the depth of 1 inch from the top within the cylinder is fixed a funnel (an inverted cone) of 6 inches perpendicular height; with the point of this funnel is connected a tube, $\frac{1}{5}$ of an inch in diameter, and $1\frac{1}{2}$ inch in length; $\frac{3}{4}$ of an inch of this tube is slightly curved, and the remaining $\frac{3}{4}$ of an inch is bent upwards, terminating in an aperture of $\frac{1}{8}$ of an inch in diameter. By this arrangement, the last few drops of water remain in the bent part of the tube, and the water is some days evaporating. The upper part of the funnel or bore of the cone is connected with a brass ring, which has been turned in a lathe, and this is connected with a circular piece 6 inches in depth, which passes outside the cylinder, and rests in a water joint, attached to the inner cylinder, and extending all round.

A fourth gauge is placed on the top of the Library; it is a funnel, whose top has a diameter of 6 inches; its exposed area is $28\frac{1}{4}$ square inches nearly. The receiving surface of the gauge is 22 feet 4 inches above the ground, and 177 feet 2 inches above the mean level of the sea.

A fifth gauge is planted on the roof of the Photographic Thermometer shed, 10 feet above the ground, and 164 feet 10 inches above the mean level of the sea. Its construction is the same as that of the third gauge.

A sixth gauge is a self-registering rain-gauge on Crosley's construction, made by Watkins and Hill. The surface exposed to the rain is 100 square inches. The collected water falls into a vibrating bucket, whose receiving concavity is entirely above the center of motion, and which is divided into two equal parts by a partition whose plane passes through the axis of motion. The pipe from the rain-receiver terminates immediately above the axis. Thus that part of the concavity which is highest is always in the position for receiving water from the pipe. When a certain quantity of water has fallen into it, it preponderates, and, falling, discharges its water into a cistern below; then the other part of the concavity receives the rain, and after a time preponderates. Thus the bucket is kept in a state of vibration. To its axis is attached an anchor with pallets, which acts upon a toothed wheel by a process exactly the reverse of that of a clock-escapement. This wheel communicates motion to a train of wheels, each of which carries a hand upon a dial-plate; and thus inches, tenths, and hundredths are registered. Sometimes, when the escapement has obviously failed, the water which has descended to the lower cistern has again been passed through the gauge, in order to enable an assistant to observe the indication of the dial-plates without fear of an imperfection in the machinery escaping notice. The gauge is placed on the ground, 21 feet South of the Magnetic Observatory, and 156 feet 6 inches above the mean level of the sea.

The seventh and eighth gauges are placed near together, about 16 feet south of the Magnetic Observatory, 5 inches above the ground, and 155 feet 3 inches above the mean level of the sea. They are similar in construction and area to No. 3. These cylinders are sunk about 8 inches in the ground.

All these gauges, except No. 7, are read at 21^h daily; in addition, Crosley's gauge and No. 8 are read daily at 9^h, and No. 7 at the end of each month only, to check the summation of the daily readings of No. 8. All are read at midnight of the last day of each month.

Gauges Nos. 1, 2, 3, 5, and 8 were made by Messrs. Negretti and Zambra; No. 4 by Troughton; No. 6 by Watkins and Hill; and No. 7 is an old gauge.

§ 24. *Electrical Apparatus.*

The electrical apparatus consists of two parts, namely, the Moveable Apparatus, which is connected with a pole nearly 80 feet high, planted 7 feet North and 2 feet East of the north-east angle of the north arm of the Magnetic Observatory (as extended in 1862); and the Fixed Apparatus, which is mounted in a projecting window in the ante-room of the Magnetic Observatory.

On the top of the pole is fixed a projecting cap, to which are fastened the ends of two iron rods, which terminate in a pit sunk in the ground, and are kept in tension by attached weights. These rods are to guide the moveable apparatus in its ascents and descents. Near the bottom of the pole is fixed a windlass; the rope upon which it acts passes over a pulley in the cap, and is used to raise the moveable apparatus, which when raised to the top is suspended on a hook.

The moveable apparatus consists of the following parts:—A plank in a nearly vertical position is attached to perforated iron bars, which slide upon the iron rods. On the upper part of this plank is a cubical box. The box incloses a stout pillar of glass, having a conical hollow in its lower part. In the bottom of the box there is a large hole through which a cone of copper passes into the conical hollow of the glass pillar. In the lower part of the box a gas-lamp is placed, by the flame of which the copper cone and the lower part of the glass pillar are kept in a state of warmth. The gas lamp is lighted when necessary by means of a sliding frame, carrying a torch similar to that of ordinary lamplighters, which can be easily raised to the box; and there are very few losses of electrical indications from the failure of the lamp. A copper wire is fastened round the glass pillar; its end is carried to a similar glass pillar, warmed in the same manner, near the north-western turret of the Octagon room; by this wire, whose length is about 400 feet, the atmospheric electricity is collected. To this wire, near the box, is attached another copper wire (now covered with gutta percha) 0·1 inch in diameter, and about 73 feet long, at the end of which is a hook; a loaded brass lever connected with the fixed apparatus presses upon this hook, and thus keeps the wire in a state of tension, and at the same time establishes the electrical communication between the long horizontal wire and the fixed apparatus.

On 1871, November 17, the box which carries the insulating glass pillar was burnt. It seems possible that this accident was caused by soot deposited during gusty weather, which afterwards caught fire from the lamp. A copper box was substituted for the wooden box on 1872, January 2.

The fixed apparatus consists of these parts:—A glass bar, nearly 3 feet long, and thickest at its middle, is supported in a horizontal position, its ends being fixed in pieces of wood projecting downwards from the roof of the projecting window. Near to each end is placed a small gas-lamp, whose chimney encircles the glass, and whose heat keeps the glass in a state of warmth proper for insulation. A brass collar surrounds the center of the glass bar; it carries one brass rod, projecting vertically upwards through a hole in the roof of the window-recess, to which rod are attached a small metallic umbrella and the loaded lever above-mentioned; and it carries another rod projecting vertically downwards, to which is attached a horizontal brass tube in an East and West direction. On the North and South sides of this tube there project four horizontal rods, through the ends of which there pass vertical rods, which can be fixed by screws at any elevation; these are placed in connexion with the electrometers, which rest on the window seat.

The electrometers during the year 1874 consisted of two Volta's Electrometers, denoted by Nos. 1 and 2; a Henley's Electrometer; a Ronalds' Spark Measurer; a Dry-pile Apparatus; and a Galvanometer.

Volta 1 and Volta 2 are of the same construction; each is furnished with a pair of straws 2 Paris inches in length; those of the latter being much heavier than those of the former: each instrument is furnished with a graduated ivory scale, whose radius is 2 Paris inches, and it is graduated into half Paris lines. In the original construction of these instruments it was intended that each division of No. 2 should correspond to five of No. 1: the actual relation between them has not been determined by observations at the Royal Observatory. The straws are suspended by hooks of fine copper wire to the suspension-piece, and they are separated by an interval of half a line.

Henley's Electrometer is supported on the West end of the large horizontal tube by means of a vertical rod fixed in it. On each side of the upper part of this rod is affixed a semicircular plate of ivory, whose circumference is graduated; at the centers of these ivory plates two pieces of brass are fixed, which are drilled to receive fine steel pivots, carrying a brass axis, into which the index or pendulum is inserted; the pendulum terminates with a pith ball. The relation between the graduations of this instrument and those of the other electrometers has not been determined. This instrument has seldom been affected till Volta 2 has risen to above 100 divisions of its scale.

The spark measurer consists of a vertical sliding rod terminated by a brass ball, which ball can be brought into contact with one of the vertical rods before referred to, also terminating in a ball; and it can be moved from it or towards it by means of a lever, with a wooden handle. During the operation of separating the balls, an index runs along a graduated scale, and exhibits the distance between the balls, and this distance measures the length of the spark.

The electrometers and the spark measurer were originally constructed under the superintendence of the late Sir Francis Ronalds, but have since received small alterations.

The dry-pile apparatus was made by Watkins and Hill; it is placed in connexion with the brass bar by a system of wires and brass rods. The indicator, which vibrates between the two poles, is a small piece of gold leaf. This instrument is very delicate, and it indicates at once the quality of the electricity. When the inclination of the gold leaf is such that it is directed towards the top of either pile, it remains there as long as the quantity of electricity continues the same or becomes greater: the position is sometimes expressed in the notes by the words "as far as possible." The angle which the gold leaf makes with the vertical at this time is about 40°.

The galvanometer was made by Gourjon of Paris, and consists of an astatic needle, composed of two large sewing needles, suspended by a split silk fibre, one of the needles of the pair vibrating within a ring formed by 2,400 coils of fine copper wire. The connexions of the two portions of wire forming these 2,400 coils are so arranged that it is possible to use a single system of 1,200 coils of single wire, or a system of 1,200 coils of double wire, or a system of 2,400 coils of single wire: in practice the last has always been used. A small ball communicating by a wire with one end of the coils is placed in contact at pleasure with the electric conductor, and a wire leading from the other end of the coil communicates with the earth. An adjustible circular card, graduated to degrees, is placed immediately below the upper needle; the numeration of its divisions proceeds in both directions from a zero. One of these directions is distinguished by the letter A, and the other by the letter B; and the nature of the indication represented by the deflection of the needle towards A or towards B will be ascertained from the following experiment. A voltaic battery being formed by means of a silver coin and a copper coin, having a piece of blotting paper moistened with saliva between them: when the copper touches the small ball, and the wire which usually communicates with the earth is made to touch the silver, the needle turns towards A; when the silver touches the small ball, and the wire is made to touch the copper, the needle turns towards B.

§ 25. *Explanation of the Tables of Meteorological Observations.*

The mean daily value of the difference between dew-point temperature and air-temperature is the difference between the two numbers in the sixth and seventh columns. The Greatest and Least are the greatest and least among the differences corresponding to the times of observation in the civil day, or they are found from the absolute maxima and minima, as determined by comparing the observations of the self-registering wet-bulb thermometers with those of the self-registering dry-bulb thermometers.

The difference between the mean temperature for the day and the mean for the same day of the year on an average of fifty years, is found by comparison with a table of results deduced by Mr. Glaisher from fifty years' observations, made at the Royal Observatory, ending 1863.

Little explanation of the results deduced from Osler's Anemometer appears to be necessary. It may be understood generally that the greatest pressure occurred in gusts of short duration.

To 1867, October 31, the indication of Robinson's Anemometer was read off every day at 22^h (10^h A.M.), and the difference between consecutive readings was entered opposite to the civil day on which the first reading was taken. From 1867, November 1, the daily values have been extracted from the sheets of the continuous record, applying to the interval from midnight to midnight, and are entered opposite to the civil day to which each value belongs.

The daily register of rain is given for each civil day ending at midnight. This applies to the Cylinder Rain-gauge partly sunk in the ground, described above as the "eighth."

For understanding the divisions of time under the heads of Electricity and Weather, the following remarks are necessary:—The day is divided by columns into two parts (from midnight to noon, and from noon to midnight), and each of these parts is roughly subdivided into two or three parts by colons (:). Thus, when there is a single colon in the first column, it denotes that the remarks before it apply (roughly) to the interval from midnight to 6 A.M., and those following it to the interval from 6 A.M. to noon. When there are two colons in the first column, it is to be understood that the twelve hours are divided into three nearly equal parts of four hours each. And similarly for the second column.

The following is the explanation of the notation employed for record of electrical observations, it being premised that the quality of the Electricity is always to be supposed positive when no indication of quality is given :—

g cur.	denotes	*galvanic currents*	s	denotes	*strong*
m	...	*moderate*	sp	...	*sparks*
N	...	*negative*	v	...	*variable*
P	...	*positive*	w	...	*weak*

The duplication of the letter denotes an intensity of the modification described, thus, s s is very strong; v v, very variable.

The Clouds and Weather are described generally by Howard's Nomenclature; the figure denotes the proportion of sky covered by clouds, the whole sky being represented by 10. The notation is as follows :

a	denotes	*aurora borealis*	sl-mt	denotes	*slight mist*
ci	...	*cirrus*	n	...	*nimbus*
ci-cu	...	*cirro-cumulus*	r	...	*rain*
ci-s	...	*cirro-stratus*	th-r	...	*thin rain*
cu	...	*cumulus*	oc-r	...	*occasional rain*
cu-s	...	*cumulo-stratus*	oc-th-r	...	*occasional thin rain*
d	...	*dew*	fr-r	...	*frozen rain*
h-d	...	*heavy dew*	h-r	...	*heavy rain*
f	...	*fog*	shs-r	...	*showers of rain*
sl-f	...	*slight fog*	c-r	...	*continued rain*
th-f	...	*thick fog*	c-h-r	...	*continued heavy rain*
fr	...	*frost*	m-r	...	*misty rain*
g	...	*gale*	fr-m-r	...	*frequent misty rain*
h-g	...	*heavy gale*	oc-m-r	...	*occasional misty rain*
glm	...	*gloom*	sl-r	...	*slight rain*
gt-glm	..	*great gloom*	h-shs	...	*heavy showers*
h-fr	...	*hoar frost*	fr-shs	...	*frequent showers*
h	...	*haze*	fr-h-shs	...	*frequent heavy showers*
hl	...	*hail*	li-shs	...	*light showers*
so-ha	...	*solar halo*	oc-shs	...	*occasional showers*
l	...	*lightning*	oc-h-shs	...	*occasional heavy showers*
li-cl	...	*light clouds*	sq	...	*squall*
lu-co	...	*lunar corona*	sqs	...	*squalls*
lu-ha	...	*lunar halo*	fr-sqs	...	*frequent squalls*
m	...	*meteor*	h-sqs	...	*heavy squalls*
ms	...	*meteors*	fr-h-sqs	...	*frequent heavy squalls*
mt	...	*mist*	oc-sqs	...	*occasional squalls*

sc	denotes *scud*	t	denotes *thunder*
li-sc	... *light scud*	t-s	... *thunder storm*
sl	... *sleet*	th-cl	... *thin clouds*
sn	... *snow*	v	... *variable*
oc-sn	... *occasional snow*	vv	... *very variable*
sl-sn	... *slight snow*	w	... *wind*
s	... *stratus*	st-w	... *strong wind*

The foot-notes show the means and extremes of readings, and their departure in each month from average values, as found from the preceding Thirty-three Years Observations; those relating to Humidity have been calculated from the Fifth Edition of Glaisher's Hygrometrical Tables.

§ 26. *Observations of Luminous Meteors.*

In arranging for the observations of meteors, the directions circulated by the Committee of the British Association have received the most careful attention. The observers have been educated in the knowledge of the principal stars by observations of the stars themselves, and by means of globes and maps. The general instruction to all observers has been, to look out for meteors on every clear night; but the observer specially appointed for the evening's duties has been more particularly charged with this observation.

On the nights specially mentioned in the directions of the British Association Committee, greater attention was given to the sky, and the observations of meteors were made more systematically. The principal nights are, January 2 and 10; February 6; March 1; April 19; May 18; June 6 and 20; July 17, 20, and 29; August 3, August 7–13; September 10; October 1 and 23; November 9–14, November 19, 28, and 30; December 8–14, especially December 11. A more extended list of days has been published by the British Association Committee.

Special arrangements were made in the August period for observing till the morning; and in the November period for observing through the night, one or two observers being on duty till midnight, and then all the observers till daybreak. The observers were so stationed as to command different views of the sky, to secure observation of all the meteors which might present themselves, and to guard against the observation of the same meteor by different observers.

The observers in the year 1874 were Mr. Nash, Mr. Cross, Mr. Todd, and Mr. J. A. Greengrass. Their observations are distinguished by the initials N., C., T., and J. A. G., respectively.

§ 27. *Details of the Chemical Operations for the Photographic Records.*

Mr. Glaisher has drawn up the following account of the Chemical Processes employed in the Photographic Operations for the self-registration of the Magnetical and Meteorological Indications.

CHEMICAL PREPARATION AND TREATMENT OF THE PHOTOGRAPHIC PAPER FOR PRIMARIES.

The paper used in 1874 is principally furnished by Hollingsworth and Turner; it is strong and of even texture, and is prepared expressly for Photographic purposes.

First Operation.—Preliminary Preparation of the Paper.

The chemical solutions used in this process are the following:—

(1.) Sixteen grains of Iodide of Potassium are dissolved in one ounce of distilled water.

(2.) Twenty-four grains of Bromide of Potassium are dissolved in one ounce of distilled water.

(3.) When the crystals are dissolved, the two solutions are mixed together, forming the iodising solution. The mixture will keep through any length of time. Immediately before use, it is filtered through filtering paper.

A quantity of the paper, sufficient for the consumption of several weeks, is treated in the following manner, sheet after sheet.

> The sheet of paper is pinned by its four corners to a horizontal board. Upon the paper, a sufficient quantity (about 50 minims, or $\frac{5}{48}$ of an ounce troy) of the iodising solution is applied, by pouring it upon the paper in front of a glass rod, which is then moved to and fro till the whole surface is uniformly wetted by the solution. Or, the solution may be evenly distributed by means of a camel-hair brush.

The paper thus prepared is allowed to remain in a horizontal position for a few minutes, and is then hung up to dry in the air; when dry, it is placed in a drawer, and may be kept through any length of time.

Second Operation.—Rendering the Paper sensitive to the Action of Light.

A solution of Nitrate of Silver is prepared by dissolving 50 grains of crystallized Nitrate of Silver in one ounce of distilled water. Since the magnetic basement has been used for photography, 15 grains of Acetic Acid have always been added to the solution.

Then the following operation is performed in a room illuminated by yellow light.

> The paper is pinned as before upon a board somewhat smaller than itself, and (by means of a glass rod, as before,) its surface is wetted with 50 minims of the Nitrate of Silver solution. It is allowed to remain a short time in a horizontal position, and, if any part of the paper still shines from the presence of a part of the solution unabsorbed into its texture, the superfluous fluid is taken off by the application of blotting paper.

The paper, still damp, is immediately placed upon the cylinder, and is covered by the exterior glass tube, and the cylinder is mounted upon the revolving apparatus, to receive the spot of light formed by the mirror, which is carried by the magnet; or to receive the line of light passing through the thermometer tube.

Third Operation.—Development of the Photographic Trace.

When the paper is removed from the cylinder, it is placed as before upon a board, and a saturated solution of Gallic Acid, to which a few drops of Aceto-Nitrate of Silver are occasionally added, is spread over the paper by means of a glass rod, and this action is continued until the trace is fully developed. The solutions are kept in the magnetic basement, and are always used at the temperature of that room. When the trace is well developed, the paper is placed in a vessel with water, and repeatedly washed with several waters; a brush being passed lightly over both sides of the paper to remove any crystalline deposit.

Fourth Operation.—Fixing the Photographic Trace.

The Photograph is placed in a solution of Hyposulphite of Soda, made by dissolving four or five ounces of the Hyposulphite in a pint of water; it is plunged completely in the liquid, and allowed to remain from one to two hours, until the yellow tint of the Iodide of Silver is removed. After this the sheet is washed repeatedly with water, allowed to remain immersed in water for 24 hours, and afterwards placed within folds of cotton cloths till nearly dry. Finally it is placed between sheets of blotting-paper, and is pressed.

CHEMICAL PREPARATION AND TREATMENT OF THE PHOTOGRAPHIC PAPER FOR SECONDARIES.

Before taking a Secondary, the Primary is examined to ascertain whether the tint of the photographic curve is sufficiently dark. If it is not, the Primary is laid, face downwards, upon a desk of transparent plate-glass, below which is a large silvered plane mirror, so placed that the light from the sky is reflected upwards through the transparent glass and through the Primary; and the photographic curve is seen from the upper side or back with perfect distinctness. An assistant then darkens the back of the photographic curve by the application of sepia; the original photograph being untouched.

The paper used for the Secondaries is made by Rive; it is a strong wove paper, of tolerably even texture, thin, but able to bear a great deal of wear.

First Operation.—Preliminary Preparation of the Paper.

The chemical solution required for this purpose is as follows:—

Two grains of Chloride of Ammonium are dissolved in one ounce of distilled water. A sufficient quantity of this solution is placed in a flat-bottomed porcelain dish, and sheets of paper, one by one, are plunged within it; care being taken that no air bubbles remain between the paper and the solution; this may be prevented by slight pressure over the sheet by means of a bent glass rod. When a few sheets are thus immersed, they are turned over, and are taken out and hung to dry. Any number of sheets may thus be prepared.

An equally good result is obtained, by spreading over one side by means of a glass rod, as in the preparation of the Primaries, a solution of Chloride of Ammonium made by dissolving five grains of the chloride in one ounce of distilled water.

Second Operation.—Rendering the Paper sensitive to the Action of Light.

The solution required for this purpose is as follows:—

To a filtered solution of Nitrate of Silver (made by dissolving 50 grains of Crystallized Nitrate of Silver in one ounce of distilled water) some strong solution of Ammonia is added; the whole becomes at first of a dark brown colour, but when a sufficient quantity of Ammonia is added the solution becomes perfectly clear; a few crystals of Nitrate of Silver are then added till the solution is a little dull, forming "Ammoniacal Nitrate of Silver"; it is then ready for use.

The following operation is performed in a room illuminated by yellow light:—

By means of a glass rod this solution is spread over the paper, whilst pinned on a board; the paper is dried before a fire, and is then in a fit state to be used for producing a Secondary.

Third Operation.—Formation of the Photographic Copy.

A sheet of the paper so prepared is placed in a printing frame with its prepared side upwards, upon a bed of blotting paper resting upon a sheet of plate-glass; the Primary is then placed on the paper with its own face downwards; and as it is necessary, for obtaining a correct copy of the Primary, that it should be in close contact with the prepared surface, a second sheet of plate-glass is placed over it, and the two are pressed together by clamps and screws. The whole is then exposed to the light (the Primary to be copied being above the paper on which the copy is to be made). The time required to produce a copy depends, in a great measure, upon the thickness of the paper on which the Primary is made, and on the actinic quality of the light; a period of five minutes in a bright sunshine, or one hour in clea daylight, is generally sufficient.

Fourth Operation.—Fixing the Photographic Secondary.

When an impression has been thus obtained, it is necessary that the undecomposed Salts of Silver remaining in the paper be removed.

For this purpose the Secondary is at once plunged into water and well washed on both sides, passing a camel-hair brush over every part of it; it is then plunged into a solution of Hyposulphite of Soda (made by dissolving two or three ounces of the Hyposulphite in a pint of water), and is left through a period varying from half an hour to an hour. It is then removed, and washed in plain water several times; and running water is allowed to pass over it for twenty-four hours.

The sheets are then placed within the folds of drying cloths, till nearly dry, and finally between sheets of blotting paper.

The process of obtaining a Tertiary from a Secondary is in every respect the same as that of obtaining a Secondary from a Primary.

§ 28. *Personal Establishment.*

The personal establishment during the year 1874 has consisted of James Glaisher, Esq., F.R.S., Superintendent of the Magnetical and Meteorological Department, and Mr. William Carpenter Nash, Assistant.

Three or four computers have usually been attached to the Department.

Royal Observatory, Greenwich,
1876, July 8.

G. B. AIRY.

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

MAGNETICAL OBSERVATIONS.

1874.

ROYAL OBSERVATORY, GREENWICH.

REDUCTION

OF THE

MAGNETIC OBSERVATIONS

(EXCLUDING THE DAYS OF GREAT MAGNETIC DISTURBANCE).

1874.

TABLE I.—MEAN WESTERN DECLINATION of the MAGNET on each ASTRONOMICAL DAY, as deduced from the MEAN of TWENTY-FOUR HOURLY MEASURES of ORDINATES of the PHOTOGRAPHIC REGISTER on that DAY.

1874.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	19°	19°	19°	19°	19°	19°	19°	19°	19°	19°	19°	19°
d	′	′	′	′	′	′	′	′	′	′	′	′
1	33·0	33·1	31·0	..	29·4	28·2	29·6	29·4	28·0	27·3	27·9	25·5
2	33·0	31·8	30·2	32·1	29·3	28·4	30·0	28·7	27·8	27·3	27·9	26·1
3	33·2	30·9	31·0	30·7	30·3	27·4	30·0	29·2	28·4	..	28·4	24·7
4	31·9	..	31·1	30·1	30·5	29·0	29·7	29·2	28·5	..	26·9	24·8
5	33·0	29·4	30·8	29·8	30·1	28·3	29·5	28·9	28·5	29·1	26·7	25·6
6	33·5	31·2	30·8	28·8	30·0	27·9	29·1	28·6	27·8	26·8	23·4	25·1
7	33·9	32·0	..	30·4	29·8	28·2	28·9	28·2	28·6	27·5	..	25·4
8	32·4	31·6	32·6	31·1	29·7	28·0	29·5	29·6	27·5	28·1	27·5	24·9
9	33·0	31·9	30·3	31·1	29·0	28·8	29·9	29·7	29·7	27·5	26·6	24·8
10	..	32·5	30·5	..	29·0	27·8	30·2	28·6	28·7	27·5	27·3	25·3
11	..	32·3	30·6	29·7	28·7	28·9	28·3	29·3	26·4	27·1	26·5	25·0
12	..	32·4	31·6	29·0	28·7	30·0	30·1	30·6	27·2	27·4	24·5	24·9
13	..	31·7	30·6	28·9	29·9	29·8	..	29·2	28·5	28·2	25·0	25·2
14	..	31·0	29·9	30·2	28·3	29·7	28·9	30·2	28·0	25·9	25·1	25·1
15	31·2	31·9	30·3	29·9	27·8	28·6	29·4	28·9	27·5	27·9	25·3	25·2
16	31·1	31·8	30·8	29·4	30·1	30·2	29·3	29·4	27·6	26·2	25·4	25·2
17	34·8	30·9	30·4	29·5	29·4	29·4	29·4	29·2	28·0	26·2	25·2	24·9
18	33·9	32·0	29·5	29·9	29·8	29·0	29·2	27·7	27·6	26·6	25·7	25·0
19	32·9	30·9	30·0	29·8	31·4	28·2	29·1	27·7	27·3	27·1	26·1	25·2
20	32·5	31·3	30·2	30·5	32·1	29·9	29·8	27·2	26·9	27·1	24·5	25·4
21	32·4	30·9	31·2	30·4	30·4	29·2	29·5	28·2	26·6	27·2	25·8	24·8
22	32·4	30·5	30·1	30·4	29·5	28·0	28·9	26·9	27·5	26·6	25·7	24·8
23	32·5	31·6	30·6	30·0	29·3	28·3	28·2	27·0	26·6	27·5	24·2	24·3
24	31·4	31·4	31·3	30·4	28·9	28·8	27·7	29·5	26·9	27·0	25·4	24·6
25	32·1	31·4	30·4	30·1	28·8	29·4	29·0	28·0	29·0	27·6	24·9	24·9
26	32·4	32·0	30·3	28·9	28·7	28·4	29·2	29·5	29·1	26·0	24·6	24·6
27	30·6	30·8	30·5	28·9	29·4	28·2	28·5	28·4	29·2	27·6	25·4	24·7
28	33·4	31·0	31·5	30·3	29·0	28·1	27·6	28·2	30·1	26·5	24·8	23·6
29	32·2		31·1	30·1	28·3	28·9	29·1	28·1	31·1	27·0	24·6	24·7
30	31·4		31·0	29·7	29·1	28·8	29·4	27·7	30·0	27·2	25·0	24·3
31	32·1		29·7		28·6		31·6	27·8		26·5		24·0

TABLE II.—MEAN MONTHLY DETERMINATION of the WESTERN DECLINATION of the MAGNET at every HOUR of the DAY; obtained by taking the MEAN of all the DETERMINATIONS at the same HOUR of the DAY through the MONTH.

1874.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	19°	19°	19°	19°	19°	19°	19°	19°	19°	19°	19°	19°
h	′	′	′	′	′	′	′	′	′	′	′	′
0	35·8	34·0	35·8	35·7	34·5	33·0	34·1	34·4	34·4	31·4	29·8	27·2
1	37·0	35·6	37·2	37·5	35·6	34·3	36·1	35·5	34·9	32·0	30·3	27·4
2	36·7	36·1	36·9	37·1	35·3	34·7	36·0	34·7	34·1	31·9	29·4	26·9
3	35·6	35·5	35·4	35·4	34·4	33·7	34·4	33·1	32·6	30·9	28·2	26·2
4	34·6	34·4	33·3	33·5	32·7	32·5	32·8	31·5	30·7	29·3	27·7	25·5
5	34·1	33·5	31·7	31·7	31·3	31·1	31·5	29·8	29·1	28·3	26·4	25·9
6	32·8	32·6	30·7	30·0	30·2	30·3	30·3	29·0	28·0	27·3	25·9	25·6
7	32·1	32·1	30·0	28·9	29·4	29·7	29·7	28·9	27·3	26·2	25·3	24·1
8	31·0	30·9	29·3	28·7	28·9	29·4	29·1	28·7	26·8	25·7	24·7	23·4
9	29·8	29·7	28·7	29·0	28·2	28·8	28·8	28·3	26·3	25·6	23·9	23·6
10	29·9	29·1	28·4	28·4	28·5	28·4	28·3	27·8	26·4	25·2	23·1	23·2
11	29·6	28·6	28·6	27·8	28·4	27·9	28·2	27·2	26·3	25·1	23·1	23·2
12	29·7	28·5	29·0	27·8	28·5	27·8	27·9	27·0	26·1	25·2	23·2	23·6
13	30·9	29·4	29·3	28·2	28·3	27·1	27·7	26·7	26·1	25·5	23·6	24·0
14	31·2	30·3	29·2	28·1	28·2	26·5	27·2	26·8	26·2	25·6	24·4	24·1
15	31·9	30·9	29·5	28·3	28·2	26·4	26·6	26·5	25·8	25·9	25·0	24·4
16	31·9	30·6	29·3	28·7	27·6	26·0	26·7	26·4	25·8	26·4	24·8	24·4
17	32·1	30·7	29·3	28·4	26·5	24·9	25·8	25·7	26·0	26·4	24·9	24·6
18	32·0	30·6	29·0	27·3	25·4	24·3	25·2	24·8	25·6	26·2	25·0	24·6
19	32·3	30·9	28·1	25·8	24·8	24·3	25·3	24·2	25·0	25·7	25·0	24·7
20	32·0	30·1	27·2	25·5	25·0	24·7	25·5	25·0	25·1	24·9	24·9	24·7
21	31·4	29·3	27·5	26·5	26·2	25·6	26·4	26·3	26·4	25·0	25·3	24·7
22	32·3	30·3	29·6	29·0	28·9	27·7	28·2	28·5	28·8	26·6	26·7	25·6
23	34·0	32·0	32·9	32·4	31·8	30·5	31·3	31·4	31·9	29·3	28·3	26·6

TABLE III.

1874.

Month.	MEAN WESTERN DECLINATION of the MAGNET IN EACH MONTH, as deduced from the Mean of the MEAN HOURLY DETERMINATIONS in each MONTH (Table II.).	EXCESS OF WESTERN DECLINATION above 18°, converted into WESTERLY FORCE, and expressed in terms of GAUSS'S UNIT measured on the METRICAL SYSTEM.	MONTHLY MEANS of all the Actual DIURNAL RANGES of the WESTERN DECLINATION, as deduced from the Twenty-four Hourly Measures of each day.
	° ′		′
January	19. 32·5	0·0483	10·3
February	19. 31·5	·0478	9·8
March	19. 30·7	·0473	11·6
April	19. 30·0	·0470	14·4
May	19. 29·5	·0468	12·3
June	19. 28·7	·0462	12·1
July	19. 29·3	·0467	12·6
August	19. 28·7	·0462	12·1
September	19. 28·2	·0460	12·3
October	19. 27·2	·0455	10·0
November	19. 25·8	·0448	9·3
December	19. 24·9	·0443	5·8
Mean	19. 28·9	0·0464	11·0

TABLE IV.—MEAN HORIZONTAL MAGNETIC FORCE, expressed in terms of the Mean Horizontal Force for the Year (nearly), and diminished by a Constant (0·8600 nearly), on each ASTRONOMICAL DAY; as deduced from the MEAN of TWENTY-FOUR HOURLY MEASURES of ORDINATES of the PHOTOGRAPHIC REGISTER on that DAY.

1874.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d												
1	0·1520	0·1514	0·1531	..	0·1502	0·1519	0·1523	0·1497	0·1515	0·1499	0·1506	0·1513
2	·1523	·1519	·1530	0·1501	·1514	·1516	·1519	·1496	·1510	·1500	·1508	·1513
3	·1523	·1519	·1526	·1508	·1521	·1516	·1514	·1493	·1508	..	·1511	·1506
4	·1516	..	·1526	·1509	·1517	·1516	·1516	·1505	·1506	..	·1511	·1512
5	·1506	·1485	·1527	·1512	·1517	·1516	·1506	·1504	·1507	·1483	·1509	·1517
6	·1515	·1501	·1528	·1513	·1516	·1518	·1505	·1496	·1511	·1492	·1497	·1520
7	·1515	·1509	..	·1501	·1516	·1507	·1503	·1507	·1501	·1490	..	·1520
8	·1514	·1512	·1504	·1504	·1525	·1502	·1507	·1500	·1501	·1489	·1505	·1521
9	·1520	·1515	·1511	·1508	·1526	·1504	·1510	·1507	·1495	·1495	·1513	·1518
10	·1521	·1504	·1514	..	·1518	·1503	·1509	·1510	·1497	·1498	·1511	·1514
11	·1519	·1513	·1513	·1514	·1520	·1508	·1499	·1512	·1501	·1502	·1504	·1516
12	·1517	·1523	·1515	·1520	·1521	·1504	·1501	·1512	·1498	·1506	·1506	·1520
13	·1519	·1521	·1514	·1504	·1520	·1506	..	·1514	·1504	·1501	·1508	·1518
14	·1518	·1526	·1520	·1511	·1519	·1507	·1498	·1511	·1506	·1504	·1509	·1520
15	·1521	·1526	·1520	·1513	·1519	·1510	·1494	·1505	·1512	·1509	·1512	·1512
16	·1512	·1528	·1521	·1515	·1515	·1514	·1494	·1511	·1512	·1503	·1513	·1504
17	·1511	·1520	·1525	·1516	·1518	·1516	·1496	·1507	·1505	·1507	·1513	·1509
18	·1507	·1519	·1522	·1519	·1517	·1515	·1498	·1511	·1502	·1509	·1516	·1512
19	·1511	·1524	·1519	·1519	·1519	·1514	·1495	·1504	·1505	·1506	·1517	·1508
20	·1520	·1518	·1512	·1518	·1523	·1514	·1496	·1497	·1507	·1507	·1512	·1513
21	·1518	·1524	·1516	·1521	·1523	·1513	·1505	·1501	·1509	·1507	·1508	·1507
22	·1517	·1521	·1519	·1520	·1524	·1513	·1512	·1505	·1508	·1507	·1513	·1506
23	·1520	·1528	·1522	·1524	·1528	·1516	·1507	·1504	·1509	·1507	·1502	·1504
24	·1517	·1527	·1523	·1525	·1523	·1522	·1506	·1505	·1511	·1515	·1503	·1513
25	·1519	·1528	·1520	·1522	·1531	·1524	·1506	·1503	·1509	·1521	·1506	·1515
26	·1522	·1533	·1514	·1523	·1520	·1528	·1508	·1510	·1503	·1507	·1505	·1511
27	·1509	·1527	·1516	·1518	·1522	·1525	·1513	·1514	·1504	·1499	·1507	·1513
28	·1513	·1531	·1523	·1504	·1517	·1522	·1510	·1512	·1504	·1502	·1513	·1515
29	·1517		·1522	·1497	·1519	·1524	·1508	·1510	·1492	·1505	·1512	..
30	·1522		·1519	·1501	·1517	·1520	·1502	·1517	·1492	·1508	·1506	..
31	·1522		·1520		·1514		·1507	·1518		·1505		..

TABLE V.—MEAN MONTHLY DETERMINATION of the HORIZONTAL MAGNETIC FORCE, expressed in terms of the Mean Horizontal Force for the Year (nearly), and diminished by a Constant (0·8600 nearly), uncorrected for TEMPERATURE, at every HOUR of the DAY; obtained by taking the MEAN of all the DETERMINATIONS at the same HOUR of the DAY through each MONTH.

1874.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h 0	0·1513	0·1510	0·1510	0·1499	0·1511	0·1505	0·1494	0·1496	0·1497	0·1495	0·1505	0·1511
1	·1516	·1514	·1514	·1505	·1514	·1509	·1500	·1501	·1501	·1500	·1508	·1513
2	·1517	·1517	·1519	·1508	·1518	·1515	·1506	·1505	·1504	·1504	·1509	·1514
3	·1520	·1519	·1522	·1512	·1522	·1517	·1508	·1508	·1506	·1504	·1509	·1514
4	·1520	·1520	·1523	·1517	·1525	·1520	·1508	·1510	·1506	·1504	·1509	·1513
5	·1519	·1520	·1522	·1520	·1528	·1523	·1510	·1511	·1508	·1506	·1510	·1513
6	·1518	·1521	·1523	·1521	·1531	·1525	·1512	·1512	·1510	·1507	·1511	·1514
7	·1517	·1520	·1524	·1520	·1529	·1524	·1513	·1513	·1511	·1509	·1510	·1513
8	·1516	·1520	·1524	·1518	·1527	·1522	·1513	·1513	·1511	·1507	·1510	·1512
9	·1514	·1519	·1523	·1519	·1526	·1520	·1511	·1513	·1511	·1506	·1510	·1511
10	·1516	·1520	·1523	·1519	·1524	·1519	·1510	·1512	·1510	·1506	·1510	·1512
11	·1514	·1520	·1523	·1519	·1524	·1518	·1510	·1511	·1510	·1506	·1509	·1512
12	·1516	·1520	·1522	·1518	·1523	·1517	·1509	·1511	·1509	·1504	·1509	·1512
13	·1516	·1519	·1522	·1517	·1522	·1517	·1510	·1511	·1508	·1504	·1508	·1512
14	·1515	·1520	·1522	·1517	·1521	·1517	·1510	·1511	·1508	·1504	·1508	·1512
15	·1517	·1521	·1522	·1515	·1521	·1517	·1509	·1510	·1508	·1504	·1509	·1513
16	·1518	·1523	·1522	·1515	·1521	·1517	·1509	·1509	·1508	·1504	·1511	·1514
17	·1520	·1524	·1523	·1517	·1521	·1516	·1509	·1508	·1507	·1505	·1512	·1515
18	·1521	·1525	·1524	·1516	·1518	·1513	·1508	·1506	·1506	·1505	·1511	·1516
19	·1521	·1525	·1522	·1512	·1513	·1510	·1505	·1502	·1503	·1503	·1511	·1516
20	·1520	·1523	·1518	·1508	·1510	·1505	·1498	·1499	·1497	·1500	·1509	·1515
21	·1515	·1518	·1511	·1501	·1507	·1502	·1492	·1495	·1493	·1495	·1505	·1513
22	·1513	·1514	·1508	·1497	·1504	·1500	·1490	·1492	·1491	·1492	·1503	·1511
23	·1512	·1511	·1507	·1496	·1507	·1502	·1490	·1491	·1493	·1494	·1503	·1512

The Thermometer on the box inclosing the Horizontal Force Magnetometer was read generally eight times every day. The means of the readings taken for the same nominal hour through each month show no sensible Mean Diurnal Inequality of Temperature.

TABLE VI.

1874.

Month.	MEAN HORIZONTAL MAGNETIC FORCE (diminished by a Constant 0·8600 nearly) IN EACH MONTH, as deduced from the Mean of the MEAN HOURLY DETERMINATIONS in each MONTH (Table V.), uncorrected for Temperature.	MEAN HORIZONTAL FORCE IN EACH MONTH, expressed in terms of GAUSS'S UNIT measured on the METRICAL SYSTEM, and diminished by a Constant (1·5437 nearly).	Mean Temperature.
January	0·1517	0·2723	62°·9
February	·1519	·2726	62·7
March	·1520	·2728	62·9
April	·1513	·2715	63·4
May	·1519	·2726	64·3
June	·1515	·2719	66·4
July	·1506	·2704	69·2
August	·1506	·2704	67·7
September	·1505	·2702	67·4
October	·1503	·2698	65·1
November	·1509	·2709	64·0
December	·1513	·2715	62·8

The value 0·8600 of Horizontal Force corresponds to 1·5437 of Gauss's Unit on the Metrical System.

TABLE VII.—MEAN VERTICAL MAGNETIC FORCE, expressed in terms of the Mean Vertical Force for the Year (nearly), and diminished by a Constant (0·9600 nearly), on each ASTRONOMICAL DAY; as deduced from the MEAN of TWENTY-FOUR HOURLY MEASURES of ORDINATES of the PHOTOGRAPHIC REGISTER on that DAY.

1874.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d												
1	0·0357	0·0364	0·0352	..	0·0340	0·0366	0·0341	0·0355	0·0339	0·0309	0·0274	0·0255
2	·0355	·0360	·0352	0·0353	·0336	·0367	·0355	·0354	·0331	·0294	·0276	·0256
3	·0350	·0357	·0357	·0347	·0329	·0354	·0341	·0328	·0326	..	·0279	·0267
4	·0353	..	·0353	·0345	·0335	·0357	·0335	·0322	·0308	..	·0289	·0265
5	·0360	·0364	·0346	·0344	·0341	·0371	·0350	·0321	·0308	·0284	·0296	·0265
6	·0360	·0363	·0342	·0345	·0340	·0366	·0349	·0329	·0312	·0279	·0309	·0261
7	·0359	·0360	..	·0339	·0340	·0346	·0354	·0336	·0313	·0287	·0291	·0258
8	·0361	·0354	·0355	·0348	·0335	·0349	·0366	·0326	·0316	·0284	·0285	·0261
9	·0363	·0360	·0350	·0348	·0333	·0367	·0378	·0320	·0301	·0289	·0274	·0260
10	·0365	·0363	·0347	·0346	·0340	·0363	·0372	·0318	·0306	·0291	·0273	·0259
11	·0367	·0362	·0347	·0348	·0338	·0349	·0359	·0308	·0311	·0294	·0262	·0270
12	·0362	·0363	·0351	·0346	·0343	·0339	·0348	·0311	·0302	·0297	·0266	·0259
13	·0358	·0358	·0348	·0346	·0351	·0341	..	·0318	·0300	·0302	·0272	·0266
14	·0360	·0354	·0344	·0344	·0350	·0340	·0359	·0313	·0303	·0301	·0277	·0258
15	·0357	·0358	·0346	·0348	·0342	·0346	·0364	·0315	·0310	·0303	·0288	·0257
16	·0351	·0354	·0347	·0345	·0344	·0342	·0352	·0322	·0312	·0297	·0289	·0267
17	·0357	·0357	·0344	·0341	·0348	·0340	·0346	·0313	·0304	·0287	·0284	·0264
18	·0372	·0353	·0342	·0349	·0356	·0341	·0354	·0328	·0299	·0286	·0287	·0252
19	·0371	·0349	·0345	·0346	·0350	·0339	·0370	·0342	·0301	·0281	·0269	·0253
20	·0360	·0354	·0348	·0348	·0345	·0339	·0379	·0341	·0321	·0271	·0257	·0260
21	·0368	·0348	·0350	·0361	·0353	·0342	·0357	·0323	·0315	·0267	·0261	·0257
22	·0373	·0353	·0356	·0358	·0363	·0352	·0345	·0315	·0307	·0263	·0270	·0257
23	·0368	·0354	·0354	·0357	·0353	·0350	·0342	·0314	·0311	·0272	·0264	·0253
24	·0361	·0350	·0351	·0348	·0361	·0339	·0334	·0320	·0316	·0272	·0265	·0252
25	·0358	·0347	·0353	·0359	·0354	·0337	·0341	·0325	·0323	·0284	·0257	·0251
26	·0363	·0347	·0352	·0358	·0354	·0328	·0350	·0320	·0322	·0293	·0261	·0250
27	·0367	·0348	·0349	·0354	·0358	·0331	·0339	·0325	·0322	·0300	·0266	·0246
28	·0366	·0351	·0346	·0343	·0361	·0331	·0327	·0318	·0320	·0290	·0264	·0239
29	·0359		·0346	·0347	·0358	·0337	·0331	·0314	·0316	·0283	·0266	·0232
30	·0360		·0350	·0342	·0363	·0352	·0340	·0324	·0315	·0288	·0263	·0230
31	·0366		·0348		·0367		·0350	·0337		·0285		·0225

TABLE VIII.—MEAN MONTHLY DETERMINATION of the VERTICAL MAGNETIC FORCE, expressed in terms of the Mean Vertical Force for the year (nearly), and diminished by a Constant (0·9600 nearly), uncorrected for TEMPERATURE, at every HOUR of the DAY; obtained by taking the MEAN of all the DETERMINATIONS at the same HOUR of the DAY through each MONTH.

1874.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h												
0	0·0358	0·0352	0·0344	0·0343	0·0342	0·0343	0·0347	0·0318	0·0309	0·0284	0·0273	0·0252
1	·0360	·0353	·0345	·0346	·0344	·0347	·0351	·0322	·0312	·0286	·0274	·0254
2	·0361	·0353	·0346	·0349	·0346	·0350	·0355	·0326	·0315	·0288	·0275	·0254
3	·0361	·0354	·0347	·0350	·0348	·0352	·0359	·0329	·0317	·0289	·0276	·0255
4	·0361	·0354	·0348	·0351	·0349	·0354	·0362	·0331	·0318	·0290	·0276	·0256
5	·0362	·0354	·0348	·0352	·0351	·0356	·0363	·0333	·0319	·0290	·0277	·0257
6	·0363	·0356	·0349	·0353	·0352	·0357	·0364	·0334	·0318	·0290	·0277	·0258
7	·0364	·0358	·0350	·0352	·0351	·0357	·0364	·0334	·0318	·0290	·0276	·0259
8	·0364	·0358	·0350	·0351	·0351	·0356	·0363	·0334	·0317	·0290	·0275	·0259
9	·0364	·0358	·0350	·0350	·0350	·0354	·0361	·0332	·0315	·0289	·0274	·0258
10	·0364	·0358	·0350	·0349	·0350	·0352	·0358	·0331	·0315	·0289	·0273	·0258
11	·0364	·0358	·0351	·0350	·0350	·0351	·0355	·0329	·0315	·0288	·0273	·0257
12	·0364	·0358	·0352	·0350	·0350	·0349	·0352	·0327	·0314	·0289	·0274	·0256
13	·0363	·0358	·0352	·0350	·0350	·0347	·0350	·0325	·0314	·0289	·0274	·0256
14	·0362	·0358	·0352	·0349	·0349	·0345	·0347	·0323	·0313	·0288	·0275	·0255
15	·0362	·0357	·0352	·0349	·0348	·0344	·0344	·0322	·0313	·0288	·0275	·0255
16	·0361	·0356	·0351	·0348	·0348	·0343	·0342	·0320	·0312	·0287	·0275	·0254
17	·0361	·0356	·0350	·0347	·0348	·0342	·0340	·0318	·0311	·0286	·0275	·0254
18	·0360	·0356	·0350	·0347	·0347	·0340	·0338	·0317	·0310	·0286	·0274	·0253
19	·0361	·0356	·0350	·0347	·0347	·0340	·0338	·0316	·0310	·0286	·0274	·0253
20	·0361	·0356	·0350	·0347	·0346	·0340	·0340	·0315	·0309	·0285	·0274	·0252
21	·0361	·0356	·0349	·0346	·0345	·0340	·0342	·0315	·0308	·0285	·0273	·0252
22	·0360	·0354	·0347	·0344	·0343	·0340	·0343	·0316	·0307	·0284	·0272	·0251
23	·0358	·0352	·0344	·0343	·0342	·0340	·0345	·0316	·0307	·0283	·0272	·0251

The Thermometer on the box inclosing the Vertical Force Magnetometer was read generally eight times every day. The means of the readings taken for the same nominal hour through each month show no sensible Mean Diurnal Inequality of Temperature.

TABLE IX.

1874.

Month.	MEAN VERTICAL MAGNETIC FORCE (diminished by a Constant 0·9600 nearly) in EACH MONTH, as deduced from the Mean of the MEAN HOURLY DETERMINATIONS in each Month (Table VIII.), uncorrected for Temperature.	MEAN VERTICAL FORCE IN EACH MONTH, expressed in terms of GAUSS'S UNIT measured on the METRICAL SYSTEM, and diminished by a Constant (4·2072 nearly).	Mean Temperature.
January	0·0362	0·1587	62°·8
February	·0356	·1560	62·8
March	·0349	·1529	62·8
April	·0348	·1525	63·6
May	·0348	·1525	64·4
June	·0347	·1521	66·5
July	·0351	·1538	69·4
August	·0324	·1420	67·8
September	·0313	·1372	67·4
October	·0287	·1258	65·1
November	·0274	·1201	64·1
December	·0255	·1118	62·8

The value 0·9600 of Vertical Force corresponds to 4·2072 of Gauss's Unit on the Metrical System.

TABLE X.—MEAN, through the Range of Months, of the MONTHLY MEAN DETERMINATIONS of the DIURNAL INEQUALITIES of DECLINATION, HORIZONTAL FORCE, and VERTICAL FORCE for the Year 1874.

January to December.

Hour, Greenwich Mean Solar Time.	Inequality of Declination.	Equivalent in terms of Gauss's Unit measured on the Metrical System.	Inequality of Horizontal Force.	Equivalent in terms of Gauss's Unit measured on the Metrical System.	Inequality of Vertical Force.	Equivalent in terms of Gauss's Unit measured on the Metrical System.
h	′					
0	+ 4·43	+ 0·00231	− 0·00083	− 0·00149	− 0·00041	− 0·00180
1	+ 5·53	+ 289	− 42	− 75	− 17	− 75
2	+ 5·23	+ 273	− 7	− 13	+ 3	+ 13
3	+ 4·03	+ 210	+ 13	+ 23	+ 19	+ 83
4	+ 2·62	+ 137	+ 25	+ 45	+ 30	+ 131
5	+ 1·45	+ 76	+ 37	+ 66	+ 40	+ 175
6	+ 0·47	+ 25	+ 50	+ 90	+ 48	+ 210
7	− 0·28	− 15	+ 48	+ 86	+ 49	+ 215
8	− 0·87	− 45	+ 40	+ 72	+ 45	+ 197
9	− 1·36	− 71	+ 32	+ 57	+ 34	+ 149
10	− 1·69	− 88	+ 30	+ 54	+ 27	+ 118
11	− 1·92	− 100	+ 26	+ 47	+ 23	+ 101
12	− 1·89	− 99	+ 21	+ 38	+ 18	+ 79
13	− 1·68	− 88	+ 17	+ 31	+ 12	+ 53
14	− 1·60	− 84	+ 17	+ 31	+ 2	+ 9
15	− 1·47	− 77	+ 18	+ 32	− 4	− 18
16	− 1·53	− 80	+ 22	+ 39	− 14	− 61
17	− 1·81	− 94	+ 27	+ 48	− 22	− 96
18	− 2·25	− 117	+ 20	+ 36	− 30	− 131
19	− 2·57	− 134	− 2	− 4	− 30	− 131
20	− 2·70	− 141	− 36	− 65	− 33	− 145
21	− 2·20	− 115	− 82	− 147	− 35	− 153
22	− 0·40	− 21	− 108	− 194	− 44	− 193
23	+ 2·12	+ 111	− 106	− 190	− 51	− 224

ROYAL OBSERVATORY, GREENWICH.

INDICATIONS

OF

MAGNETOMETERS

ON FIVE DAYS OF GREAT MAGNETIC DISTURBANCE.

1874.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 4 h m	° ′ ″	
0. 0	19. 40. 25	·0524
0. 24	37. 40	·0509
0. 34	39. 0	·0517
0. 43	37. 20	·0508
1. 0	37. 15	·0507
1. 3	42. 30	·0535
	***	
1. 40	38. 30	·0515
1. 50	41. 35	·0530
1. 58	36. 30	·0504
2. 12	39. 15	·0518
2. 21	43. 25	·0540
2. 36	42. 20	·0534
2. 47	39. 45	·0521
2. 53	52. 40	·0588
3. 3	46. 0	·0553
3. 8	46. 25	·0555
3. 10	42. 55	·0537
3. 28	57. 25	·0613
3. 36	51. 50	·0583
3. 43	54. 55	·0600
3. 50	47. 20	·0561
3. 57	39. 55	·0522
3. 59	43. 40	·0541
4. 4	49. 20	·0571
4. 8	52. 0	·0585
4. 14	47. 55	·0564
4. 18	53. 10	·0591
4. 21	55. 15	·0601
4. 38	45. 5	·0548
4. 46	35. 40	·0499
4. 58	42. 0	·0532
5. 3	30. 0	·0470
5. 9	40. 10	·0523
5. 12	34. 0	·0491
5. 19	39. 35	·0520
5. 30	27. 50	·0458
5. 38	57. 10	·0612
5. 49	45. 20	·0550
5. 53	59. 10	·0622
5. 58	36. 15	·0502
6. 2	44. 10	·0544
6. 8	42. 30	·0535
6. 10	43. 10	·0539
6. 17	32. 40	·0483
6. 22	38. 5	·0512
6. 27	35. 55	·0501
6. 31	26. 50	·0453
6. 38	41. 0	·0527
6. 42	46. 10	·0554
6. 47	44. 40	·0546
6. 50	47. 30	·0562

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 4 h m		
0. 0	·1512	·2714
0. 12	·1509	·2709
0. 25	·1511	·2712
0. 28	·1509	·2709
0. 37	·1515	·2719
0. 48	·1509	·2709
1. 6	·1513	·2715
1. 20	·1523	·2733
1. 26	·1516	·2721
	***	
1. 48	·1516	·2721
1. 55	·1526	·2739
2. 0	·1508	·2707
2. 22	·1537	·2759
2. 48	·1515	·2719
3. 0	·1540	·2764
3. 4	·1510	·2710
3. 16	·1498	·2689
3. 29	·1521	·2730
3. 31	·1509	·2709
3. 35	·1518	·2724
3. 41	·1509	·2709
3. 48	·1516	·2721
3. 51	·1507	·2706
4. 3	·1536	·2757
4. 10	·1511	·2712
4. 18	·1529	·2744
4. 20	·1518	·2724
4. 22	·1521	·2730
4. 23	·1512	·2714
4. 31	·1520	·2728
4. 40	·1497	·2688
4. 51	·1510	·2710
4. 59	·1493	·2680
5. 4	·1523	·2733
5. 7	·1508	·2707
5. 13	·1515	·2719
5. 22	·1492	·2679
5. 33	·1555	·2791
5. 42	·1509	·2709
5. 49	·1556	·2793
5. 51	·1504	·2700
5. 58	·1511	·2712
6. 7	·1490	·2675
6. 22	·1590	·2854
6. 31	·1530	·2746
6. 36	·1538	·2760
6. 41	·1511	·2712
6. 45	·1528	·2742
7. 0	·1620	·2908
7. 6	·1549	·2780
7. 10	·1560	·2800

Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 4 h m		
0. 0	·0351	·1538
0. 30	·0352	·1543
0. 48	·0352	·1543
1. 0	·0353	·1547
1. 7	·0353	·1547
1. 13	·0355	·1556
1. 19	·0354	·1552
1. 30	·0354	·1552
1. 53	·0356	·1560
2. 4	·0354	·1552
2. 16	·0355	·1556
2. 24	·0358	·1569
2. 46	·0359	·1573
2. 57	·0364	·1596
3. 4	·0361	·1582
3. 9	·0363	·1591
3. 13	·0362	·1587
3. 30	·0373	·1635
3. 35	·0375	·1644
3. 48	·0381	·1669
3. 52	·0382	·1674
4. 0	·0385	·1687
4. 9	·0387	·1696
4. 18	·0391	·1713
4. 25	·0396	·1735
4. 32	·0403	·1766
4. 38	·0402	·1762
4. 42	·0404	·1771
4. 50	·0403	·1766
4. 55	·0409	·1792
5. 2	·0414	·1815
5. 7	·0412	·1806
5. 11	·0419	·1836
5. 16	·0413	·1810
5. 18	·0411	·1801
5. 25	·0417	·1828
5. 34	·0414	·1815
5. 38	·0420	·1841
	(†)	
7. 49	·0349	·1529
7. 52	·0365	·1600
7. 54	·0359	·1573
7. 57	·0354	·1552
8. 0	·0363	·1591
8. 2	·0354	·1552
8. 5	·0368	·1613
8. 7	·0359	·1573
8. 9	·0363	·1591
8. 12	·0362	·1587
8. 16	·0384	·1683
8. 18	·0385	·1687
8. 21	·0382	·1674

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 4 h m	° ′ ″	
6. 59	19. 39. 30	·0520
7. 6	19. 49. 40	·0572
7. 8	20. 3. 15	·0643
7. 11	19. 41. 55	·0532
7. 18	44. 0	·0543
7. 27	23. 40	·0436
7. 30	25. 20	·0446
7. 39	20. 40	·0421
7. 42	21. 30	·0426
7. 43	19. 24. 20	·0440
7. 52	18. 41. 10	·0215
7. 57	19. 18. 0	·0407
8. 0	10. 50	·0369
8. 3	53. 0	·0590
8. 8	30. 55	·0475
8. 10	34. 15	·0492
8. 22	18. 30	·0410
8. 26	21. 10	·0424
8. 32	26. 10	·0450
8. 39	23. 25	·0435
8. 45	26. 10	·0450
8. 57	21. 55	·0428
9. 10	30. 30	·0473
9. 23	34. 5	·0491
9. 34	27. 0	·0454
9. 45	33. 20	·0487
9. 54	27. 0	·0454
10. 2	24. 55	·0443
10. 10	27. 20	·0456
10. 22	27. 50	·0458
10. 30	21. 15	·0424
10. 48	27. 0	·0454
11. 4	30. 40	·0473
11. 20	32. 20	·0482
11. 37	32. 20	·0482
11. 50	33. 10	·0486
12. 22	31. 50	·0479
12. 50	32. 0	·0480
13. 16	32. 10	·0481
13. 30	31. 20	·0477
14. 10	31. 45	·0479
15. 25	32. 10	·0481
16. 4	32. 0	·0480
16. 30	32. 5	·0480
17. 10	31. 40	·0478
18. 2	31. 30	·0478
19. 7	30. 15	·0471
19. 32	30. 20	·0472
19. 50	29. 30	·0468
20. 4	30. 20	·0472
20. 23	29. 20	·0467
21. 23	29. 30	·0468

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 4 h m		
7. 20	·1453	·2608
7. 28	·1473	·2644
7. 37	·1446	·2596
7. 45	·1486	·2668
7. 48	·1407	·2526
7. 59	·1480	·2657
8. 6	·1424	·2556
8. 8	·1430	·2567
8. 12	·1424	·2556
8. 15	·1432	·2571
8. 17	·1429	·2565
8. 28	·1450	·2603
8. 37	·1433	·2572
8. 44	·1442	·2589
8. 48	·1436	·2578
8. 56	·1449	·2601
9. 8	·1458	·2617
9. 12	·1451	·2605
9. 29	·1462	·2625
9. 42	·1482	·2661
9. 53	·1465	·2630
9. 57	·1470	·2639
9. 59	·1467	·2634
10. 10	·1480	·2657
10. 18	·1483	·2662
10. 22	·1475	·2648
10. 26	·1466	·2632
10. 36	·1476	·2650
10. 54	·1471	·2641
11. 6	·1473	·2644
11. 12	·1473	·2644
11. 20	·1468	·2635
11. 42	·1474	·2646
11. 54	·1470	·2639
	***	
12. 47	·1474	·2646
14. 15	·1476	·2650
15. 21	·1484	·2664
15. 29	·1480	·2657
17. 6	·1486	·2668
18. 36	·1492	·2679
19. 6	·1487	·2670
19. 50	·1486	·2668
19. 58	·1492	·2679
20. 20	·1486	·2668
20. 27	·1487	·2670
22. 0	·1476	·2650
22. 51	·1475	·2648
23. 19	·1466	·2632
23. 59	·1470	·2639

Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 4 h m		
8. 24	·0384	·1683
8. 28	·0380	·1665
8. 38	·0390	·1709
8. 50	·0395	·1731
8. 58	·0390	·1709
9. 0	·0388	·1700
9. 5	·0390	·1709
9. 10	·0388	·1700
9. 14	·0392	·1718
9. 21	·0391	·1713
9. 35	·0389	·1704
9. 44	·0384	·1683
9. 56	·0383	·1678
10. 3	·0381	·1669
10. 12	·0379	·1661
10. 18	·0376	·1648
10. 24	·0375	·1644
10. 30	·0374	·1640
10. 38	·0374	·1640
10. 49	·0373	·1635
11. 0	·0373	·1635
11. 23	·0371	·1626
12. 40	·0369	·1617
13. 50	·0367	·1609
16. 42	·0366	·1604
18. 20	·0365	·1600
20. 13	·0365	·1600
21. 0	·0365	·1600
21. 38	·0364	·1596
22. 27	·0363	·1591
22. 52	·0362	·1587
23. 0	·0362	·1587
23. 20	·0361	·1582
23. 34	·0362	·1587
23. 41	·0362	·1587
23. 59	·0363	·1591

The indications are taken from the sheets of the Photographic Record, except where an asterisk is attached to the number, in which instances they are inferred from eye observations. The Symbol *** denotes that the magnet has been generally in a state of agitation, and the Symbol (†) that the register has failed between the preceding and following readings.

For the Horizontal and Vertical Forces, increasing readings denote increasing forces.

The constant by which the values of Horizontal Force are diminished is 0·8600 nearly, as expressed in parts of the whole Horizontal Force, equivalent to 1·5437 in terms of Gauss's Unit measured on the Metrical System. The corresponding constant for Vertical Force is 0·9600 nearly, equivalent to 4·2072 in terms of Gauss's Unit.

Feb. 4. The spot of light for Vertical Force went off the sheet in the direction of *increasing* force at $5^{h}. 38^{m}$, and returned suddenly on to the sheet immediately before $7^{h}. 49^{m}$.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature.		Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature.	
				Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.		Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb. 4								
h m	° ′ ″		h m			h m		
21.28	19.30.10	·0471						
21.39	29.40	·0468						
21.48	30.20	·0472						
21.51	29.50	·0469						
22.36	32. 5	·0480						
22.40	31.20	·0477						
22.58	32.40	·0483						
23.18	31.20	·0477						
23.23	32.25	·0482						
23.30	32. 5	·0480						
23.36	33. 0	·0485						
23.40	32.20	·0482						
23.59	33.30	·0488						
Mar. 7			Mar. 7			Mar. 7		
0. 0	19.33.40	·0488	0. 0	·1524	·2735	0. 0	·0329	·1441
0. 5	32.45	·0484	0. 9	·1521	·2730	0. 5	·0329	·1441
0.18	33.50	·0489	0.12	·1518	·2724	0.43	·0335	·1468
0.37	36.10	·0502	0.40	·1524	·2735	1. 8	·0339	·1485
0.41	34.40	·0494	0.46	·1518	·2724	1.45	·0340	·1490
0.52	35.30	·0499	1. 0	·1522	·2732	2.33	·0341	·1494
1.26	36.25	·0503	1.11	·1524	·2735	2.45	·0343	·1503
1.32	37.15	·0507	1.32	·1526	·2739	3. 7	·0343	·1503
1.56	37. 0	·0506	2. 7	·1524	·2735	3.30	·0344	·1508
2. 0	37.10	·0507	2.17	·1526	·2739	3.44	·0344	·1508
2.20	36.55	·0506	2.40	·1523	·2733	4. 0	·0345	·1512
2.39	36.10	·0502	3. 0	·1533	·2751	4.12	·0344	·1508
2.51	37.35	·0509	3.16	·1527	·2741	4.32	·0346	·1516
2.59	37.30	·0509	3.29	·1530	·2746	4.47	·0345	·1512
3.11	35.55	·0501	3.37	·1534	·2753	5. 2	·0345	·1512
3.18	36.20	·0503	3.45	·1528	·2742	5.25	·0347	·1521
3.28	35.55	·0501	3.59	·1529	·2744	5.45	·0346	·1516
3.38	36.25	·0503	4.12	·1523	·2733	6.47	·0350	·1534
3.45	35.35	·0499	4.35	·1526	·2739	6.56	·0351	·1538
3.58	36.15	·0502	4.48	·1522	·2732	7. 2	·0352	·1543
4.16	34.25	·0493	5. 0	·1524	·2735	7.10	·0352	·1543
4.36	34.35	·0494	5.24	·1539	·2762	7.30	·0354	·1552
5. 8	31.10	·0476	5.44	·1527	·2741	7.58	·0357	·1565
5.34	35.35	·0499	5.54	·1524	·2735	8.38	·0358	·1569
5.43	36. 0	·0501	6. 6	·1525	·2737	8.48	·0357	·1565
6. 8	34.20	·0493	6.14	·1528	·2742	8.57	·0358	·1569
6.13	35.15	·0497	6.35	·1522	·2732	9. 5	·0357	·1565
6.30	35.10	·0497	6.46	·1524	·2735	9.33	·0358	·1569
6.50	31.25	·0477	6.54	·1527	·2741	9.43	·0356	·1560
7. 4	36.25	·0503	7. 0	·1528	·2742	9.52	·0350	·1534
7.16	34.15	·0492	7.13	·1511	·2712	9.56	·0349	·1529
7.27	35.15	·0497	7.23	·1509	·2709	10. 3	·0347	·1521
7.48	30.20	·0472	7.40	·1494	·2682	10.20	·0343	·1503
8. 0	31.10	·0476	7.57	·1503	·2698	10.36	·0349	·1529
8.29	26.35	·0452	8.12	·1496	·2686	10.52	·0348	·1525
8.39	29.30	·0468	8.32	·1507	·2706	11. 2	·0349	·1529
8.48	29.55	·0470	8.48	·1497	·2688	11. 7	·0346	·1516

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature.		Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature.	
				Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.		Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Mar. 7			Mar. 7			Mar. 7		
h m	° ′ ″		h m			h m		
8.52	19.28.55	·0464	8.57	·1497	·2688	11.15	·0345	·1512
8.59	28.55	·0464	9. 2	·1492	·2679	11.18	·0344	·1508
9. 8	26.10	·0450	9.25	·1484	·2664	11.23	·0345	·1512
9.18	24.20	·0440	9.30	·1482	·2661	11.32	·0344	·1508
9.30	26. 0	·0449	9.36	·1485	·2666	11.43	·0347	·1521
9.41	22.40	·0431	9.47	·1534	·2753	11.49	·0347	·1521
9.51	32.50	·0484	9.52	·1509	·2709	12. 0	·0345	·1512
9.59	29.20	·0467	9.59	·1509	·2709	12. 6	·0346	·1516
10. 2	30.20	·0472	10. 9	·1498	·2689	12.22	·0346	·1516
10.10	27.50	·0458	10.17	·1502	·2697	12.36	·0343	·1503
10.19	30.35	·0473	10.26	·1478	·2653	12.41	·0344	·1508
10.30	21.10	·0424	10.37	·1496	·2686	12.50	·0340	·1490
10.40	24.40	·0441	10.41	·1491	·2677	12.57	·0339	·1485
10.59	16.45	·0401	10.52	·1493	·2680	13. 2	·0337	·1477
11. 6	17.20	·0404	11. 5	·1496	·2686	13. 8	·0336	·1472
11.20	10.50	·0369	11.16	·1482	·2661	13.17	·0338	·1481
11.26	11.40	·0374	11.24	·1479	·2655	13.22	·0338	·1481
11.40	11.30	·0374	11.37	·1464	·2628	13.26	·0336	·1472
11.55	19.50	·0416	11.46	·1471	·2641	13.36	·0329	·1441
12.19	3.50	·0333	11.48	·1469	·2637	13.46	·0335	·1468
12.28	0.30	·0316	11.51	·1472	·2643	13.51	·0334	·1464
12.33	3. 0	·0329	11.59	·1469	·2637	13.57	·0330	·1446
12.47	13.30	·0384	12. 2	·1477	·2652	14. 3	·0331	·1450
12.50	13.40	·0384	12.10	·1481	·2659	14.11	·0327	·1433
12.58	16.40	·0400	12.21	·1478	·2653	14.20	·0324	·1420
13. 2	16.45	·0401	12.36	·1462	·2625	14.25	·0323	·1415
13.10	15.50	·0396	12.56	·1441	·2587	14.32	·0315	·1381
13.22	18.30	·0410	12.58	·1444	·2592	14.40	·0317	·1390
13.36	10.55	·0370	13. 2	·1441	·2587	14.48	·0315	·1381
13.50	21.40	·0426	13.21	·1467	·2634	14.58	·0319	·1398
14. 0	17.10	·0403	13.29	·1461	·2623	15. 2	·0319	·1398
14.20	7.15	·0351	13.38	·1442	·2589	15. 5	·0321	·1406
14.40	34.40	·0494	13.48	·1459	·2619	15.15	·0319	·1398
14.56	18.50	·0411	14. 5	·1516	·2721	15.17	·0319	·1398
15. 9	31.50	·0479	14.22	·1479	·2655	15.24	·0317	·1390
15.16	28.30	·0462	14.26	·1478	·2653	15.30	·0317	·1390
15.23	26.50	·0453	14.36	·1453	·2608	15.34	·0318	·1394
15.35	27.40	·0457	14.43	·1476	·2650	15.42	·0319	·1398
16. 1	23.30	·0436	14.46	·1468	·2635	15.47	·0319	·1398
16. 7	24.10	·0439	14.59	·1486	·2668	16. 4	·0322	·1411
16.10	23.50	·0437	15. 2	·1478	·2653	16.14	·0321	·1406
16.28	23.55	·0438	15.10	·1489	·2673	16.30	·0320	·1402
16.47	31. 0	·0475	15.16	·1499	·2691	16.43	·0322	·1411
17. 0	34.15	·0492	15.21	·1496	·2686	16.47	·0321	·1406
17. 9	42.45	·0536	15.32	·1506	·2704	16.57	·0322	·1411
17.13	40.20	·0524	15.36	·1502	·2697	17. 6	·0321	·1406
17.19	43.10	·0539	15.42	·1512	·2714	17.13	·0323	·1415
17.23	39. 0	·0517	15.47	·1508	·2707	17.19	·0321	·1406
17.40	41.55	·0532	15.51	·1508	·2707	17.21	·0322	·1411
17.50	42.25	·0534	16. 6	·1522	·2732	17.30	·0319	·1398
17.59	41.55	·0532	16.17	·1519	·2726	17.38	·0321	·1406
18.10	43.30	·0541	16.31	·1512	·2714	18. 2	·0320	·1402

Greenwich Mean Solar Time.	Readings of Thermometers.		Greenwich Mean Solar Time.	Readings of Thermometers.		Greenwich Mean Solar Time.	Readings of Thermometers.		Greenwich Mean Solar Time.	Readings of Thermometers.		Greenwich Mean Solar Time.	Readings of Thermometers.	
	Of H. F. Magnet.	Of V. F. Magnet.		Of H. F. Magnet.	Of V. F. Magnet.		Of H. F. Magnet.	Of V. F. Magnet.		Of H. F. Magnet.	Of V. F. Magnet.		Of H. F. Magnet.	Of V. F. Magnet.
Feb. 4			Feb. 4			Feb. 4			March 7			March 7		
h m	°	°	h m	°	°	h m	°	°	h m	°	°	h m	°	°
0. 0	62·8	62·1	3. 0	62·7	63·1	22. 0	63·1	62·9	0. 0	62·6	62·6	3. 0	62·9	62·5
1. 0	62·8	62·6	9. 0	62·5	63·5	23. 0	62·5	62·9	1. 0	62·9	63·1	9. 0	63·2	63·2
2. 0	62·8	62·9	21. 0	62·4	62·9				2. 0	62·8	62·8	21.30	61·9	61·2

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
Mar. 7			Mar. 7			Mar. 7		
h m	° ′ ″		h m			h m		
18.20	19.37.40	·0509	16.47	·1524	·2735	18.11	·0321	·1406
18.34	45.10	·0549	16.58	·1530	·2746	18.20	·0318	·1394
18.40	43.25	·0540	17. 8	·1502	·2697	18.33	·0322	·1411
18.45	45. 0	·0548	17.20	·1529	·2744	18.40	·0321	·1406
18.53	46.45	·0557	17.21	·1527	·2741	18.45	·0323	·1415
19. 0	44. 5	·0543	17.34	·1531	·2748	18.50	·0322	·1411
19.10	43.50	·0542	18. 2	·1509	·2709	18.55	·0324	·1420
19.25	48.40	·0567	18. 9	·1512	·2714	19. 3	·0323	·1415
19.46	40.20	·0524	18.28	·1478	·2653	19.13	·0323	·1415
19.59	43.10	·0539	18.35	·1482	·2661	19.26	·0325	·1424
	***		18.39	·1477	·2652	19.44	·0323	·1415
20.19	43.30	·0541	18.45	·1479	·2655	19.58	·0325	·1424
20.27	42.25	·0534	18.50	·1472	·2643	20.25	·0325	·1424
20.46	46. 0	·0553	19. 7	·1484	·2664	20.43	·0327	·1433
21. 0	43.50	·0542	19.14	·1475	·2648	20.57	·0327	·1433
21. 4	44. 0	·0543	19.18	·1479	·2655	21. 5	·0328	·1437
21.11	41.25	·0529	19.22	·1473	·2644	21.14	·0327	·1433
21.29	39.55	·0522	19.39	·1481	·2659	21.34	·0329	·1441
21.50	42. 0	·0532	19.52	·1472	·2643	21.53	·0331	·1450
21.59	41.15	·0528	20. 6	·1471	·2641	22. 0	·0330	·1446
22. 7	41.35	·0530	20.12	·1473	·2644	22.20	·0332	·1455
	***		20.17	·1468	·2635	22.40	·0333	·1459
22.40	37.20	·0508	20.20	·1471	·2641	22.52	·0335	·1468
22.50	37.20	·0508	20.30	·1459	·2619	22.57	·0336	·1472
23.10	37.30	·0509	20.45	·1461	·2623	23. 5	·0337	·1477
23.16	39.10	·0518	20.50	·1459	·2619	23.18	·0340	·1490
23.23	38. 0	·0512	21. 7	·1463	·2626	23.21	·0341	·1494
23.26	39.30	·0520	21.21	·1452	·2607	23.26	·0341	·1494
23.32	40.20	·0524	21.28	·1453	·2608	23.32	·0342	·1499
23.40	37.20	·0508	21.35	·1456	·2614	23.40	·0342	·1499
23.48	40.20	·0524	21.58	·1453	·2608	23.53	·0348	·1525
23.53	39.40	·0520	22. 5	·1456	·2614	23.59	·0350	·1534
23.59	40.40	·0525	22. 8	·1454	·2610			
			22.11	·1458	·2617			
			22.22	·1457	·2616			
			22.28	·1461	·2623			
			22.32	·1459	·2619			
			22.40	·1459	·2619			
			22.45	·1464	·2628			
			22.51	·1460	·2621			
			22.54	·1463	·2626			
			22.57	·1459	·2619			
			23.16	·1480	·2657			
			23.20	·1479	·2655			
			23.27	·1487	·2670			
			23.41	·1470	·2639			
			23.50	·1479	·2655			
			23.55	·1475	·2648			
			23.57	·1478	·2653			
			23.59	·1474	·2646			

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
Apr. 1			Apr. 1			Apr. 1		
h m	° ′ ″		h m			h m		
0. 0	19.41.20	·0529	0. 0	·1490	·2675	0. 0	·0341	·1494
0. 9	42. 0	·0532	0. 9	·1491	·2677	0.42	·0341	·1494
0.12	45. 0	·0548	0.20	·1497	·2688	0.50	·0342	·1499
0.35	45.20	·0550	0.32	·1492	·2679	1. 2	·0343	·1503
0.40	43.35	·0541	0.42	·1492	·2679	1. 8	·0343	·1503
0.54	44.30	·0546	0.48	·1484	·2664	1.15	·0344	·1508
1. 4	44.25	·0545	1.10	·1496	·2686	1.37	·0345	·1512
1.14	42.30	·0535	1.20	·1490	·2675	1.40	·0346	·1516
1.26	42.40	·0535	1.32	·1499	·2691	1.50	·0347	·1521
1.41	41.20	·0529	1.45	·1499	·2691	2.10	·0347	·1521
1.50	42.20	·0534	1.52	·1506	·2704	2.16	·0349	·1529
2.10	38.15	·0513	2.14	·1496	·2686	2.22	·0350	·1534
2.23	42.30	·0535	2.25	·1516	·2721	2.38	·0351	·1538
2.40	40.50	·0526	2.37	·1502	·2697	2.45	·0352	·1543
2.52	38.50	·0516	2.45	·1510	·2710	2.50	·0352	·1543
3.10	40.20	·0524	2.52	·1505	·2702	2.55	·0353	·1547
3.22	37.55	·0511	3. 0	·1517	·2723	3.10	·0354	·1552
3.32	37.10	·0507	3.16	·1522	·2732	3.20	·0353	·1547
3.40	37.40	·0509	3.26	·1512	·2714	3.34	·0353	·1547
3.50	37.20	·0508	3.32	·1510	·2710	3.45	·0354	·1552
4. 3	37.55	·0511	3.41	·1512	·2714	3.55	·0354	·1552
4.29	36.20	·0503	3.55	·1509	·2709	4.12	·0355	·1556
4.36	37.30	·0509	4. 3	·1514	·2717	4.22	·0355	·1556
4.40	39. 0	·0517	4.21	·1511	·2712	4.44	·0359	·1573
4.54	36.20	·0503	4.30	·1506	·2704	4.52	·0358	·1569
5. 8	38. 5	·0512	4.37	·1512	·2714	5. 3	·0360	·1578
5.16	36. 0	·0501	4.44	·1521	·2730	5. 8	·0361	·1582
5.52	31. 0	·0475	4.56	·1509	·2709	5.14	·0360	·1578
6.36	31.25	·0477	5. 2	·1506	·2704	5.40	·0360	·1578
7. 8	26.15	·0450	5.10	·1510	·2710	5.55	·0361	·1582
7.20	28.10	·0460	5.18	·1498	·2689	6.25	·0360	·1578
7.34	28.40	·0462	5.25	·1500	·2693	7. 0	·0360	·1578
7.50	30. 0	·0470	5.41	·1490	·2675	7. 5	·0361	·1582
8. 7	30.20	·0472	6. 1	·1505	·2702	7.18	·0362	·1587
8.11	31. 0	·0475	6.13	·1510	·2710	8.10	·0363	·1591
8.27	28.55	·0464	6.22	·1506	·2704	8.30	·0363	·1591
8.40	29.55	·0470	6.29	·1507	·2706	8.45	·0364	·1596
8.58	33.30	·0488	6.37	·1511	·2712	8.52	·0365	·1600
9.11	28.50	·0463	6.45	·1506	·2704	9.10	·0363	·1591
9.23	28.30	·0462	6.52	·1507	·2706	10. 0	·0362	·1587
9.46	25.50	·0448	7. 0	·1502	·2697	10.22	·0362	·1587
10. 0	26. 0	·0449	7. 6	·1509	·2709	10.45	·0363	·1591
10.16	24.40	·0441	7.15	·1507	·2706	11. 2	·0365	·1600
10.23	24.50	·0442	7.22	·1511	·2712	11.12	·0363	·1591
10.36	23.40	·0436	7.32	·1510	·2710	11.22	·0365	·1600
10.44	24.35	·0441	7.48	·1516	·2721	11.45	·0358	·1569
10.50	24.20	·0440	7.57	·1512	·2714	12. 3	·0354	·1552
11. 2	26.40	·0452	8. 7	·1512	·2714	12.18	·0356	·1560
11.20	19.20	·0414	8.10	·1516	·2721	12.24	·0358	·1569
11.36	25. 0	·0444	8.28	·1515	·2719	12.35	·0359	·1573
11.43	25. 0	·0444	8.34	·1512	·2714	12.42	·0358	·1569
11.55	28.40	·0462	8.40	·1516	·2721	12.51	·0357	·1565

The indications are taken from the sheets of the Photographic Record, except where an asterisk is attached to the number, in which instances they are inferred from eye observations. The Symbol *** denotes that the magnet has been generally in a state of agitation, and the Symbol (†) that the register has failed between the preceding and following readings.

For the Horizontal and Vertical Forces, increasing readings denote increasing forces.

The constant by which the values of Horizontal Force are diminished is 0·8600 nearly, as expressed in parts of the whole Horizontal Force, equivalent to 1·5437 in terms of Gauss's Unit measured on the Metrical System. The corresponding constant for Vertical Force is 0·9600 nearly, equivalent to 4·2072 in terms of Gauss's Unit.

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Apr. 1			Apr. 1			Apr. 1		
h m	° ′ ″		h m			h m		
11. 59	19. 28. 40	·0462	8. 51	·1516	·2721	13. 14	·0356	·1560
12. 9	25. 0	·0444	9. 0	·1527	·2741	13. 26	·0355	·1556
12. 27	12. 35	·0379	9. 5	·1521	·2730	13. 34	·0355	·1556
12. 52	20. 0	·0418	9. 25	·1526	·2739	13. 42	·0354	·1552
13. 18	15. 0	·0392	9. 30	·1519	·2726	13. 54	·0355	·1556
13. 33	14. 10	·0387	9. 54	·1516	·2721	14. 2	·0357	·1565
13. 40	14. 50	·0390	10. 30	·1495	·2684	14. 26	·0351	·1538
13. 52	13. 50	·0385	10. 47	·1499	·2691	14. 36	·0352	·1543
13. 56	14. 30	·0389	10. 58	·1494	·2682	14. 43	·0353	·1547
14. 2	14. 20	·0388	11. 10	·1505	·2702	14. 58	·0349	·1529
14. 29	7. 50	·0354	11. 28	·1568	·2814	15. 10	·0351	·1538
14. 52	18. 15	·0408	11. 42	·1549	·2780	15. 20	·0350	·1534
15. 2	16. 20	·0399	12. 12	·1476	·2650	15. 38	·0346	·1516
15. 18	24. 0	·0438	12. 36	·1509	·2709	15. 44	·0347	·1521
15. 26	25. 20	·0446	12. 51	·1500	·2693	15. 59	·0342	·1499
15. 31	21. 0	·0423	13. 10	·1494	·2682	16. 2	·0341	·1494
15. 40	20. 0	·0418	13. 21	·1497	·2688	16. 16	·0345	·1512
15. 52	24. 30	·0441	13. 46	·1484	·2664	16. 26	·0345	·1512
16. 10	26. 50	·0453	13. 58	·1490	·2675	16. 38	·0344	·1508
16. 20	30. 50	·0474	14. 2	·1502	·2697	16. 47	·0343	·1503
16. 24	29. 50	·0469	14. 15	·1507	·2706	16. 52	·0342	·1499
16. 41	39. 0	·0517	14. 38	·1496	·2686	17. 0	·0343	·1503
16. 56	34. 40	·0494	14. 44	·1510	·2710	17. 5	·0348	·1525
17. 8	40. 10	·0523	14. 59	·1492	·2679	17. 18	·0344	·1508
17. 23	33. 40	·0488	15. 20	·1496	·2686	17. 28	·0344	·1508
17. 30	35. 0	·0496	15. 36	·1503	·2698	17. 36	·0342	·1499
17. 41	28. 10	·0460	15. 44	·1504	·2700	17. 49	·0345	·1512
17. 53	29. 10	·0466	15. 50	·1512	·2714	17. 54	·0345	·1512
17. 58	27. 10	·0455	16. 8	·1482	·2661	18. 10	·0348	·1525
18. 14	26. 0	·0449	16. 28	·1516	·2721	18. 15	·0348	·1525
18. 18	23. 30	·0436	16. 58	·1479	·2655	18. 27	·0352	·1543
18. 26	24. 25	·0440	17. 15	·1524	·2735	18. 37	·0353	·1547
18. 41	24. 10	·0439	17. 24	·1523	·2733	18. 45	·0355	·1556
18. 52	26. 40	·0452	17. 44	·1494	·2682	18. 58	·0355	·1556
19. 1	24. 50	·0442	17. 53	·1498	·2689	19. 8	·0357	·1565
19. 9	27. 10	·0455	18. 12	·1484	·2664	19. 20	·0356	·1560
19. 20	25. 20	·0446	18. 17	·1477	·2652	19. 25	·0357	·1565
19. 26	27. 15	·0455	18. 20	·1483	·2662	19. 32	·0356	·1560
19. 34	25. 0	·0444	18. 27	·1484	·2664	19. 44	·0357	·1565
19. 39	24. 45	·0442	18. 31	·1480	·2657	20. 2	·0357	·1565
19. 48	27. 40	·0457	18. 38	·1482	·2661	20. 38	·0359	·1573
19. 51	27. 30	·0457	18. 44	·1481	·2659	21. 0	·0359	·1573
20. 0	29. 40	·0468	18. 50	·1486	·2668	21. 20	·0358	·1569
20. 4	28. 50	·0463	19. 0	·1484	·2664	21. 40	·0357	·1565
20. 24	31. 0	·0475	19. 10	·1490	·2675	22. 0	·0356	·1560
20. 32	30. 30	·0473	19. 24	·1483	·2662	22. 10	·0354	·1552
20. 43	32. 20	·0482	19. 27	·1485	·2666	22. 25	·0354	·1552
21. 6	30. 10	·0471	19. 46	·1471	·2641	22. 36	·0353	·1547
21. 20	29. 30	·0468	19. 56	·1462	·2625	22. 47	·0352	·1543
21. 26	30. 20	·0472	20. 2	·1461	·2623	23. 15	·0351	·1538
21. 44	31. 10	·0476	20. 6	·1456	·2614	23. 22	·0350	·1534
22. 2	34. 10	·0492	20. 13	·1462	·2625	23. 29	·0351	·1538

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Apr. 1			Apr. 1			Apr. 1		
h m	° ′ ″		h m			h m		
22. 16	19. 32. 30	·0483	20. 24	·1463	·2626	23. 40	·0350	·1534
22. 40	34. 30	·0494	20. 28	·1462	·2625	23. 44	·0349	·1529
22. 51	34. 25	·0493	20. 41	·1471	·2641	23. 51	·0348	·1525
23. 0	35. 50	·0500	21. 13	·1474	·2646	23. 59	·0349	·1529
23. 18	37. 30	·0509	21. 23	·1472	·2643			
23. 24	36. 50	·0505	22. 5	·1483	·2662			
23. 30	41. 25	·0529	22. 10	·1472	·2643			
23. 39	41. 30	·0530	22. 36	·1480	·2657			
23. 44	43. 10	·0539	22. 51	·1479	·2655			
23. 59	39. 10	·0518	23. 2	·1482	·2661			
			23. 20	·1483	·2662			
			23. 25	·1487	·2670			
			23. 35	·1483	·2662			
			23. 46	·1495	·2684			
			23. 50	·1493	·2680			
			23. 59	·1496	·2686			
Oct. 3			Oct. 3			Oct. 3		
0. 0	19. 30. 30	·0473	0. 0	·1493	·2680	0. 0	·0280	·1227
0. 16	30. 30	·0473	0. 15	·1493	·2680	0. 14	·0279	·1222
0. 22	31. 10	·0476	1. 5	·1498	·2689	0. 27	·0280	·1227
0. 35	31. 40	·0478	1. 15	·1496	·2686	0. 45	·0280	·1227
0. 47	31. 20	·0477	1. 26	·1499	·2691	1. 10	·0281	·1231
1. 3	31. 40	·0478	1. 45	·1499	·2691	1. 50	·0282	·1236
1. 12	31. 10	·0476	1. 50	·1500	·2693	1. 54	·0284	·1245
1. 28	31. 35	·0478	1. 54	·1495	·2684	2. 3	·0283	·1240
1. 50	31. 5	·0475	2. 0	·1520	·2728	2. 26	·0282	·1236
1. 51	29. 45	·0469	2. 6	·1523	·2733	2. 40	·0282	·1236
1. 58	34. 30	·0494	2. 24	·1516	·2721	3. 48	·0283	·1240
2. 12	32. 40	·0483	2. 42	·1517	·2723	4. 5	·0284	·1245
2. 20	33. 0	·0485	2. 45	·1514	·2717	5. 0	·0284	·1245
2. 24	32. 30	·0483	2. 53	·1519	·2726	5. 30	·0283	·1240
2. 28	33. 0	·0485	3. 2	·1513	·2715	5. 48	·0284	·1245
2. 42	32. 20	·0482		***		5. 54	·0283	·1240
2. 48	33. 10	·0486	4. 15	·1519	·2726	6. 3	·0284	·1245
3. 1	31. 20	·0477		***		6. 24	·0284	·1245
3. 10	32. 0	·0480	4. 48	·1518	·2724	6. 37	·0285	·1249
4. 40	29. 40	·0468	4. 54	·1520	·2728	7. 0	·0285	·1249
5. 30	30. 40	·0473	5. 29	·1521	·2730	7. 5	·0284	·1245
	***		5. 33	·1524	·2735	7. 36	·0286	·1253
6. 18	30. 40	·0473	5. 39	·1520	·2728	7. 48	·0285	·1249
6. 32	29. 50	·0469	5. 48	·1521	·2730	7. 52	·0286	·1253
6. 38	31. 10	·0476	5. 52	·1525	·2737	8. 0	·0285	·1249
6. 50	30. 40	·0473	6. 2	·1517	·2723	8. 12	·0286	·1253
6. 58	29. 0	·0465	6. 7	·1523	·2733	8. 19	·0285	·1249
7. 16	31. 0	·0475	6. 15	·1520	·2728	8. 42	·0285	·1249
7. 33	30. 30	·0473	6. 20	·1524	·2735	8. 49	·0287	·1258
7. 37	31. 10	·0476	6. 24	·1519	·2726	8. 54.	·0285	·1249
7. 50	31. 20	·0477	6. 32	·1522	·2734	9. 0	·0287	·1258
7. 57	32. 20	·0482	6. 33	·1528	·2742	9. 3	·0286	·1253
8. 2	31. 5	·0475	6. 43	·1529	·2744	9. 33	·0288	·1262
8. 16	30. 20	·0472	6. 51	·1522	·2732	9. 52	·0289	·1266

Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Readings of Thermometers. Of V. F. Magnet.	Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Readings of Thermometers. Of V. F. Magnet.	Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Readings of Thermometers. Of V. F. Magnet.	Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Readings of Thermometers. Of V. F. Magnet.	Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Readings of Thermometers. Of V. F. Magnet.
April 1			April 1			April 1			Oct. 3			Oct. 3		
h m	°	°	h m	°	°	h m	°	°	h m	°	°	h m	°	°
0. 0	63·4	63·2	3. 0	63·4	63·4	22. 0	63·6	64·0	0. 0	65·3	64·8	3. 0	65·6	65·0
1. 0	63·3	63·2	9. 0	64·0	65·2	23. 0	63·6	63·2	1. 0	65·6	65·0	9. 0	65·6	65·0
2. 0	63·6	63·6	21. 0	63·7	64·5				2. 0	65·8	65·0	21. 30	65·6	66·6

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
Oct. 3			Oct. 3			Oct. 3		
h m	° ′ ″		h m			h m		
8. 24	19. 30. 50	·0474	7. 5	·1536	·2757	10. 10	·0289	·1266
8. 30	30. 40	·0473	7. 6	·1527	·2741	10. 14	·0290	·1271
8. 36	30. 0	·0470	7. 8	·1528	·2742	10. 24	·0289	·1266
8. 56	30. 40	·0473	7. 15	·1521	·2730	10. 28	·0290	·1271
9. 2	29. 20	·0467	7. 28	·1522	·2732	10. 40	·0290	·1271
9. 6	29. 40	·0468	7. 37	·1530	·2746	10. 50	·0291	·1275
9. 14	28. 30	·0462	7. 44	·1538	·2760	11. 10	·0292	·1280
9. 25	29. 40	·0468	7. 52	·1526	·2739	11. 40	·0291	·1275
9. 31	29. 20	·0467	8. 0	·1528	·2742	12. 0	·0286	·1253
9. 37	30. 20	·0472	8. 12	·1519	·2726	12. 4	·0287	·1258
9. 45	28. 55	·0464	8. 20	·1533	·2751	12. 12	·0287	·1258
9. 52	28. 55	·0464	8. 25	·1523	·2733	12. 22	·0285	·1249
10. 10	27. 25	·0456	8. 30	·1525	·2737	12. 27	·0282	·1236
10. 24	27. 10	·0455		***		12. 33	·0283	·1240
10. 29	25. 20	·0446	8. 35	·1523	·2733	12. 42	·0281	·1231
10. 45	23. 20	·0435	8. 38	·1517	·2723	12. 52	·0277	·1214
10. 59	22. 10	·0429	8. 44	·1524	·2735	13. 0	·0279	·1222
11. 16	21. 55	·0428	8. 47	·1517	·2723	13. 10	·0282	·1236
11. 34	16. 30	·0400	8. 55	·1534	·2753	13. 20	·0286	·1253
11. 43	15. 50	·0396	9. 0	·1508	·2707	13. 24	·0285	·1249
12. 12	4. 20	·0336	9. 6	·1516	·2721	13. 28	·0286	·1253
12. 34	19. 9. 20	·0362	9. 9	·1512	·2714	13. 37	·0285	·1249
13. 6	18. 52. 20	·0273	9. 13	·1515	·2719	13. 42	·0286	·1253
13. 34	19. 7. 20	·0352		***		13. 57	·0282	·1236
13. 56	12. 50	·0380	9. 30	·1509	·2709	14. 2	·0283	·1240
14. 10	8. 40	·0358	9. 36	·1515	·2719	14. 20	·0281	·1231
14. 16	9. 20	·0362	9. 45	·1507	·2706	14. 40	·0283	·1240
14. 19	8. 55	·0360	9. 59	·1513	·2715	14. 50	·0278	·1218
14. 42	25. 45	·0448	10. 7	·1512	·2714	15. 2	·0275	·1205
14. 53	24. 15	·0439	10. 15	·1505	·2702	15. 20	·0280	·1227
14. 59	23. 55	·0438	10. 23	·1516	·2721	15. 26	·0279	·1222
15. 24	35. 50	·0500	10. 28	·1508	·2707	15. 34	·0276	·1209
15. 52	23. 30	·0436	10. 34	·1514	·2717	15. 52	·0270	·1183
16. 5	18. 30	·0410	10. 46	·1503	·2698	16. 10	·0272	·1192
16. 12	18. 10	·0408	10. 59	·1500	·2693	16. 17	·0274	·1201
16. 36	31. 15	·0476	11. 6	·1501	·2695	16. 27	·0276	·1209
16. 44	31. 0	·0475	11. 30	·1486	·2668	16. 41	·0275	·1205
16. 54	30. 55	·0475	12. 5	·1467	·2634	16. 55	·0277	·1214
17. 1	32. 20	·0482	12. 7	·1472	·2643	17. 6	·0277	·1214
17. 8	31. 50	·0479	12. 10	·1470	·2639	17. 26	·0279	·1222
17. 18	32. 25	·0482	12. 15	·1474	·2646	17. 31	·0278	·1218
17. 35	31. 50	·0479	12. 22	·1473	·2644	17. 36	·0280	·1227
17. 38	27. 45	·0458	12. 30	·1463	·2626	17. 44	·0282	·1236
17. 48	30. 5	·0470	12. 46	·1470	·2639	18. 0	·0283	·1240
17. 52	29. 40	·0468	12. 58	·1448	·2599	18. 12	·0285	·1249
17. 57	32. 0	·0480	13. 5	·1442	·2589	18. 20	·0287	·1258
18. 7	26. 40	·0452	13. 8	·1443	·2590	18. 30	·0284	·1245
18. 15	26. 45	·0453	13. 10	·1440	·2585	18. 35	·0286	·1253
18. 21	33. 40	·0488	13. 22	·1445	·2594	18. 42	·0284	·1245
18. 24	32. 40	·0483	13. 26	·1445	·2594	18. 47	·0287	·1258
18. 42	39. 20	·0519	13. 30	·1449	·2601	18. 53	·0285	·1249
18. 45	37. 0	·0506	13. 40	·1443	·2590	19. 2	·0285	·1249

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination, above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
Oct. 3			Oct. 3			Oct. 3		
h m	° ′ ″		h m			h m		
18. 48	19. 39. 0	·0517	13. 50	·1446	·2596	19. 14	·0284	·1245
18. 56	37. 30	·0509	14. 4	·1435	·2576	19. 25	·0287	·1258
19. 0	39. 0	·0517	14. 14	·1442	·2589	19. 34	·0291	·1275
19. 4	37. 20	·0508	14. 18	·1441	·2587	19. 42	·0288	·1262
19. 6	38. 0	·0512	14. 26	·1450	·2603	19. 50	·0290	·1271
19. 19	30. 10	·0471	14. 29	·1448	·2599	20. 2	·0291	·1275
19. 32	41. 40	·0530	14. 38	·1456	·2614	20. 7	·0290	·1271
19. 44	38. 40	·0515	14. 45	·1470	·2639	20. 15	·0291	·1275
19. 50	41. 30	·0530	14. 54	·1474	·2646	20. 24	·0290	·1271
19. 56	41. 10	·0528	15. 10	·1462	·2625	20. 40	·0291	·1275
20. 2	42. 45	·0536	15. 30	·1490	·2675	21. 0	·0295	·1293
20. 8	37. 30	·0509	15. 46	·1507	·2706	21. 10	·0295	·1293
20. 17	38. 55	·0517	16. 10	·1479	·2655	21. 14	·0296	·1297
20. 30	34. 0	·0491	16. 40	·1502	·2697	21. 18	·0294	·1289
20. 45	30. 50	·0474	16. 44	·1499	·2691	21. 21	·0296	·1297
20. 59	31. 50	·0479	16. 51	·1502	·2697	21. 23	·0295	·1293
21. 8	29. 40	·0468	17. 25	·1489	·2673	21. 32	·0297	·1302
21. 14	31. 20	·0477	17. 38	·1470	·2639	21. 37	·0296	·1297
21. 20	33. 30	·0488	17. 51	·1477	·2652	21. 40	·0297	·1302
21. 24	31. 45	·0479	17. 56	·1484	·2664	21. 42	·0296	·1297
21. 30	36. 10	·0502	18. 18	·1450	·2603	21. 52	·0301	·1319
21. 40	31. 0	·0475	18. 28	·1406	·2524	22. 0	·0299	·1310
22. 6	54. 0	·0595	18. 39	·1437	·2580	22. 5	·0300	·1315
22. 8	52. 40	·0588	18. 44	·1431	·2569	22. 11	·0299	·1310
22. 12	53. 25	·0592	18. 50	·1450	·2603	22. 15	·0300	·1315
22. 32	46. 50	·0557	18. 57	·1429	·2565	22. 21	·0298	·1306
22. 38	50. 10	·0575	19. 6	·1438	·2581	22. 32	·0301	·1319
22. 50	46. 10	·0554	19. 8	·1430	·2567	22. 39	·0302	·1324
22. 54	47. 40	·0562		(†)		22. 42	·0301	·1319
23. 11	42. 40	·0535	19. 30	·1430	·2567	22. 50	·0300	·1315
23. 28	40. 50	·0526	19. 36	·1443	·2590	23. 0	·0301	·1319
23. 38	41. 35	·0530	19. 42	·1418	·2545	23. 5	·0302	·1324
23. 42	40. 10	·0523		(†)		23. 15	·0302	·1324
23. 53	40. 30	·0525	19. 54	·1418	·2545	23. 20	·0303	·1328
23. 59	43. 20	·0540	20. 5	·1435	·2576	23. 32	·0303	·1328
			20. 8	·1431	·2569	23. 40	·0304	·1333
			20. 16	·1440	·2585	23. 47	·0303	·1328
			20. 26	·1426	·2560	23. 59	·0305	·1337
			20. 29	·1428	·2563			
			20. 34	·1426	·2560			
			20. 42	·1420	·2549			
			20. 54	·1429	·2565			
			20. 58	·1422	·2553			
			21. 3	·1422	·2553			
				(†)				
			22. 34	·1418	·2545			
			22. 40	·1430	·2567			
			22. 50	·1412	·2535			
			22. 54	·1423	·2554			
			23. 0	·1420	·2549			
			23. 3	·1423	·2554			
				(†)				

The indications are taken from the sheets of the Photographic Record, except where an asterisk is attached to the number, in which instances they are inferred from eye observations. The Symbol *** denotes that the magnet has been generally in a state of agitation, and the Symbol (†) that the register has failed between the preceding and following readings.

For the Horizontal and Vertical Forces, increasing readings denote increasing forces.

The constant by which the values of Horizontal Force are diminished is 0·8600 nearly, as expressed in parts of the whole Horizontal Force, equivalent to 1·5437 in terms of Gauss's Unit measured on the Metrical System. The corresponding constant for Vertical Force is 0·9600 nearly, equivalent to 4·2072 in terms of Gauss's Unit.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force: Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force: Expressed in terms of Gauss's Unit measured on the Metrical System.
h m	° ′ ″		Oct. 3 h m			h m		
			23. 15	·1424	·2556			
			23. 30	·1438	·2581			
			23. 36	·1436	·2578			
			23. 45	·1449	·2601			
			23. 48	·1445	·2594			
			23. 59	·1452	·2607			
Oct. 4			Oct. 4			Oct. 4		
0. 0	19. 43. 50	·0542	0. 0	·1454	·2610	0. 0	·0305	·1337
0. 3	44. 0	·0543	0. 7	·1464	·2628	0. 9	·0303	·1328
0. 9	42. 45	·0536	0. 15	·1453	·2608	0. 12	·0304	·1333
0. 12	43. 0	·0538	0. 18	·1457	·2616	0. 18	·0303	·1328
0. 18	41. 55	·0532	0. 24	·1450	·2603	0. 25	·0304	·1333
0. 22	42. 30	·0535	0. 29	·1455	·2612	0. 32	·0304	·1333
0. 30	43. 0	·0538	0. 38	·1449	·2601	0. 53	·0307	·1346
0. 34	42. 30	·0535	0. 48	·1460	·2621	1. 0	·0306	·1341
0. 43	45. 45	·0552	0. 50	·1459	·2619	1. 9	·0309	·1354
0. 54	47. 25	·0561	0. 57	·1471	·2641	1. 14	·0309	·1354
1. 2	45. 20	·0550	1. 6	·1460	·2621	1. 21	·0311	·1363
1. 10	47. 0	·0559	1. 12	·1471	·2641	1. 27	·0312	·1368
1. 18	44. 40	·0546	1. 18	·1466	·2632	1. 32	·0313	·1372
1. 24	46. 40	·0556	1. 24	·1471	·2641	1. 40	·0312	·1368
1. 33	44. 50	·0547	1. 26	·1469	·2637	1. 43	·0314	·1377
1. 38	45. 25	·0550	1. 29	·1472	·2643	1. 49	·0313	·1372
1. 43	45. 10	·0549	1. 34	·1463	·2626	2. 0	·0315	·1381
1. 47	46. 30	·0556	1. 38	·1469	·2637	2. 4	·0318	·1394
1. 51	45. 5	·0548	1. 42	·1467	·2634	2. 12	·0320	·1402
2. 0	43. 40	·0541	1. 46	·1474	·2646	2. 16	·0322	·1411
2. 6	45. 0	·0548	1. 53	·1466	·2632	2. 20	·0321	·1406
2. 10	44. 30	·0546	2. 3	·1465	·2630	2. 24	·0325	·1424
2. 20	48. 40	·0567	2. 12	·1483	·2662	2. 26	·0326	·1428
2. 28	36. 45	·0505	2. 20	·1485	·2666	2. 32	·0328	·1437
2. 36	42. 40	·0535	2. 29	·1457	·2616	2. 38	·0331	·1450
2. 41	39. 0	·0517	2. 38	·1500	·2693	2. 42	·0334	·1464
2. 53	54. 45	·0599	2. 40	·1496	·2686	2. 45	·0340	·1490
2. 54	34. 0	·0491	2. 55	·1547	·2777	2. 50	·0343	·1503
2. 59	29. 25	·0467	3. 1	·1484	·2664	2. 53	·0346	·1516
3. 4	30. 10	·0471	3. 7	·1483	·2662	2. 55	·0342	·1499
3. 11	31. 20	·0477	3. 13	·1488	·2671	3. 0	·0336	·1472
3. 16	29. 50	·0469	3. 18	·1484	·2664	3. 5	·0332	·1455
3. 24	34. 45	·0495	3. 24	·1490	·2675	3. 12	·0330	·1446
3. 27	34. 25	·0493	3. 29	·1482	·2661	3. 18	·0328	·1437
3. 33	37. 20	·0508	3. 34	·1484	·2664	3. 29	·0326	·1428
3. 40	33. 50	·0489	3. 40	·1468	·2635	3. 37	·0323	·1415
3. 50	33. 0	·0485	3. 48	·1475	·2648	3. 42	·0324	·1420
4. 1	32. 40	·0483	3. 56	·1472	·2643	3. 55	·0322	·1411
4. 8	35. 30	·0499	4. 8	·1492	·2679	4. 5	·0324	·1420
4. 16	35. 0	·0496	4. 27	·1466	·2632	4. 10	·0322	·1411
4. 30	29. 30	·0468	4. 34	·1470	·2639	4. 20	·0321	·1406
4. 33	30. 10	·0471	4. 35	·1462	·2625	4. 24	·0321	·1406
4. 38	28. 50	·0463	4. 37	·1468	·2635	4. 29	·0319	·1398
4. 45	29. 30	·0468	4. 41	·1456	·2614	4. 32	·0320	·1402

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force: Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force: Expressed in terms of Gauss's Unit measured on the Metrical System.
Oct. 4 h m	° ′ ″		Oct. 4 h m			Oct. 4 h m		
5. 5	19. 33. 20	·0487	4. 59	·1475	·2648	4. 36	·0319	·1398
5. 26	27. 20	·0456	5. 10	·1466	·2632	4. 52	·0319	·1398
5. 30	28. 5	·0459	5. 23	·1463	·2626	5. 4	·0320	·1402
5. 36	24. 20	·0440	5. 27	·1469	·2637	5. 14	·0322	·1411
5. 40	32. 0	·0480	5. 35	·1455	·2612	5. 20	·0321	·1406
5. 56	18. 30	·0410	5. 38	·1468	·2635	5. 25	·0323	·1415
6. 2	20. 40	·0421	5. 51	·1440	·2585	5. 31	·0322	·1411
6. 7	19. 25	·0414	5. 58	·1451	·2605	5. 35	·0323	·1415
6. 13	23. 50	·0437	6. 6	·1454	·2610	5. 42	·0320	·1402
6. 18	22. 50	·0432	6. 10	·1463	·2626	5. 53	·0322	·1411
6. 23	25. 20	·0446	6. 19	·1454	·2610	6. 7	·0319	·1398
6. 28	25. 40	·0447	6. 26	·1461	·2623	6. 18	·0316	·1385
6. 36	28. 0	·0459	6. 28	·1460	·2621	6. 22	·0317	·1390
6. 46	26. 15	·0450	6. 36	·1466	·2632	6. 27	·0316	·1385
6. 56	36. 0	·0501	6. 42	·1459	·2619	6. 32	·0317	·1390
7. 13	27. 45	·0458	6. 55	·1478	·2653	6. 38	·0316	·1385
7. 26	22. 55	·0433	7. 2	·1449	·2601	6. 50	·0318	·1394
7. 37	35. 50	·0500	7. 8	·1446	·2596	7. 0	·0315	·1381
7. 48	23. 20	·0435	7. 24	·1456	·2614	7. 15	·0314	·1377
8. 6	32. 30	·0483	7. 33	·1486	·2668	7. 23	·0313	·1372
8. 20	19. 50	·0416	7. 48	·1438	·2581	7. 30	·0311	·1363
8. 30	16. 15	·0398	7. 59	·1468	·2635	7. 35	·0308	·1350
8. 37	18. 0	·0407	8. 14	·1439	·2583	7. 40	·0303	·1328
8. 45	20. 50	·0422	8. 23	·1450	·2603	7. 44	·0306	·1341
8. 53	15. 25	·0394	8. 39	·1452	·2607	7. 56	·0306	·1341
9. 0	16. 40	·0400	8. 54	·1438	·2581	8. 10	·0303	·1328
9. 16	21. 10	·0424	9. 5	·1447	·2598	8. 16	·0305	·1337
9. 23	20. 50	·0422	9. 13	·1438	·2581	8. 30	·0306	·1341
9. 30	18. 50	·0411	9. 24	·1434	·2574	8. 42	·0305	·1337
9. 43	22. 20	·0430	9. 36	·1445	·2594	9. 10	·0304	·1333
10. 6	17. 55	·0407	9. 44	·1439	·2583	9. 20	·0305	·1337
10. 12	17. 55	·0407	10. 7	·1471	·2641	9. 30	·0306	·1341
10. 22	6. 25	·0347	10. 16	·1448	·2599	9. 42	·0304	·1333
10. 48	22. 20	·0430	10. 32	·1480	·2657	9. 50	·0305	·1337
10. 58	22. 30	·0431	10. 47	·1472	·2643	9. 57	·0302	·1324
11. 6	20. 10	·0419	11. 0	·1444	·2592	10. 2	·0301	·1319
11. 16	18. 40	·0410	11. 7	·1450	·2603	10. 5	·0302	·1324
11. 28	23. 15	·0434	11. 18	·1468	·2635	10. 15	·0300	·1315
11. 49	19. 50	·0416	11. 30	·1454	·2610	10. 23	·0301	·1319
12. 18	21. 20	·0425	11. 40	·1449	·2601	10. 31	·0300	·1315
12. 26	20. 15	·0419	11. 56	·1460	·2621	10. 40	·0299	·1310
12. 34	23. 30	·0436	12. 0	·1457	·2616	10. 46	·0300	·1315
12. 41	25. 40	·0447	12. 8	·1461	·2623	10. 57	·0298	·1306
12. 46	24. 15	·0439	12. 17	·1455	·2612	11. 1	·0297	·1302
12. 52	24. 0	·0438	12. 32	·1443	·2590	11. 12	·0296	·1297
13. 2	20. 15	·0419	12. 37	·1446	·2596	11. 20	·0297	·1302
13. 10	23. 50	·0437	12. 53	·1430	·2567	11. 30	·0296	·1297
13. 18	24. 35	·0441	12. 56	·1436	·2578	11. 40	·0296	·1297
13. 38	17. 10	·0403	12. 59	·1435	·2576	11. 52	·0297	·1302
13. 43	16. 55	·0402	13. 7	·1443	·2590	12. 3	·0296	·1297
13. 59	20. 10	·0419	13. 12	·1440	·2585	12. 16	·0295	·1293
14. 4	20. 15	·0419	13. 20	·1432	·2571	12. 24	·0293	·1284

Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Of V. F. Magnet.	Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Of V. F. Magnet.
Oct. 4 h m	°	°	Oct. 4 h m	°	°
0. 0	64·9	65·3	22. 0	64·3	64·4
9. 30	65·8	66·4	23. 0	64·3	64·7
21. 0	64·0	64·3			

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
Oct. 4 h m	° ′ ″		Oct. 4 h m			Oct. 4 h m		
14. 10	19. 21. 25	·0425	13. 44	·1463	·2626	12. 35	·0289	·1266
14. 13	20. 30	·0421	13. 56	·1467	·2634	12. 48	·0284	·1245
14. 30	23. 0	·0433	14. 4	·1467	·2634	12. 53	·0286	·1253
14. 34	23. 10	·0434	14. 11	·1462	·2625	12. 57	·0285	·1249
14. 51	25. 30	·0447	14. 21	·1466	·2632	13. 1	·0287	·1258
14. 57	24. 40	·0441	15. 3	·1458	·2617	13. 11	·0284	·1245
15. 8	23. 50	·0437	15. 10	·1463	·2626	13. 17	·0280	·1227
15. 16	24. 50	·0442	15. 27	·1456	·2614	13. 25	·0282	·1236
15. 30	22. 30	·0431	15. 50	·1464	·2628	13. 33	·0286	·1253
15. 52	25. 20	·0446	16. 7	·1457	·2616	13. 42	·0289	·1266
15. 58	25. 0	·0444	16. 13	·1467	·2634	14. 0	·0292	·1280
16. 7	26. 45	·0453		***		14. 5	·0292	·1280
16. 10	26. 30	·0452	16. 54	·1461	·2623	14. 20	·0294	·1289
16. 16	28. 30	·0462	17. 24	·1465	·2630	14. 35	·0294	·1289
16. 28	29. 10	·0466	17. 46	·1463	·2626	14. 58	·0295	·1293
16. 38	28. 40	·0462	18. 6	·1469	·2637	15. 10	·0295	·1293
16. 43	29. 0	·0465	18. 18	·1468	·2635	15. 25	·0294	·1289
16. 59	26. 30	·0452	18. 30	·1465	·2630	15. 34	·0295	·1293
17. 6	26. 40	·0452		***		15. 49	·0295	·1293
17. 16	25. 15	·0445	18. 56	·1474	·2646	16. 5	·0293	·1284
17. 24	25. 30	·0447		***		16. 10	·0293	·1284
17. 37	24. 20	·0440	19. 18	·1468	·2635	16. 32	·0290	·1271
	***		19. 57	·1449	·2601	16. 51	·0288	·1262
18. 20	24. 20	·0440	20. 2	·1452	·2607	17. 14	·0287	·1258
18. 36	23. 15	·0434	20. 9	·1449	·2601	17. 45	·0288	·1262
18. 52	25. 20	·0446	20. 17	·1452	·2607	18. 30	·0287	·1258
18. 54	24. 50	·0442	20. 23	·1449	·2601	18. 43	·0288	·1262
18. 58	25. 30	·0447	20. 38	·1458	·2617	19. 12	·0286	·1253
19. 16	23. 50	·0437	20. 40	·1454	·2610	19. 45	·0285	·1249
19. 24	25. 30	·0447	20. 47	·1457	·2616	20. 8	·0285	·1249

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
Oct. 4 h m	° ′ ″		Oct. 4 h m			Oct. 4 h m		
19. 34	19. 25. 25	·0446	21. 16	·1439	·2583	20. 30	·0283	·1240
19. 38	26. 20	·0451	21. 38	·1452	·2607	20. 37	·0284	·1245
19. 50	25. 0	·0444	21. 44	·1444	·2592	20. 40	·0283	·1240
19. 58	26. 10	·0450	21. 54	·1452	·2607	21. 11	·0283	·1240
20. 7	28. 50	·0463	21. 56	·1449	·2601	21. 22	·0284	·1245
20. 20	31. 5	·0475	22. 6	·1456	·2614	21. 36	·0285	·1249
20. 28	29. 55	·0470	22. 45	·1468	·2635	21. 56	·0286	·1253
	***		23. 20	·1472	·2643	22. 30	·0286	·1253
20. 42	29. 0	·0465	23. 26	·1469	·2637	22. 45	·0286	·1253
20. 54	31. 0	·0475	23. 31	·1474	·2646	22. 58	·0287	·1258
21. 8	28. 45	·0463	23. 36	·1468	·2635	23. 15	·0287	·1258
21. 24	28. 35	·0462	23. 59	·1473	·2644	23. 45	·0288	·1262
21. 30	29. 35	·0468				23. 59	·0289	·1266
21. 33	29. 10	·0466						
21. 40	30. 20	·0472						
21. 42	28. 55	·0464						
21. 46	30. 40	·0473						
21. 49	28. 55	·0464						
21. 54	30. 30	·0473						
21. 58	31. 0	·0475						
22. 9	31. 30	·0478						
22. 19	31. 40	·0478						
22. 26	29. 50	·0469						
22. 37	30. 40	·0473						
22. 46	29. 20	·0467						
22. 52	30. 0	·0470						
	***							
23. 40	31. 0	·0475						
23. 48	32. 30	·0483						
23. 59	34. 25	·0493						

The indications are taken from the sheets of the Photographic Record, except where an asterisk is attached to the number, in which instances they are inferred from eye observations. The Symbol *** denotes that the magnet has been generally in a state of agitation, and the Symbol (†) that the register has failed between the preceding and following readings.

For the Horizontal and Vertical Forces, increasing readings denote increasing forces.

The constant by which the values of Horizontal Force are diminished is 0·8600 nearly, as expressed in parts of the whole Horizontal Force, equivalent to 1·5437 in terms of Gauss's Unit measured on the Metrical System. The corresponding constant for Vertical Force is 0·9600 nearly, equivalent to 4·2072 in terms of Gauss's Unit.

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

OBSERVATIONS

OF THE

MAGNETIC DIP.

1874.

RESULTS of OBSERVATIONS of MAGNETIC DIP, on each Day of Observation.

Day and Approximate Hour, 1874.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″	
January 6. 22	D 1	3 inches	67. 47. 12	N
10. 2	C 1	6 „	67. 41. 48	N
14. 2	D 2	3 „	67. 44. 21	N
17. 2	C 2	6 „	67. 43. 52	N
20. 22	C 1	6 „	67. 44. 52	N
21. 0	B 1	9 „	67. 40. 35	N
21. 3	C 1	6 „	67. 43. 36	N
27. 1	B 2	9 „	67. 43. 22	N
30. 0	B 1	9 „	67. 41. 21	N
30. 3	D 1	3 „	67. 44. 42	N
31. 0	D 2	3 „	67. 46. 11	N
February 5. 2	D 1	3 „	67. 44. 18	N
7. 2	C 2	6 „	67. 46. 6	N
10. 22	D 2	3 „	67. 46. 34	N
11. 0	C 2	6 „	67. 45. 59	N
11. 3	D 2	3 „	67. 46. 28	N
18. 2	B 1	9 „	67. 44. 25	N
23. 22	B 2	9 „	67. 43. 22	N
24. 2	C 1	6 „	67. 42. 42	N
25. 2	C 2	6 „	67. 44. 6	N
27. 22	D 1	3 „	67. 47. 16	N
27. 23	C 1	6 „	67. 44. 57	N
March 4. 2	C 1	6 „	67. 44. 13	N
6. 3	D 1	3 „	67. 48. 10	N
13. 23	B 1	9 „	67. 44. 15	N
14. 0	C 2	6 „	67. 45. 21	N
20. 2	D 2	3 „	67. 47. 41	N
20. 22	B 2	9 „	67. 42. 46	N
24. 22	B 1	9 „	67. 42. 3	N
25. 2	C 2	6 „	67. 43. 35	N
25. 3	B 1	9 „	67. 41. 40	N
31. 2	D 1	3 „	67. 46. 40	N
April 7. 2	D 2	3 „	67. 46. 8	N
10. 2	C 1	6 „	67. 44. 53	N
14. 21	B 2	9 „	67. 45. 6	N
15. 1	C 2	6 „	67. 44. 41	N
15. 3	B 2	9 „	67. 42. 9	N
20. 3	D 1	3 „	67. 43. 38	N
21. 1	B 1	9 „	67. 44. 7	N
25. 1	D 1	3 „	67. 47. 50	N
28. 2	D 2	3 „	67. 46. 43	N
29. 22	C 1	6 „	67. 45. 28	N
30. 3	C 1	6 „	67. 44. 45	N
May 6. 2	B 2	9 „	67. 43. 6	N
9. 3	D 2	3 „	67. 44. 57	N
14. 1	B 1	9 „	67. 42. 54	N
15. 2	C 2	6 „	67. 44. 48	N
19. 2	D 1	3 „	67. 46. 6	N
19. 22	B 2	9 „	67. 43. 20	N
19. 23	C 1	6 „	67. 44. 12	N
25. 22	B 1	9 „	67. 41. 32	N
26. 3	B 1	9 „	67. 40. 7	N
30. 0	C 2	6 „	67. 43. 32	N

Day and Approximate Hour, 1874.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″	
June 4. 2	D 2	3 inches	67. 42. 36	N
8. 22	B 2	9 „	67. 41. 53	N
9. 0	C 2	6 „	67. 45. 6	N
9. 2	C 1	6 „	67. 43. 7	N
9. 3	B 2	9 „	67. 41. 54	N
17. 0	D 2	3 „	67. 44. 18	N
20. 1	D 1	3 „	67. 42. 27	N
27. 1	B 1	9 „	67. 41. 26	N
29. 22	C 2	6 „	67. 43. 5	N
30. 2	D 1	3 „	67. 46. 14	N
July 4. 1	C 1	6 „	67. 43. 28	N
8. 2	D 2	3 „	67. 46. 47	N
11. 1	C 2	6 „	67. 43. 15	N
11. 2	D 1	3 „	67. 46. 24	N
16. 2	B 2	9 „	67. 43. 26	N
17. 22	B 1	9 „	67. 44. 49	N
17. 23	C 1	6 „	67. 45. 25	N
18. 3	B 1	9 „	67. 41. 0	N
22. 22	B 2	9 „	67. 40. 29	N
24. 22	C 2	6 „	67. 42. 54	N
25. 3	C 2	6 „	67. 43. 34	N
August 5. 23	B 2	9 „	67. 39. 14	N
7. 22	D 2	3 „	67. 46. 3	N
8. 3	D 2	3 „	67. 44. 56	N
14. 2	C 1	6 „	67. 43. 3	N
14. 22	B 1	9 „	67. 41. 46	N
15. 3	B 1	9 „	67. 42. 11	N
20. 2	C 2	6 „	67. 42. 30	N
21. 22	B 2	9 „	67. 41. 31	N
22. 2	D 1	3 „	67. 42. 34	N
22. 3	B 2	9 „	67. 40. 25	N
25. 23	D 1	3 „	67. 42. 40	N
29. 2	C 1	6 „	67. 39. 53	N
31. 2	D 2	3 „	67. 43. 34	N
September 5. 2	C 2	6 „	67. 40. 52	N
9. 23	B 1	9 „	67. 42. 11	N
12. 2	D 2	3 „	67. 43. 56	N
15. 1	B 2	9 „	67. 40. 33	N
16. 0	C 1	6 „	67. 41. 29	N
16. 1	D 1	3 „	67. 43. 3	N
19. 1	D 2	3 „	67. 43. 30	N
25. 22	B 2	9 „	67. 42. 56	N
26. 3	B 2	9 „	67. 40. 23	N
30. 2	B 1	9 „	67. 40. 27	N
October 1. 0	C 2	6 „	67. 43. 14	N
6. 2	D 1	3 „	67. 44. 12	N
9. 22	B 1	9 „	67. 42. 24	N
10. 3	B 1	9 „	67. 43. 2	N
16. 23	C 1	6 „	67. 44. 16	N
21. 23	D 2	3 „	67. 43. 26	N
23. 0	B 2	9 „	67. 40. 18	N
23. 1	C 1	6 „	67. 42. 36	N

The initial N is that of Mr. W. C. Nash.

RESULTS of OBSERVATIONS of MAGNETIC DIP, on each Day of Observation—*continued.*

Day and Approximate Hour, 1874.	Needle.	Length of Needle.	Magnetic Dip.	Observer.	Day and Approximate Hour, 1874.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″		d h			° ′ ″	
October 29. 2	B 1	9 inches	67. 43. 1	N	November 26. 22	D 2	3 inches	67. 45. 18	N
31. 0	B 2	9 "	67. 42. 53	N	27. 3	D 2	3 "	67. 42. 21	N
November 5. 0	D 2	3 "	67. 45. 0	N	December 7. 1	C 1	6 "	67. 42. 40	N
5. 1	D 1	3 "	67. 45. 5	N	11. 1	D 1	3 "	67. 45. 6	N
11. 1	C 2	6 "	67. 46. 8	N	17. 0	C 2	6 "	67. 42. 50	N
12. 1	D 1	3 "	67. 45. 9	N	17. 1	D 2	3 "	67. 45. 6	N
12. 2	C 2	6 "	67. 46. 32	N	20. 21	D 1	3 "	67. 44. 19	N
20. 2	C 1	6 "	67. 44. 40	N	21. 3	D 1	3 "	67. 41. 24	N
23. 1	B 2	9 "	67. 42. 30	N	30. 2	D 2	3 "	67. 44. 32	N
26. 0	B 1	9 "	67. 39. 12	N	31. 2	B 1	9 "	67. 38. 19	N
26. 1	C 2	6 "	67. 42. 10	N	31. 22	B 2	9 "	67. 40. 38	N

The initial N is that of Mr. W. C. Nash.

MONTHLY MEANS of MAGNETIC DIPS.

Month, 1874.	B 1, 9-inch Needle.	Number of Observations.	B 2, 9-inch Needle.	Number of Observations.	C 1, 6-inch Needle.	Number of Observations.
	° ′ ″		° ′ ″		° ′ ″	
January	67. 40. 58	2	67. 43. 22	1	67. 43. 25	3
February	67. 44. 25	1	67. 43. 22	1	67. 43. 49	2
March	67. 42. 39	3	67. 42. 46	1	67. 44. 13	1
April	67. 44. 7	1	67. 43. 37	2	67. 45. 2	3
May	67. 41. 31	3	67. 43. 13	2	67. 44. 12	1
June	67. 41. 26	1	67. 41. 54	2	67. 43. 7	1
July	67. 42. 54	2	67. 41. 57	2	67. 44. 26	2
August	67. 41. 58	2	67. 40. 23	3	67. 41. 28	2
September	67. 41. 19	2	67. 41. 17	3	67. 41. 29	1
October	67. 42. 49	3	67. 41. 36	2	67. 43. 26	2
November	67. 39. 12	1	67. 42. 30	1	67. 44. 40	1
December	67. 38. 19	1	67. 40. 38	1	67. 42. 40	1
Means	67. 41. 57	Sum 22	67. 42. 1	Sum 21	67. 43. 36	Sum 20

Month, 1874.	C 2, 6-inch Needle.	Number of Observations.	D 1, 3-inch Needle.	Number of Observations.	D 2, 3-inch Needle.	Number of Observations.
	° ′ ″		° ′ ″		° ′ ″	
January	67. 43. 52	1	67. 45. 57	2	67. 45. 16	2
February	67. 45. 24	3	67. 45. 47	2	67. 46. 31	2
March	67. 44. 28	2	67. 47. 25	2	67. 47. 41	1
April	67. 44. 41	1	67. 45. 44	2	67. 46. 26	2
May	67. 44. 10	2	67. 46. 6	1	67. 44. 57	1
June	67. 44. 5	2	67. 44. 20	2	67. 43. 27	2
July	67. 43. 14	3	67. 46. 24	1	67. 46. 47	1
August	67. 42. 30	1	67. 42. 37	2	67. 44. 51	3
September	67. 40. 52	1	67. 43. 3	1	67. 43. 43	2
October	67. 43. 14	1	67. 44. 12	1	67. 43. 26	1
November	67. 44. 57	3	67. 45. 7	2	67. 44. 13	3
December	67. 42. 50	1	67. 43. 36	3	67. 44. 49	2
Means	67. 44. 0	Sum 21	67. 44. 59	Sum 21	67. 45. 1	Sum 22

For this table the monthly means have been formed without reference to the hour at which the observation was made on each day.
In combining the monthly results, to form the annual means, weights have been given proportional to the number of observations.

YEARLY MEANS of MAGNETIC DIPS for each of the NEEDLES, and GENERAL MEAN for the Year 1874.

Lengths of the several Sets of Needles.	Needles.	Number of Observations with each Needle.	Mean Yearly Dips from Observations with each Needle.	Mean Yearly Dips from each Set of Needles.	Mean Yearly Dip from all the Sets of Needles.
			° ′ ″	° ′ ″	° ′ ″
9-inch Needles	B 1	22	67. 41. 57	67. 41. 59	67. 43. 36
	B 2	21	67. 42. 1		
6-inch Needles	C 1	20	67. 43. 36	67. 43. 48	
	C 2	21	67. 44. 0		
3-inch Needles	D 1	21	67. 44. 59	67. 45. 0	
	D 2	22	67. 45. 1		

RESULTS of OBSERVATIONS of MAGNETIC DIP at the Hours of Observation 9^h. a.m. and 3^h. p.m.

Month and Day, 1874.		Needle.	Length of Needle.	Magnetic Dip. At 9^h. a.m. ±	Magnetic Dip. At 3^h. p.m. ±	Excess of the Magnetic Dip at 9^h. a.m. over the Magnetic Dip at 3^h. p.m.
				° ′ ″	° ′ ″	′ ″
January	21	C 1	6 inches	67. 44. 52	67. 43. 36	+ 1. 16
February	11	D 2	3 „	67. 46. 34	67. 46. 28	+ 0. 6
March	25	B 1	9 „	67. 42. 3	67. 41. 40	+ 0. 23
April	15	B 2	9 „	67. 45. 6	67. 42. 9	+ 2. 57
	30	C 1	6 „	67. 45. 28	67. 44. 45	+ 0. 43
May	26	B 1	9 „	67. 41. 32	67. 40. 7	+ 1. 25
June	9	B 2	9 „	67. 41. 53	67. 41. 54	− 0. 1
July	18	B 1	9 „	67. 44. 49	67. 41. 0	+ 3. 49
	25	C 2	6 „	67. 42. 54	67. 43. 34	− 0. 40
August	8	D 2	3 „	67. 46. 3	67. 44. 56	+ 1. 7
	15	B 1	9 „	67. 41. 46	67. 42. 11	− 0. 25
	22	B 2	9 „	67. 41. 31	67. 40. 25	+ 1. 6
September	26	B 2	9 „	67. 42. 56	67. 40. 23	+ 2. 33
October	10	B 1	9 „	67. 42. 24	67. 43. 2	− 0. 38
November	27	D 2	3 „	67. 45. 18	67. 42. 21	+ 2. 57
December	21	D 1	3 „	67. 44. 19	67. 41. 24	+ 2. 55
Means		....		67. 43. 43	67. 42. 30	+ 1. 13

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

DEFLEXION OF A MAGNET

FOR

ABSOLUTE MEASURE

OF

HORIZONTAL FORCE.

1874.

ABSTRACT of the OBSERVATIONS of DEFLEXION of a MAGNET for ABSOLUTE MEASURE of HORIZONTAL FORCE.

Month and Day, 1874.	Distances of Centers of Magnets.	Temperature.	Observed Deflexion.	Mean of the Times of Vibration of Deflecting Magnet.	Number of Vibrations.	Temperature.	Observer.
	ft.	°	° ′ ″	s		°	
January 26	1·0 1·3	45·3	11. 27. 59 5. 12. 3	5·512 5·508	100 100	46·8 47·2	N
February 27	1·0 1·3	52·0	11. 26. 52 5. 11. 28	5·511 5·513	100 100	53·4 54·7	N
March 21	1·0 1·3	49·7	11. 27. 15 5. 11. 27	5·512 5·513	100 100	50·3 51·0	N
April 22	1·0 1·3	72·5	11. 23. 46 5. 9. 56	5·520 5·522	100 100	76·3 73·7	N
May 25	1·0 1·3	62·3	11. 23. 38 5. 10. 3	5·517 5·519	100 100	63·0 62·8	N
June 23	1·0 1·3	70·2	11. 22. 28 5. 9. 19	5·518 5·520	100 100	74·3 71·2	N
July 25	1·0 1·3	72·3	11. 21. 25 5. 8. 49	5·525 5·527	100 100	74·4 75·1	N
August 26	1·0 1·3	72·7	11. 20. 24 5. 8. 29	5·524 5·521	100 100	73·5 76·8	N
September 25	1·0 1·3	75·4	11. 19. 13 5. 7. 47	5·527 5·531	100 100	80·0 76·2	N
October 24	1·0 1·3	53·7	11. 21. 10 5. 8. 18	5·519 5·521	100 100	55·8 55·6	N
November 27	1·0 1·3	41·8	11. 21. 43 5. 9. 4	5·530 5·519	100 100	47·0 43·7	N
December 21	1·0 1·3	36·7	11. 21. 9 5. 8. 31	5·520 5·524	100 100	37·2 41·0	N

The position of the Deflecting Magnet with regard to the suspended Magnet is always that which was formerly termed "Lateral." The Deflecting Magnet is placed on the East side of the suspended Magnet, with its marked pole alternately E. and W., and it is placed on the West side with its pole alternately E. and W.; and the deflexion in the table above is the mean of the four deflexions observed in those positions of the magnets.

The lengths of 1 foot and 1·3 foot answer to 304·8 and 396·2 millimètres respectively.

The initial N is that of Mr. W. C. Nash.

In the following calculations every observation is reduced to the temperature 35°.

COMPUTATION of the VALUES of ABSOLUTE MEASURE of HORIZONTAL FORCE in the Year 1874.

Month and Day, 1874.		In English Measure.									Value of X in Metric Measure.
		Apparent Value of A^1.	Apparent Value of A^2.	Apparent Value of P.	Mean Value of P.	Log. A corrected by the Application of Mean Value of P. = Log. $\frac{m}{X}$	Adopted Time of Vibration of Deflecting Magnet.	Log. m X.	Value of X.	Value of m.	
January	26	+0·09955	0·09972	−0·00419	−0·00227	8·99921	5·5100	0·17798	3·885	0·3878	1·791
February	27	+0·09951	0·09965	−0·00345		8·99895	5·5120	0·17814	3·887	0·3878	1·792
March	21	+0·09952	0·09961	−0·00222		8·99890	5·5125	0·17784	3·886	0·3876	1·792
April	22	+0·09942	0·09952	−0·00247		8·99847	5·5210	0·17821	3·889	0·3876	1·793
May	25	+0·09922	0·09938	−0·00396		8·99773	5·5180	0·17781	3·891	0·3871	1·794
June	23	+0·09919	0·09928	−0·00222		8·99745	5·5190	0·17835	3·894	0·3872	1·796
July	25	+0·09908	0·09916	−0·00198		8·99693	5·5260	0·17739	3·893	0·3865	1·795
August	26	+0·09894	0·09906	−0·00298		8·99640	5·5225	0·17797	3·898	0·3865	1·797
September	25	+0·09882	0·09888	−0·00149		8·99576	5·5290	0·17717	3·897	0·3859	1·797
October	24	+0·09872	0·09867	+0·00124		8·99508	5·5200	0·17703	3·899	0·3855	1·798
November	27	+0·09860	0·09872	−0·00299		8·99492	5·5245	0·17558	3·893	0·3848	1·795
December	21	+0·09844	0·09846	−0·00050		8·99400	5·5220	0·17539	3·897	0·3843	1·797
Means........		..	..	..	..	..	..	..	3·892	..	1·795

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

METEOROLOGICAL OBSERVATIONS.

1874.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer, with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	Thames. Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Jan. 1	..	29·994	46·6	35·6	41·1	37·8	67·3	29·9	42·3	39·8	3·3	7·1	0·0	+ 3·8	W : WSW	SW	3·1	0·0	0·3	285	0·00
2	Greatest Dec. N.: Full.,	29·735	50·7	42·5	46·6	42·7	57·5	36·6	42·0	39·8	3·9	6·5	1·3	+ 9·6	SW	WSW : SW	7·4	0·0	1·4	466	0·10
3	..	29·219	48·6	37·3	41·7	38·3	74·9	31·3	42·2	39·4	3·4	6·9	1·5	+ 5·0	SSW	WSW : SW	10·2	0·0	1·4	482	0·14
4	..	29·447	42·3	33·5	36·3	30·8	70·0	28·0	42·0	39·2	5·5	7·5	1·5	— 0·1	WSW	WNW : WSW	3·3	0·0	0·4	372	0·01
5	..	29·900	39·7	30·8	35·0	31·0	48·0	23·3	41·6	38·4	4·0	6·4	1·6	— 1·2	W	WNW : WSW	2·7	0·0	0·3	357	0·01
6	..	30·185	44·5	30·6	38·6	35·4	81·1	20·1	40·8	38·4	3·2	7·7	0·0	+ 2·6	WSW	WSW	1·0	0·0	0·1	252	0·00
7	..	30·005	45·1	33·8	38·9	32·0	98·7	27·5	40·4	38·3	6·9	10·8	2·4	+ 3·1	SW : SSW	SSW : SSE	1·3	0·0	0·2	266	0·00
8	..	29·665	44·2	33·8	39·1	35·7	46·2	27·0	40·4	38·0	3·4	5·1	2·1	+ 3·4	S by E	S by W	7·5	0·0	1·1	443	0·00
9	Apogee: In Equator.	29·705	50·0	40·2	46·0	41·8	56·9	39·8	40·0	37·5	4·2	6·7	0·5	+10·2	S by W	SSW : SW	6·7	0·0	1·0	463	0·01
10	Last Qr.	29·891	53·0	42·5	46·2	41·4	83·1	33·4	40·6	38·0	4·8	8·8	1·8	+10·3	SW	SW : NNE	1·3	0·0	0·1	237	0·00
11	..	29·909	41·5	33·9	35·7	35·0	45·1	31·5	41·0	38·4	0·7	2·0	0·0	— 0·3	NNE : SW	WSW	0·7	0·0	0·0	160	0·00
12	..	29·744	49·1	32·1	42·5	41·8	50·7	29·0	41·0	38·8	0·7	3·5	0·0	+ 6·4	WSW	WSW : NW	2·3	0·0	0·4	301	0·01
13	..	29·924	44·3	31·0	37·7	33·6	87·5	24·5	41·0	38·8	4·1	9·0	0·4	+ 1·5	WSW	W : WSW	3·8	0·0	0·4	316	0·00
14	..	29·821	52·3	40·3	47·1	43·7	64·5	37·2	41·0	38·6	3·4	7·0	0·9	+10·8	W : WSW	WSW	7·0	0·0	1·0	445	0·00
15	..	29·719	50·4	45·2	47·3	43·0	60·9	40·9	42·1	39·3	4·3	5·5	2·5	+10·9	WSW	SW	2·8	0·0	0·8	404	0·00
16	Greatest Declination S.	29·268	51·5	36·0	44·3	40·0	89·0	31·0	42·1	40·3	4·3	9·0	0·0	+ 7·8	SW : SSW	SW : WSW	10·2	0·1	1·4	486	0·09
17	..	29·494	41·9	32·1	36·3	31·1	70·2	28·0	42·1	40·0	5·2	9·9	1·3	— 0·3	SW : W	WNW : WSW	2·3	0·0	0·2	346	0·00
18	New	29·488	51·5	30·2	43·2	40·3	51·8	22·0	42·6	40·0	2·9	5·0	0·0	+ 6·5	SW : SSW	SW : WSW	7·5	0·0	1·4	496	0·07
19	..	29·494	48·0	43·5	44·9	43·4	49·6	40·1	42·3	40·0	1·5	2·5	0·0	+ 8·0	WSW : SW	SSE : S : SSW	2·7	0·0	0·3	264	0·22
20	Perigee	29·552	55·0	44·5	50·5	45·4	70·2	42·0	43·1	40·5	5·1	10·2	0·0	+13·5	SW : WSW	WSW	11·0	0·0	2·8	642	0·07
21	..	30·038	52·2	40·3	45·0	39·0	89·7	32·9	43·9	41·5	6·0	10·8	1·6	+ 7·8	WSW	WSW	1·7	0·0	0·3	310	0·00
22	..	30·230	41·3	31·0	35·5	35·5	54·0	27·1	44·0	41·4	0·0	0·5	0·0	— 1·9	WSW : SSW	SE	0·0	0·0	0·0	67	0·00
23	In Equator	30·062	51·5	38·1	45·4	43·8	90·0	34·8	44·1	41·6	1·6	6·4	0·0	+ 7·7	SW	WSW	2·5	0·0	0·3	293	0·00
24	..	30·054	50·0	35·0	40·4	37·3	50·0	28·0	44·0	42·0	3·1	5·8	0·7	+ 2·5	WSW : NNE	N : NNW	3·7	0·0	0·9	407	0·25
25	First Qr.	30·364	43·1	28·1	35·0	30·4	73·4	19·0	44·1	42·0	4·6	9·0	2·1	— 3·1	NNW : WSW	WSW	0·7	0·0	0·1	203	0·00
26	..	30·234	47·0	34·4	42·3	39·2	66·0	27·7	43·4	41·4	3·1	4·6	2·0	+ 4·0	WSW	WSW : W	5·0	0·0	0·7	409	0·00
27	..	30·319	49·2	39·0	44·5	37·2	82·0	31·4	43·1	41·2	7·3	10·7	0·8	+ 6·1	W : N	NNW	1·7	0·0	0·2	274	0·00
28	..	30·359	46·2	37·7	42·8	42·1	48·0	30·1	43·2	41·0	0·7	2·3	0·0	+ 4·4	Calm : N	NW : W	0·0	0·0	0·0	126	0·02
29	Greatest Declination N.	30·186	43·0	41·1	41·6	37·9	45·1	39·3	43·0	41·0	3·7	5·1	2·4	+ 3·3	NW : W	W : WNW	1·3	0·0	0·2	258	0·00
30	..	30·279	46·5	35·3	41·5	32·8	86·3	27·0	43·0	41·0	8·7	13·2	2·0	+ 3·4	W : N	N : NNW	3·7	0·0	0·3	274	0·00
31	..	30·327	47·2	32·4	40·2	37·5	59·8	24·9	42·8	40·5	2·7	7·7	0·0	+ 2·3	WSW	NW : N	1·9	0·0	0·2	237	0·00
Means	..	29·891	47·3	36·2	41·7	38·0	66·7	30·5	42·2	39·9	3·8	6·9	0·9	+ 4·8	...	...	..	..	..	Sum 10341	Sum 1·00

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $30^{in}\cdot026$ on the 1st; the absolute minimum in the month was $29^{in}\cdot115$ on the 3rd.
The second maximum ,, was $30^{in}\cdot197$ on the 6th; the second minimum ,, was $29^{in}\cdot620$ on the 8th.
The third maximum ,, was $29^{in}\cdot973$ on the 11th; the third minimum ,, was $29^{in}\cdot715$ on the 12th.
The fourth maximum ,, was $29^{in}\cdot976$ on the 13th; the fourth minimum ,, was $29^{in}\cdot172$ on the 16th.
The fifth maximum ,, was $29^{in}\cdot668$ on the 17th; the fifth minimum ,, was $29^{in}\cdot420$ on the 18th.
The sixth maximum ,, was $30^{in}\cdot275$ on the 22nd; the sixth minimum ,, was $29^{in}\cdot966$ on the 24th.
The absolute maximum ,, was $30^{in}\cdot390$ on the 25th; the seventh minimum ,, was $30^{in}\cdot205$ on the 26th.
The eighth maximum ,, was $30^{in}\cdot385$ on the 28th; the eighth minimum ,, was $30^{in}\cdot153$ on the 29th.
The ninth maximum ,, was $30^{in}\cdot353$ on the 31st.
The range in the month was $1^{in}\cdot275$.
The mean for the month was $29^{in}\cdot891$, being $0^{in}\cdot156$ *higher* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was 55°·0 on the 20th; the lowest was 28°·1 on the 25th.
The range ,, was 26°·9.
The mean ,, of all the highest daily readings was 47°·3, being 4°·1 *higher* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was 36°·2, being 2°·6 *higher* than the average of the preceding 33 years.
The mean daily range was 11°·1, being 1°·5 *greater* than the average of the preceding 33 years.
The mean for the month was 41°·7, being 3°·4 *higher* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Jan. 1	w	o : w	o : o	li.-cl : 10, lu.-ha
2	w	o	10 : oc.-shs : 10, r, w	10 : v, oc.-r : lu.-co, lu.-ha
3	o	o	10, th.-r, sc	v, ci, ci.-s, oc.-r, w : ci, ci.-cu, lu.-ha
4	o	o	v	ci, ci.-cu, cu, h, hl : v, l
5	o	o	sn, ci	ci, h : o, h
6	o	o	ci, s, h.-fr, mt	ci, ci.-cu : 10
7	o	o	v : ci	ci, ci.-cu : o : s
8	o	o	v : cu.-s, sl, th.-r	10, li.-shs : 10, li.-shs : v
9	o	o	v, ci.-cu, ci.-s, cu.-s	10, th.-r : 10, sl.-r
10	o	o	li.-cl, lu.-ha : ci, ci.-cu, sl.-f	ci, ci.-cu, cu.-s : 10, th.-r
11			10, th.-f	10, th.-f : 10
12			10, th.-r	10, th.-r : v : ci, sl.-f
13			o	cu.-s : v : 10
14			10, w	10 : 10
15			10 : 10	10, th.-r : 10
16			ci, cu, cu.-s	ci, ci.-cu, cu, oc.-r, w : v, oc.-r
17			o : vv, hl	ci, ci.-cu, cu.-s : o
18			o : v : 10, th.-r, st.-w	10, fr.-r, w : v, h
19			v : 10, th.-r	10, oc.-r : 10, oc.-r
20			10, w : 10, v, w	ci, ci.-cu, cu.-s, oc.-shs, st.-w : ci.-cu
21			o, mt	ci, ci.-cu : v : o
22			th.-f	th.-f : th.-f
23			ci, ci.-cu, cu.-s, mt	ci.-cu, cu.-s : cu.-s
24			10 : 10, r	10, r, v : o
25			o : ci, ci.-s, h.-fr, mt	o : o, h.-fr
26			o : v	10 : 10
27			ci, ci.-cu, mt	ci, ci.-cu : o
28			v : 10, th.-r, f	10, th.-r, glm : 10
29			10	10 : 10
30			ci, ci.-cu, cu, cu.-s, mt	ci, ci.-cu, mt : o, h
31			o, fr, v	10 : 10

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 38°·0, being 3°·0 *higher* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot229$, being $0^{in}\cdot026$ *greater* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot6$, being $0^{gr}\cdot2$ *greater* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 87 (that of Saturation being represented by 100), being 1 *less* than the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 552 grains, being 1 grain *less* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·6.

WIND.

The proportions were of N. 4, S. 9, W. 18, E. 0, and Calm 0. The greatest pressure in the month was $11^{lbs}\cdot0$ on the square foot on the 20th. The mean daily horizontal movement of the air for the month was 334 miles.

RAIN.

Fell on 12 days in the month, amounting to $1^{in}\cdot00$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot91$ *less* than the average fall of the preceding 59 years.

ELECTRICITY.

The electrical apparatus was not in action from January 11 to 31.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Feb. 1	Full	30·319	46·7	42·1	43·9	36·6	50·0	39·6	42·4	40·0	7·3	8·8	3·5	+ 6·1	NNW: N	N: Calm	0·1	0·0	0·0	117	0·00
2	..	30·228	42·9	39·8	41·0	35·4	44·2	36·7	42·4	40·0	5·6	7·7	2·3	+ 3·3	Calm	W: WSW	0·2	0·0	0·0	153	0·00
3	..	30·261	45·3	37·0	40·9	39·5	45·4	29·9	42·4	40·0	1·4	3·5	0·0	+ 3·1	WSW	N: NE	1·1	0·0	0·0	178	0·00
4	..	30·448	45·2	31·6	36·7	33·5	61·5	21·6	42·4	39·8	3·2	9·5	0·0	− 1·3	NE	ENE: ESE: Calm	0·3	0·0	0·0	152	0·00
5	Apogee: In Equator.	30·408	36·4	28·5	30·8	29·5	71·2	22·0	42·2	39·4	1·3	4·7	0·0	− 7·5	Calm	E: ENE	0·0	0·0	0·0	50	0·00
6	..	30·280	30·9	24·1	27·4	27·4	43·6	21·9	42·0	40·0	0·0	0·0	0·0	−11·2	Calm	ENE	0·0	0·0	0·0	65	0·00
7	..	30·090	43·4	26·7	34·5	33·1	74·7	26·7	41·6	40·0	1·4	5·9	0·0	− 4·3	WNW: WSW	W: WSW	1·1	0·0	0·1	233	0·00
8	..	29·983	44·1	29·5	37·2	31·0	91·4	20·0	41·2	39·4	6·2	11·3	1·3	− 1·7	WSW: NW: NNE	N	4·0	0·0	0·7	351	0·00
9	Last Qr.	30·102	37·8	24·4	31·1	21·5	70·7	14·3	41·3	39·0	9·6	13·5	2·7	− 7·8	NW: WSW: N	N	1·6	0·0	0·2	232	0·00
10	..	30·386	34·8	23·0	28·1	15·3	81·3	17·5	40·6	38·0	12·8	17·6	2·9	−10·7	NE: E: SE	SE	4·2	0·0	0·5	296	0·00
11	..	30·192	34·5	21·0	27·2	13·4	90·5	15·7	39·9	37·8	13·8	15·6	12·6	−11·4	SSE: SE	SE	2·0	0·0	0·3	267	0·00
12	..	29·882	43·9	25·2	35·6	32·4	59·0	20·2	38·6	36·4	3·2	8·8	0·0	− 2·8	SE: SSE	S: SSW	2·1	0·0	0·4	289	0·00
13	Greatest Declination S.	29·816	48·1	44·2	46·3	43·6	55·1	39·0	38·6	36·2	2·7	3·8	0·0	+ 8·0	SW	SW	4·5	0·1	1·5	502	0·01
14	..	29·505	51·5	46·1	48·5	43·3	68·7	44·7	39·4	36·4	5·2	7·0	0·8	+10·3	SW	SW: SSW	10·6	0·1	2·7	592	0·01
15	..	29·285	52·9	44·2	47·3	43·8	72·2	37·9	40·3	37·3	3·5	8·0	0·6	+ 9·2	SSW	SSW	6·1	0·1	1·0	442	0·10
16	New	29·351	49·8	40·9	44·9	39·7	72·8	34·3	40·8	38·4	5·2	8·2	2·2	+ 6·8	SSW	WSW: SW	5·0	0·0	0·7	373	0·01
17	..	29·152	46·6	33·0	39·5	37·0	53·8	28·9	41·6	39·0	2·5	5·3	1·3	+ 1·3	SSW	NW: WNW: WSW	4·0	0·0	0·6	366	0·04
18	Perigee	29·474	44·9	30·0	36·5	30·9	66·0	25·4	42·4	38·8	5·6	10·8	0·8	− 1·8	WSW	N: NW	1·7	0·0	0·1	206	0·00
19	In Equator	29·877	46·6	31·2	38·1	32·8	84·9	22·8	42·1	39·0	5·3	12·0	0·0	− 0·4	NNW: N	N: W	0·6	0·0	0·0	193	0·00
20	..	30·043	41·7	27·3	33·0	31·2	61·2	19·3	41·9	39·3	1·8	5·5	0·0	− 5·7	WSW	E: SE: S	0·1	0·0	0·0	162	0·00
21	..	29·830	48·4	31·6	40·6	34·9	90·3	24·5	41·4	39·0	5·7	11·5	0·0	+ 1·8	S: SW	SW: SSW	1·8	0·0	0·1	276	0·00
22	..	29·617	47·3	41·6	43·5	40·4	59·8	40·7	41·4	39·8	3·1	6·5	0·0	+ 4·5	S	S: SSE	1·0	0·0	0·1	198	0·01
23	First Qr.	29·739	46·4	41·1	42·8	40·2	58·0	39·5	42·0	40·0	2·6	5·2	0·2	+ 3·6	NW: N	N	0·4	0·0	0·0	145	0·03
24	..	29·863	45·2	31·3	38·4	37·0	57·1	24·5	42·1	40·0	1·4	5·5	0·0	− 1·0	N: E	ESE: E	0·4	0·0	0·0	135	0·00
25	Greatest Declination N.	29·593	45·5	29·1	37·7	34·0	78·2	20·6	42·3	40·0	3·7	9·7	0·0	− 1·9	E: SE	SSE	2·2	0·0	0·3	255	0·00
26	..	29·052	47·8	38·4	43·7	42·1	52·0	33·9	42·3	40·0	1·6	3·2	0·0	+ 3·9	SSE	SSW	14·0	0·2	2·0	502	0·51
27	..	29·259	54·2	39·7	45·6	39·2	102·5	33·6	42·6	39·8	6·4	13·0	0·7	+ 5·7	SSE: SW	SW	6·5	0·0	1·0	422	0·22
28	..	29·815	55·9	34·0	43·7	38·0	103·3	29·8	43·3	41·0	5·7	16·4	0·0	+ 3·6	WSW	WSW: SSW: S	0·3	0·0	0·0	162	0·00
Means	..	29·852	45·0	33·5	38·7	34·2	68·5	28·1	41·5	39·1	4·6	8·5	1·1	+ 0·1	...	...	..	..	..	Sum 7314	Sum 0·94

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The absolute maximum in the month was 30in·458 on the 4th; the second maximum ,, was 30in·433 on the 10th; the third maximum ,, was 29in·390 on the 16th; the fourth maximum ,, was 30in·064 on the 20th; the fifth maximum ,, was 29in·889 on the 24th.

The first minimum in the month was 30in·202 on the 2nd; the second minimum ,, was 29in·919 on the 8th; the third minimum ,, was 29in·285 on the 15th; the fourth minimum ,, was 29in·096 on the 17th; the fifth minimum ,, was 29in·602 on the 22nd; the absolute minimum ,, was 28in·949 on the 26th.

The range in the month was 1in·509.

The mean for the month was 29in·852, being 0in·056 *higher* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was 55°·9 on the 28th; the lowest was 21°·0 on the 11th.

The range ,, was 34°·9.

The mean ,, of all the highest daily readings was 45°·0, being 0°·5 *lower* than the average of the preceding 33 years.

The mean ,, of all the lowest daily readings was 33°·5, being 0°·7 *lower* than the average of the preceding 33 years.

The mean daily range was 11°·5, being 0°·2 *greater* than the average of the preceding 33 years.

The mean for the month was 38°·7, being 0°·6 *lower* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Feb. 1			10, f	10, mt : 10
2			10 : 10, sl.-f	10 v
3	o	o	o : 10, f	10, f : 10 : 10
4	o	o : w	10 : 10 : ci.-cu	ci, ci.-cu : o, d, a, f, h.-fr
5	o	o	f : 10, f, h.-fr	f : o : 10, th.-f
6			th.-f, h.-fr : 10, th.-f, h.-fr	10, th.-f, h.-fr : 10, th.-f, h.-fr
7			10, f : sl.-f, v	o : v : 10
8			10	v, sn : o : o
9			ci, h, f, h.-fr	ci, ci.-cu, cu, cu.-s : v
10			h.-fr : ci.-cu, h.-fr, sn	ci.-cu : v
11			o : o	o : o
12			10	10 : v
13			ci, ci.-cu, sc	10, oc.-th.-r : 10, oc.-th.-r
14			10 : 10	10, w : 10, oc.-th.-r, st.-w
15	o	o	10 : 10, oc.-r	ci, ci.-cu : ci, ci.-cu, cu
16	o	o	10, oc.-th.-r	10, oc.-th.-r : 10 : v
17	o	o	10, r	10, oc.-r : v : o
18	o	o	ci, ci.-cu, h.-fr	ci, ci.-s, cu, cu.-s, mt, hl : o, sl.-f, h.-fr
19	o	o	o, h.-fr : ci, ci.-cu	ci, ci.-cu : v, f : o, sl.-f
20	o	o	f, h.-fr : f	li.-cl, h, f : o, h.-d
21	o	o	h.-fr, ci, ci.-cu	ci, ci.-cu, ci.-s : 10 : 10
22	o	o	10, mt	10 : 10, th.-r
23	o	o	10, mt, th.-r	10, r : 10 : 10
24	o	o	10 : 10	cu, ci.-cu : v : o
25	o	o	h.-fr, ci, ci.-cu	ci, ci.-cu : 10 : 10
26	o	o	10 : 10, r, w	c.-h.-r, st.-w ; c.-h.-r, st.-w
27	o	o	10, r, w : v : ci, ci.-s	ci, ci.-cu, ci.-s, sl.-r : o, lu.-ha
28	o	o	lu.-ha, h.-fr : ci, ci.-s	ci, ci.-cu, cu · li.-cl, lu.-ha

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $34^{\circ}\cdot2$, being $0^{\circ}\cdot9$ *lower* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot197$, being $0^{in}\cdot009$ *less* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot3$, being $0^{gr}\cdot1$ *greater* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 85 (that of Saturation being represented by 100), being *the same as* the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 555 grains, being 2 grains *greater* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 7·1.

WIND.

The proportions were of N. 6, S. 9, W. 8, E. 4, and Calm 1. The greatest pressure in the month was $14^{lbs}\cdot0$ on the square foot on the 26th. The mean daily horizontal movement of the air for the month was 261 miles.

RAIN.

Fell on 9 days in the month, amounting to $0^{in}\cdot94$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot60$ *less* than the average fall of the preceding 59 years.

ELECTRICITY.

The electrical apparatus was out of action on February 1 and 2, and from February 6 to 14.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer, with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Mar. 1	..	29·849	56·8	40·3	46·9	42·5	105·0	34·3	44·0	41·5	4·4	11·6	0·7	+ 6·7	S : SSW	SSW : S	2·3	0·0	0·2	269	0·01
2	..	30·252	54·9	37·8	44·3	41·8	94·8	30·8	44·6	42·2	2·5	11·4	0·0	+ 4·1	S : SE	S : ESE	0·2	0·0	0·0	135	0·00
3	Full	30·383	50·7	32·7	40·5	38·0	109·8	23·5	45·1	42·4	2·5	9·8	0·0	+ 0·3	ESE : ENE	E : SE	0·4	0·0	0·0	156	0·00
4	..	30·385	48·9	31·4	39·0	36·1	100·4	21·7	45·4	43·0	2·9	10·5	0·0	− 1·1	SE : Calm	Calm	0·0	0·0	0·0	63	0·00
5	In Equator: Apogee.	30·363	47·9	33·6	39·9	34·8	66·4	26·3	45·2	43·2	5·1	12·4	1·2	− 0·2	Calm : W	NNE : WSW	0·0	0·0	0·0	105	0·00
6	..	30·535	51·4	36·0	42·7	34·9	111·0	29·0	45·0	43·2	7·8	16·6	0·7	+ 2·6	Calm : NE	NE	3·9	0·0	0·5	313	0·02
7	..	30·298	48·3	29·8	38·0	35·1	66·3	21·2	45·0	43·5	2·9	9·0	0·0	− 2·2	WSW : W	Variable	0·0	0·0	0·0	141	0·00
8	..	29·816	55·2	28·7	39·9	34·1	101·2	20·7	44·8	43·0	5·8	17·5	0·0	− 0·4	WSW	W : WSW	1·2	0·0	0·1	235	0·00
9	..	29·382	45·3	32·0	35·4	33·1	56·8	30·0	44·6	42·5	2·3	5·8	0·0	− 5·0	WSW	N : NW	3·9	0·0	0·2	268	0·12
10	..	29·551	36·3	26·0	30·1	24·6	77·0	26·0	44·4	42·0	5·5	8·7	1·6	−10·5	N : NW	NW : NNE : N	6·0	0·0	0·8	436	0·06
11	Last Qr.	29·849	36·9	22·6	28·7	21·9	76·7	15·0	43·6	41·0	6·8	10·7	4·6	−12·2	N : NW	N	7·3	0·0	1·0	376	0·04
12	Greatest Declination S.	29·984	41·5	24·6	32·6	31·2	50·6	19·9	42·4	40·0	1·4	5·3	0·0	− 8·6	N : WSW	WSW : NW	3·0	0·0	0·4	341	0·05
13	..	30·215	46·2	31·7	39·0	32·7	72·0	23·9	41·6	39·4	6·3	12·1	0·0	− 2·4	NNW : NE	WSW : NW	0·8	0·0	0·0	199	0·00
14	..	30·273	51·6	39·2	44·5	36·5	76·9	34·0	41·6	39·2	8·0	13·6	2·8	+ 3·0	WNW : NW	WNW : W : WSW	2·5	0·0	0·4	349	0·00
15	..	30·153	53·1	42·0	47·2	40·5	81·8	35·0	42·6	39·2	6·7	9·0	4·6	+ 5·5	WSW : W : WNW	NW : W	2·7	0·0	0·4	381	0·03
16	..	30·123	54·9	41·7	47·3	41·1	78·1	38·9	42·1	40·0	6·2	10·8	3·5	+ 5·4	WSW	W : WSW	2·8	0·0	0·5	379	0·00
17	..	30·058	55·1	45·5	49·5	46·3	65·0	42·0	42·9	40·0	3·2	7·0	1·9	+ 7·5	WSW	WSW	4·2	0·2	1·2	539	0·00
18	New: Perigee; In Equator.	29·899	58·0	41·0	48·5	42·1	104·0	35·0	43·8	41·0	6·4	15·6	1·1	+ 6·4	WSW	N W : NNW	3·1	0·0	0·5	375	0·05
19	..	29·742	51·6	34·3	44·0	38·4	80·9	28·1	44·6	41·8	5·6	11·6	0·0	+ 1·8	WSW : SW	WSW : WNW	11·4	0·0	1·2	451	0·01
20	..	29·886	49·7	38·9	43·7	34·0	68·2	30·4	45·4	42·4	9·7	14·4	4·6	+ 1·5	WNW : W : NW	NNW	3·7	0·0	0·7	391	0·00
21	..	29·961	54·8	38·0	45·6	40·2	77·0	31·6	45·2	42·2	5·4	11·8	3·1	+ 3·3	SW	SW : WSW	9·7	0·0	0·9	386	0·00
22	..	29·946	57·9	44·6	51·3	47·4	72·0	40·1	45·6	42·7	3·9	11·0	0·2	+ 9·1	WSW	W : WSW	4·5	0·0	1·0	440	0·00
23	..	30·095	65·4	46·8	54·1	50·0	116·5	41·3	46·1	43·4	4·1	12·8	0·8	+11·9	WSW	WSW : SW	0·2	0·0	0·0	189	0·00
24	First Qr.	30·157	56·2	40·0	45·8	41·8	74·2	31·0	46·3	43·7	4·0	9·6	0·0	+ 3·6	WSW : W	NNE	3·2	0·0	0·1	214	0·00
25	Greatest Declination N.	30·218	55·5	35·2	43·7	36·0	119·9	26·0	46·3	44·0	7·7	19·2	0·3	+ 1·4	NE	ENE : ESE	2·6	0·0	0·2	236	0·00
26	..	30·145	55·6	31·3	41·9	37·9	115·0	20·3	46·8	44·0	4·0	16·4	0·0	− 0·6	ENE : SW	SW	0·7	0·0	0·0	146	0·00
27	..	29·833	64·3	33·5	50·7	40·9	113·0	21·9	47·2	44·0	9·8	20·7	0·0	+ 7·8	SW	SW : WSW	5·8	0·0	1·1	392	0·00
28	..	29·899	59·7	42·0	49·8	41·2	119·3	36·4	48·8	45·0	8·6	19·6	0·7	+ 6·6	W	WSW	7·0	0·0	1·5	515	0·00
29	..	29·659	60·0	48·0	53·1	46·7	92·7	46·8	49·4	46·0	6·4	13·3	3·8	+ 9·5	WSW	WSW	13·8	1·4	4·6	822	0·01
30	..	29·790	57·1	46·0	49·9	38·9	102·3	41·0	49·6	46·3	11·0	17·9	6·1	+ 5·9	WSW : W	W : SW	9·1	0·1	2·8	645	0·00
31	..	29·705	55·0	39·2	47·5	44·3	63·5	34·0	49·6	46·3	3·2	10·6	1·2	+ 3·1	WSW	W	7·6	0·3	1·9	623	0·05
Means	..	30·013	52·8	36·6	43·7	38·2	87·4	30·2	45·1	42·5	5·5	12·5	1·4	+ 2·1	...	...	..	..	..	Sum 10510	Sum 0·45

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·417 on the 4th; the first minimum in the month was 30in·341 on the 5th.
The absolute maximum ,, was 30in·555 on the 6th; the absolute minimum ,, was 29in·368 on the 9th.
The third maximum ,, was 30in·061 on the 12th; the third minimum ,, was 29in·939 on the 12th.
The fourth maximum ,, was 30in·335 on the 14th; the fourth minimum ,, was 29in·876 on the 18th.
The fifth maximum ,, was 29in·981 on the 18th; the fifth minimum ,, was 29in·640 on the 19th.
The sixth maximum ,, was 30in·042 on the 21st; the sixth minimum ,, was 29in·917 on the 21st.
The seventh maximum ,, was 30in·277 on the 25th; the seventh minimum ,, was 29in·790 on the 27th.
The eighth maximum ,, was 29in·966 on the 28th; the eighth minimum ,, was 29in·654 on the 29th.
The ninth maximum ,, was 29in·860 on the 30th; the ninth minimum ,, was 29in·663 on the 31st.
The range in the month was 1in·187.
The mean for the month was 30in·013, being 0in·271 *higher* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was 65°·4 on the 23rd; the lowest was 22°·6 on the 11th.
The range ,, was 42°·8.
The mean ,, of all the highest daily readings was 52°·8, being 2°·9 *higher* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was 36°·6, being 1°·4 *higher* than the average of the preceding 33 years.
The mean daily range was 16°·2, being 1°·5 *greater* than the average of the preceding 33 years.
The mean for the month was 43°·7, being 2°·1 *higher* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
March 1	o	o	v, r	cu, cu.-s, ci : o, h.-d
2	o	o	v : 10, f	ci, ci.-cu, ci.-s, cu, cu.-s: ci, ci.-cu, f
3		o	f : 10, f	3, ci, ci.-cu, cu : o, h.-fr
4	o	o : w	v, f	v, f : v, f : o, sl.-f
5	o	o	f : 10, sl.-f	h : sl.-f, glm
6	o	o	10, r : v	ci, ci.-cu : v : o
7	o	o	o, h.-fr : h.-fr, h, mt, f, li.-cl	ci, h, mt : o : o, mt, f
8			o, sl.-f, h.-fr : th.-cl	o : o, h
9			v : 10, r, sl, sn, gt.-glm	10, sl, sn : 10
10			sn : v	ci, ci.-cu, v, oc.-sn : v, sl, oc.-sn
11			o : 10, sn	ci, cu, cu.-s, w : v : o
12			v : 10, sn	v, sn, oc.-r, sl.-f : f
13			v : o, mt, v	10 : 10, mt
14			ci, mt	ci, ci.-cu, cu : o
15			10, r : 10, mt	10 : v
16			ci, ci.-cu, ci.-s	ci.-cu, cu : v, li.-cl
17			10	10, sl.-r : 10, oc.-th.-r
18			10 : 10, r	v, ci, ci.-cu : o
19			o : ci, ci.-cu	10, sl.-r, w : ci.-cu
20			ci.-cu, cu.-s	ci, ci.-cu, cu.-s : o
21			v, w : 10	10 : v : v, sc
22			10	10 : ci
23			10, mt : v	ci : o, lu.-co
24			v : 10, f	10 : v : o
25	o	o : w	ci, ci.-s	o : o, d
26	o	o	10 : 10 : ci, ci.-cu	ci, ci.-cu : o : ci
27	o	o	o : ci, ci.-s	ci : v, lu.-ha, th.-r
28	o	o	v : v : o	ci, ci.-cu, cu : v : 10, th.-r, w
29			10, r, st.-w	10, st.-w : 10, sc, w
30			v, w : ci, ci.-cu, ci.-s, w	ci, ci.-cu, cu.-s, w: v : 10
31			10, w : 10, r, w	10, fr.-shs : v, w

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The mean for the month was $38^{\circ}\cdot2$, being $1^{\circ}\cdot8$ *higher* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot231$, being $0^{in}\cdot015$ *greater* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot7$, being $0^{gr}\cdot2$ *greater* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 81 (that of Saturation being represented by 100), being 1 *less* than the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 552 grains, being 2 grains *greater* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was $6\cdot5$.

WIND.

The proportions were of N. 6, S. 6, W. 15, E. 3, and Calm 1. The greatest pressure in the month was $13^{lbs}\cdot8$ on the square foot on the 29th. The mean daily horizontal movement of the air for the month was 339 miles.

RAIN.

Fell on 11 days in the month, amounting to $0^{in}\cdot45$, as measured in the simple cylinder gauge partly sunk below the ground; being $1^{in}\cdot14$ *less* than the average fall of the preceding 59 years.

ELECTRICITY.

The insulating lamp was not in action from March 8 to 24 and from March 29 to 31.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9^h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	Osler's. General Direction. P.M.	Osler's. Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
April 1	Apogee: In Equator: Full	29·873	58·5	38·6	47·6	39·5	117·0	32·8	49·6	46·3	8·1	16·2	3·9	+ 3·0	WSW : W	W : SW	19·4	0·2	1·8	589	0·00
2	..	29·374	57·0	45·7	51·1	50·3	75·0	44·0	49·6	46·3	0·8	5·7	0·0	+ 6·3	SW	SW	19·7	0·3	4·6	752	0·01
3	..	29·172	55·7	40·0	46·2	37·7	100·3	35·0	49·9	46·3	8·5	14·4	3·3	+ 1·2	WSW	WSW: SW: SSW	13·0	0·0	2·5	639	0·42
4	..	29·313	47·0	37·4	41·5	39·0	76·2	31·4	49·6	47·0	2·5	6·3	0·0	− 3·7	SW : SSW	SW	11·1	0·0	1·0	467	0·22
5	..	29·378	56·3	39·4	43·6	38·6	110·5	33·0	49·2	46·0	5·0	17·1	0·7	− 1·8	SW : W	WSW	2·6	0·0	0·4	319	0·05
6	..	29·657	59·4	35·6	45·9	39·5	119·7	29·0	49·0	46·6	6·4	17·5	0·5	+ 0·5	WSW : W	NW : W	1·1	0·0	0·1	227	0·00
7	..	29·815	60·2	36·7	46·9	40·1	121·4	29·3	49·0	46·0	6·8	19·4	1·9	+ 1·5	W	WSW : SW	1·5	0·0	0·1	261	0·00
8	Greatest Declination S.	29·753	58·0	39·0	46·1	36·6	120·0	32·0	49·2	45·6	9·5	20·1	3·9	+ 0·7	SW : NW	WNW : WSW	2·1	0·0	0·2	325	0·02
9	Last Qr.	29·443	52·9	38·1	45·1	42·6	86·0	31·0	49·4	45·8	2·5	11·0	0·8	− 0·2	SW	SSW	4·6	0·0	1·0	400	0·22
10	..	29·196	55·2	39·5	45·3	40·6	78·5	34·0	49·1	45·8	4·7	12·1	0·0	+ 0·1	SW : WSW	WSW : SW	1·1	0·0	0·1	204	0·05
11	..	29·077	53·7	34·4	42·9	39·7	119·5	28·3	49·6	46·4	3·2	10·4	0·8	− 2·2	SSW : S : SSE	NE : ESE	2·3	0·0	0·1	182	0·03
12	..	29·400	48·8	38·3	43·2	39·4	63·9	33·0	49·9	47·0	3·8	7·3	0·0	− 1·8	NNE	NE : SW	1·3	0·0	0·1	217	0·13
13	..	29·121	51·1	36·0	42·2	39·9	100·6	29·2	49·8	47·7	2·3	8·8	0·0	− 2·7	SW	SSW : SE	8·0	0·0	0·7	343	0·15
14	..	29·642	53·7	40·9	46·1	42·8	72·5	37·2	49·6	47·5	3·3	9·0	0·7	+ 1·1	ENE : NNE	NNE	8·2	0·0	1·0	460	0·00
15	In Equator: Perigee	29·867	57·3	41·0	45·6	43·0	118·4	31·1	49·6	47·4	2·6	10·1	0·0	+ 0·3	NNE	NNE	3·5	0·0	0·6	351	0·00
16	New	29·783	59·8	43·0	49·7	44·2	89·9	32·0	49·2	46·6	5·5	15·6	0·0	+ 4·2	N	NW	2·3	0·0	0·1	170	0·01
17	..	29·856	59·2	42·7	49·0	39·5	111·3	32·1	49·6	47·4	9·5	18·2	2·6	+ 3·3	W : NW	NW : W	3·1	0·0	0·5	381	0·00
18	..	29·859	64·3	47·7	54·0	49·2	116·9	44·9	49·6	47·5	4·8	12·2	1·5	+ 8·0	WSW : W	NW	2·7	0·0	0·4	325	0·04
19	..	29·943	69·1	46·1	56·4	48·5	131·7	39·7	50·6	47·5	7·9	21·8	0·8	+10·0	WSW	WSW	1·3	0·0	0·1	252	0·00
20	..	29·902	69·0	43·9	55·8	46·1	130·5	37·9	51·9	49·0	9·7	18·9	2·2	+ 9·1	WSW	SW	0·3	0·0	0·0	155	0·00
21	Greatest Declination N.	29·802	78·0	41·2	60·6	46·0	133·0	31·0	52·6	49·5	14·6	26·2	0·0	+13·6	Calm : SE	SW	1·1	0·0	0·1	189	0·00
22	..	29·946	70·8	46·0	56·4	46·9	133·9	38·8	53·6	50·8	9·5	20·2	3·8	+ 9·2	W : N : NE	ENE : ESE	1·5	0·0	0·1	236	0·00
23	First Qr.	29·941	79·7	43·9	59·5	53·8	136·5	38·2	55·6	52·0	5·7	24·6	0·0	+12·1	E	SW	0·2	0·0	0·0	178	0·00
24	..	29·992	65·8	49·1	55·3	50·8	92·0	44·0	55·8	52·6	4·5	12·2	0·6	+ 7·7	WSW : W	WSW	1·3	0·0	0·1	258	0·00
25	..	29·974	68·3	52·0	58·9	54·0	96·7	47·0	56·6	53·0	4·9	11·3	0·4	+11·2	WSW	NE : SE	0·0	0·0	0·0	129	0·00
26	..	30·007	71·9	48·2	58·3	52·3	135·1	39·3	58·1	54·0	6·0	15·7	0·0	+10·4	ESE	ESE	1·2	0·0	0·1	199	0·00
27	..	30·025	75·1	47·0	59·1	50·6	133·6	39·9	58·6	54·8	8·5	21·1	0·0	+11·0	E : ESE	ESE	2·1	0·0	0·3	262	0·00
28	Apogee: In Equator	30·125	62·8	40·0	50·3	41·6	129·5	31·0	59·6	55·4	8·7	20·1	0·4	+ 1·9	ENE : ESE	ESE : E	5·8	0·0	0·6	315	0·00
29	..	30·098	59·2	36·1	46·4	36·2	128·4	27·0	59·6	55·6	10·2	20·9	0·0	− 2·4	ENE : E	E : ESE	1·5	0·0	0·1	213	0·00
30	..	29·791	68·3	30·5	50·1	38·5	118·8	22·3	59·0	55·3	11·6	23·8	0·0	+ 0·8	SW: WSW: WNW	NW : NE	0·7	0·0	0·0	175	0·00
Means	..	29·704	61·5	41·3	50·0	43·6	109·9	34·5	52·1	49·0	6·4	15·6	1·0	+ 3·7	...	...	..	..	..	Sum 9173	Sum 1·35

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $29^{in}\cdot923$ on the 1st; the first minimum in the month was $29^{in}\cdot110$ on the 3rd.
The second maximum ,, was $29^{in}\cdot340$ on the 4th; the second minimum ,, was $29^{in}\cdot280$ on the 4th.
The third maximum ,, was $29^{in}\cdot879$ on the 7th; the absolute minimum ,, was $29^{in}\cdot046$ on the 11th.
The fourth maximum ,, was $29^{in}\cdot534$ on the 12th; the fourth minimum ,, was $29^{in}\cdot058$ on the 13th.
The fifth maximum ,, was $29^{in}\cdot888$ on the 15th; the fifth minimum ,, was $29^{in}\cdot764$ on the 16th.
The sixth maximum ,, was $29^{in}\cdot962$ on the 19th; the sixth minimum ,, was $29^{in}\cdot778$ on the 21st.
The seventh maximum ,, was $30^{in}\cdot011$ on the 22nd; the seventh minimum ,, was $29^{in}\cdot920$ on the 23rd.
The absolute maximum ,, was $30^{in}\cdot163$ on the 29th; the eighth minimum ,, was $29^{in}\cdot753$ on the 30th.
The range in the month was $1^{in}\cdot117$.
The mean for the month was $29^{in}\cdot704$, being $0^{in}\cdot066$ *lower* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was $79^{\circ}\cdot7$ on the 23rd; the lowest was $30^{\circ}\cdot5$ on the 30th.
The range ,, was $49^{\circ}\cdot2$.
The mean ,, of all the highest daily readings was $61^{\circ}\cdot5$, being $3^{\circ}\cdot7$ *higher* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was $41^{\circ}\cdot3$, being $2^{\circ}\cdot1$ *higher* than the average of the preceding 33 years.
The mean daily range was $20^{\circ}\cdot2$, being $1^{\circ}\cdot6$ *greater* than the average of the preceding 33 years.
The mean for the month was $50^{\circ}\cdot0$, being $2^{\circ}\cdot9$ *higher* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
April 1			ci, ci.-cu, st.-w	ci, ci.-cu, w : 10, sl.-r, w
2			10, oc.-shs, st.-w : 10, st.-w	10, th.-r, st.-w : 10, th.-r, st.-w
3			10, r, st.-w : ci, ci.-cu	vv, fr.-h.-shs, hl : v, oc.-shs
4	o	o	10, fr.-shs, w	10, r, w : 10, r : 10, r
5	o	o	10 : 10	ci,ci.-cu,cu,cu.-s : v, hl, sl.-r : v
6	o	o	o : o, v	ci, ci.-cu, cu : v : o, h.-d
7	o	o	ci, sl.-f	ci, ci.-cu, cu, cu.-s : 10
8	o	o	10, r : ci, ci.-cu	ci, ci.-s, cu, cu.-s : o
9	o	o	ci, ci.-cu, cu	10, th.-r : 10, th.-r
10	o	o	10 : 10, sl.-r	v : li.-cl
11	o :ss,sp,g.-cur	wN : s	ci, ci.-cu, cu : ci.-cu, cu, cu.-s, hl, r	ci.-cu, cu, cu.-s, n : o : v, r
12	o	o : w	10 : 10, th.-r	10, r : 10
13	o	o	10 : 10, r, w	v, hl, fr.-shs : v, oc.-shs
14	o	o	10 : 10	10 : 10, w
15	o	o : w	10 : 10	ci, ci.-cu : v, d
16	o	o	10 : 10, sl.-r	ci, ci.-cu : vv
17	o : w	w : o	ci.-cu, cu.-s	ci.-cu, cu.-s : 10
18	o	w : o	10, r : 10	ci, ci.-cu, cu, sl.-r : 10
19	o	o	li.-cl, mt	ci, ci.-cu, cu.-s : 10
20	o	o	ci, ci.-cu, cu	ci, ci.-cu, s : o
21	o	o	o : o	o : o
22	o	o	o : o	ci, ci.-cu, ci.-s : ci, ci.-cu, ci.-s : o
23	o	o	o : o : li.-cl	ci, ci.-cu, cu : v : o
24	o	o : w	v : 10, mt	10 : ci, ci.-s, s : ci, ci.-s, s
25	o	o : w	10	10 : v : o
26	o	o : w	o : o	o : o : 10, sc
27	o	o	10 : ci	ci : ci
28	o	o	li.-cl : mt	ci, ci.-s : o, h.-d
29	o	o : w	o : ci, ci.-cu	ci : ci : o
30	o	o	o : o, h, mt	o, h, mt : ci.-cu, mt

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 43°·6, being 3°·0 *higher* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot284$, being $0^{in}\cdot030$ *greater* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $3^{grs}\cdot3$, being $0^{gr}\cdot4$ *greater* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 79 (that of Saturation being represented by 100), being *the same as* the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 539 grains, being 4 grains *less* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 5·8.

WIND.

The proportions were of N. 5, S. 7, W. 12, E. 6, and Calm 0. The greatest pressure in the month was $19^{lbs}\cdot7$ on the square foot on the 2nd. The mean daily horizontal movement of the air for the month was 306 miles.

RAIN.

Fell on 12 days in the month, amounting to $1^{in}\cdot35$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot34$ *less* than the average fall of the preceding 59 years.

ELECTRICITY.—The insulating lamp was not burning from April 1 to 3.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	Thames. Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
May 1	Full	29·853	60·2	37·0	46·2	36·1	131·1	28·0	58·6	55·0	10·1	19·0	1·8	— 3·6	NNE	NE: ESE: E	2·3	0·0	0·2	275	0·00
2	..	29·903	57·7	33·1	43·8	35·7	138·7	22·0	58·0	54·6	8·1	19·6	1·5	— 6·5	NE	ESE: E	2·2	0·0	0·1	240	0·01
3	..	29·645	51·9	34·3	42·2	35·4	91·9	26·2	57·3	54·0	6·8	13·2	1·1	— 8·6	ENE: NNE	N	0·6	0·0	0·0	142	0·01
4	..	29·691	53·2	35·6	43·2	33·8	117·8	28·1	56·6	53·6	9·4	16·0	0·7	— 8·0	NNE	NNE: N	1·1	0·0	0·1	239	0·00
5	..	29·754	54·4	39·3	45·2	34·7	133·0	32·0	57·1	53·0	10·5	17·2	3·2	— 6·3	N: NNE	NNE: N	1·5	0·0	0·1	222	0·00
6	Greatest Declination S.	29·647	59·0	38·2	44·6	36·7	117·9	28·0	54·8	53·0	7·9	19·0	0·5	— 7·1	N: WSW	SW	1·1	0·0	0·0	165	0·00
7	..	29·513	61·7	37·9	47·5	36·2	129·5	26·4	54·6	52·8	11·3	22·2	0·0	— 4·2	WSW: W	NW: N	1·5	0·0	0·1	225	0·00
8	..	29·455	55·3	38·0	42·5	37·1	113·5	30·8	54·4	52·5	5·4	13·8	2·1	— 9·2	W: N	N	2·0	0·0	0·1	229	0·01
9	Last Qr.	29·523	56·1	34·8	44·2	36·4	133·4	27·1	54·1	52·2	7·8	16·6	1·3	— 7·3	N	NNE	2·5	0·0	0·2	272	0·00
10	..	29·751	57·9	31·1	43·7	36·7	123·3	21·7	53·8	51·8	7·0	19·8	0·0	— 7·6	NW: WSW: NNE	NNE	1·1	0·0	0·0	167	0·00
11	..	29·936	59·2	33·5	45·3	37·3	129·1	24·7	53·2	51·6	8·0	20·7	0·0	— 5·9	NNE	NNE: SE	2·8	0·0	0·1	157	0·01
12	In Equator	29·993	56·4	32·2	44·7	36·9	101·0	23·2	53·6	51·8	7·8	17·7	0·0	— 6·5	NNE	N: NNE	2·9	0·0	0·2	276	0·00
13	..	30·170	60·6	44·1	50·4	42·6	92·8	36·6	53·0	51·5	7·8	16·3	2·2	— 1·0	NNE	NE: SE	2·4	0·0	0·2	269	0·00
14	Perigee	30·150	56·7	46·1	49·7	43·2	91·6	39·3	53·0	51·4	6·5	10·3	1·3	— 2·0	SW: W: NW	NE: SE: S	0·8	0·0	0·0	178	0·00
15	New	29·976	58·4	38·6	45·5	39·3	125·8	28·0	53·0	51·0	6·2	14·0	1·5	— 6·5	WSW: NNE	NNE	9·4	0·0	1·3	428	0·07
16	..	30·181	61·2	34·3	46·8	36·5	138·2	24·0	53·3	51·3	10·3	21·5	c·5	— 5·5	NNE	NNE: NE: E	0·9	0·0	0·0	171	0·00
17	..	30·126	62·3	33·0	47·6	37·1	146·0	22·7	53·6	51·8	10·5	22·8	0·0	— 5·0	NE	NNE: E	0·9	0·0	0·1	162	0·00
18	Greatest Declination N.	30·088	61·9	31·9	47·3	39·9	136·8	20·2	54·0	52·2	7·4	18·0	0·0	— 5·6	ENE: NE	ENE: SE	1·3	0·0	0·1	194	0·00
19	..	30·073	61·6	39·7	49·2	42·1	137·6	28·9	54·1	52·5	7·1	16·4	0·0	— 4·1	ENE: NE	E: ESE	0·9	0·0	0·0	189	0·00
20	..	30·026	63·2	36·0	49·2	40·6	149·5	26·1	54·4	52·8	8·6	18·7	0·0	— 4·3	ENE	E: ENE	1·8	0·0	0·2	261	0·00
21	..	29·751	64·6	39·2	52·5	45·7	143·0	30·8	54·8	52·8	6·8	13·5	0·5	— 1·3	ENE	E	4·0	0·0	0·7	345	0·00
22	..	29·417	77·6	49·4	61·0	53·7	145·3	44·0	55·4	53·8	7·3	21·4	0·8	+ 6·9	ENE	Variable	1·2	0·0	0·1	176	0·00
23	First Qr.	29·315	60·8	52·7	54·7	53·6	71·0	51·2	56·4	54·8	1·1	3·7	0·0	+ 0·4	SE: NE: NNE	NNE: WSW	0·0	0·0	0·0	120	0·04
24	..	29·416	73·9	53·0	61·2	54·4	130·0	47·9	56·6	55·0	6·8	19·0	0·2	+ 6·6	WSW	W: SW	0·5	0·0	0·0	181	0·00
25	..	29·638	72·0	48·7	56·3	52·9	76·4	40·9	57·6	55·7	3·4	16·1	0·0	+ 1·4	WSW	E: NE	1·6	0·0	0·0	133	0·27
26	In Equator: Apogee.	29·800	70·0	46·1	57·2	50·2	140·6	36·1	57·9	56·0	7·0	17·5	0·0	+ 2·0	NE	NE: SE	0·7	0·0	0·0	152	0·00
27	..	29·837	75·6	44·5	60·0	52·1	126·7	37·3	58·9	56·8	7·9	18·4	0·0	+ 4·6	Calm: WSW	W: WSW	0·8	0·0	0·0	158	0·00
28	..	29·847	72·6	52·3	61·5	53·9	117·9	43·0	59·8	57·4	7·6	18·0	1·6	+ 5·8	SW: WSW	WSW: SW	2·6	0·0	0·3	312	0·00
29	..	29·814	70·4	50·4	58·7	52·3	117·3	42·8	60·6	57·5	6·4	15·6	0·2	+ 2·7	SW	WSW: SW	2·4	0·0	0·2	294	0·00
30	..	29·721	76·1	49·8	61·7	51·2	137·2	41·8	61·0	58·0	10·5	22·4	0·0	+ 5·4	SW: WSW	WSW	2·2	0·0	0·5	338	0·00
31	Full	29·888	76·9	47·7	60·6	51·3	143·5	36·3	61·4	58·4	9·3	23·5	0·0	+ 4·0	WSW	WSW	3·0	0·0	0·4	327	0·00
Means	..	29·803	63·2	40·7	50·5	42·8	123·5	32·1	56·0	53·8	7·7	17·5	0·7	— 2·5	...	...	..	..	..	Sum 6997	Sum 0·42

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $29^{in}\cdot933$ on the 2nd; the first minimum in the month was $29^{in}\cdot611$ on the 3rd.
The second maximum ,, was $29^{in}\cdot767$ on the 5th; the second minimum ,, was $29^{in}\cdot430$ on the 8th.
The third maximum ,, was $30^{in}\cdot185$ on the 13th; the third minimum ,, was $29^{in}\cdot814$ on the 15th.
The absolute maximum ,, was $30^{in}\cdot202$ on the 16th; the absolute minimum ,, was $29^{in}\cdot304$ on the 23rd.
The fifth maximum ,, was $29^{in}\cdot862$ on the 27th; the fifth minimum ,, was $29^{in}\cdot693$ on the 30th.
The range in the month was $0^{in}\cdot898$.
The mean for the month was $29^{in}\cdot803$, being $0^{in}\cdot023$ *higher* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was 77°·6 on the 22nd; the lowest was 31°·1 on the 10th.
The range ,, was 46°·5.
The mean ,, of all the highest daily readings was 63°·2, being 1°·3 *lower* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was 40°·7, being 3°·3 *lower* than the average of the preceding 33 years.
The mean daily range was 22°·5, being 2°·0 *greater* than the average of the preceding 33 years.
The mean for the month was 50°·5, being 2°·4 *lower* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
May 1	o	o	10	ci, ci.-cu, cu : ci, ci.-s, s
2	o	o	o : ci.-cu, cu	ci, ci.-cu, cu.-s : v, oc.-r : 10
3	o	o	10 : 10 : ci, ci.-cu	v, li.-shs : v, li.-shs
4	o	o	ci.-cu, cu	v, sl.-r : 10 : 10
5	o	o	ci, ci.-cu, cu	v, sl.-r, ci.-cu, cu.-s : 8
6	o	w : o	li.-cl : ci, ci.-cu, h	10 : v : o
7	o	o	ci, ci.-cu, cu	ci.-cu, cu, sl.-r : 10 : 10
8	o :ssN,ssP,sp,g.-cur	wN : w	10 : 10, sl.-r, glm, f	ci, ci.-cu, cu, r, t: v : o, l
9	o	o : w	ci, ci.-cu, cu	ci.-cu,cu,cu.-s,n,glm: v, sl.-r : o
10	o	o : w	ci, ci.-cu, cu, cu.-s, v	v : ci, ci.-s, cu.-s, f
11	w	o : w	ci, ci.-cu, cu, hl, r	ci, ci.-cu, cu, oc.-shs : v
12	o	w	ci, ci.-cu, cu	ci, cu, cu.-s : 10, oc.-th.-r : 10, oc.-th.-r
13	o	o	10 : v, oc.-th.-r	10 : 10
14	o	o	10 : 10	10 : 10, oc.-r
15	o	o	10, oc.-r : 10, st.-w	w, v : o
16	o	o	o : o : ci.-cu, cu	ci, ci.-cu : o
17	o	o	ci, ci.-cu	ci : o
18	o	o	ci.-cu, mt	ci.-cu, cu.-s : v : 10
19	o	o	ci, ci.-cu, cu	ci, ci.-cu, ci.-s : v : o
20	o	o	o, d : ci, ci.-cu, cu	ci, ci.-cu, cu : li.-cl
21	o	o	ci, ci.-cu, cu	ci, ci.-s : v : 10, r
22	o	ssP,ssN,sp,g.-cur	li.-cl, mt, h	v : t.-s : 10
23	o	o	10, th.-r, mt	10, th.-r : 10, oc.-r
24	o	m	ci.-cu, mt	ci.-cu, cu, mt : ci.-s, mt
25	o :ssP,ssN,sp,g.-cur	ssP,ssN,sp,g.-cur: o	10, t	10, t.-s, r : 10, oc.-th.-r
26	o	o	ci, ci.-cu	10 : v : s
27	o	o	v : 10, h	v, ci.-cu : ci, ci.-s, v
28	o	o : w	ci, ci.-s, cu, cu.-s	10 : 10 : v, lu.-ha
29	o	o : w	ci, ci.-cu, cu, v	ci.-cu, cu : v : v, lu.-ha
30	o	o	ci, ci.-s, cu.-s	ci, ci.-cu, ci.-s, cu.-s : o
31	o	o : w	ci, ci.-cu, cu	ci, ci.-cu : o : o

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $42^{\circ}\cdot 8$, being $2^{\circ}\cdot 6$ *lower* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot 275$, being $0^{in}\cdot 027$ *less* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $3^{grs}\cdot 2$, being $0^{gr}\cdot 2$ *less* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 76 (that of Saturation being represented by 100), being *the same as* the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 541 grains, being *the same as* the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by o and a cloudy sky by 10, was 6·8.

WIND.

The proportions were of N. 12, S. 4, W. 7, E. 8, and Calm o. The greatest pressure in the month was $9^{lbs}\cdot 4$ on the square foot on the 15th. The mean daily horizontal movement of the air for the month was 226 miles.

RAIN.

Fell on 7 days in the month, amounting to $0^{in}\cdot 42$, as measured in the simple cylinder gauge partly sunk below the ground; being $1^{in}\cdot 71$ *less* than the average fall of the preceding 59 years.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Readings of Thermometers. Dry. Lowest.	Readings of Thermometers. Dry. Mean Daily Value.	Readings of Thermometers. Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Difference between the Dew Point Temperature and Air Temperature. Greatest.	Difference between the Dew Point Temperature and Air Temperature. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	Wind as deduced from Anemometers. Osler's. General Direction. P.M.	Osler's. Pressure in lbs. on the square foot. Greatest.	Osler's. Pressure in lbs. on the square foot. Least.	Osler's. Pressure in lbs. on the square foot. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
June 1	..	29·972	78·4	51·6	63·5	54·6	157·4	41·4	62·3	59·0	8·9	20·4	0·0	+ 6·5	WSW	WSW	3·0	0·0	0·4	298	0·00
2	Greatest Declination S.	29·809	83·7	52·6	65·4	53·7	149·0	44·4	62·8	59·6	11·7	23·5	0·0	+ 8·1	SE	SW : WSW	3·0	0·0	0·3	231	0·00
3	..	30·058	72·2	52·0	59·7	52·9	125·9	42·0	63·8	61·0	6·8	18·5	0·0	+ 2·3	WNW	W : SE : WSW	0·3	0·0	0·0	173	0·22
4	..	30·269	80·3	47·0	62·9	46·7	169·1	36·0	64·0	61·0	16·2	25·8	0·0	+ 5·6	SW	SW	0·4	0·0	0·0	162	0·00
5	..	30·083	83·2	48·2	66·4	47·9	152·4	38·2	65·2	61·6	18·5	33·7	1·3	+ 9·2	WSW : SW	WSW : NNE	0·4	0·0	0·0	134	0·00
6	..	29·924	78·5	54·5	64·4	56·0	130·7	48·4	65·8	63·5	8·4	20·7	0·2	+ 7·4	SE : NNE	Variable	1·0	0·0	0·0	152	0·59
7	Last Qr.	30·018	69·2	48·0	56·1	50·3	136·5	39·0	66·3	63·0	5·8	14·9	1·0	− 0·9	NE	ENE: ESE	1·1	0·0	0·0	193	0·05
8	In Equator	30·064	72·6	44·0	58·4	44·3	143·6	34·6	66·4	62·8	14·1	23·0	0·0	+ 1·1	Calm : NE: ENE	ESE : E	1·2	0·0	0·1	184	0·00
9	..	29·964	79·9	46·2	64·2	46·2	149·9	36·8	67·0	64·4	18·0	31·1	0·6	+ 6·5	NNE : NE	SE : SW	0·3	0·0	0·0	143	0·00
10	..	30·013	71·0	50·5	59·5	50·7	91·0	40·0	66·0	64·0	8·8	14·1	3·2	+ 1·5	WSW	NW : N	2·4	0·0	0·3	294	0·00
11	Perigee	29·978	78·1	42·3	60·4	48·2	150·4	31·6	66·3	63·7	12·2	23·8	0·7	+ 2·1	WSW	W : WNW : NNE	5·2	0·0	0·6	352	0·00
12	..	30·194	65·6	40·0	51·5	38·9	151·5	31·0	66·3	63·7	12·6	22·0	3·0	− 7·1	NE	NE	2·8	0·0	0·6	348	0·00
13	..	30·204	64·8	37·5	49·8	38·2	153·0	26·9	65·4	63·5	11·6	22·9	0·0	− 9·0	NE: N	NNE : NE	3·5	0·0	0·7	307	0·00
14	New	30·238	64·4	41·2	51·3	41·6	128·8	32·2	64·1	62·4	9·7	20·3	0·7	− 7·7	NNE: NE	ENE : NE	2·9	0·0	0·4	343	0·00
15	Greatest Declination N.	30·308	70·7	43·4	55·1	45·7	163·2	34·8	63·4	61·8	9·4	23·9	0·9	− 3·9	NNE	NNE	3·4	0·0	0·5	357	0·00
16	..	30·042	65·8	49·0	53·8	48·1	144·0	47·2	62·9	61·3	5·7	17·6	0·6	− 5·2	NNE	NNE	5·6	0·0	1·0	461	0·05
17	..	29·963	68·2	50·0	55·3	51·3	123·0	49·0	62·2	60·8	4·0	15·8	0·4	− 3·7	NNE: NE	E: ENE	2·9	0·0	0·4	333	0·51
18	..	30·106	59·8	51·3	54·0	50·9	79·2	46·7	61·9	60·3	3·1	5·9	2·2	− 5·1	NNE: NE	NNE : NE	1·5	0·0	0·3	297	0·00
19	..	30·070	66·7	49·6	54·0	48·6	146·0	45·5	61·4	59·7	5·4	15·7	2·4	− 5·2	NE	NE : SE	0·7	0·0	0·0	190	0·00
20	..	30·010	59·7	48·3	52·1	49·7	85·3	42·3	61·6	60·0	2·4	7·6	0·6	− 7·4	SSE: E	ESE : E	0·5	0·0	0·0	163	0·00
21	First Qr.	29·839	68·6	42·5	54·6	44·4	143·8	34·7	61·2	59·6	10·2	20·9	0·0	− 5·3	E: ENE	ESE	0·8	0·0	0·0	164	0·00
22	In Equator	29·805	75·3	40·1	58·2	48·5	124·9	32·0	61·6	60·0	9·7	22·8	0·0	− 2·1	Calm: SW	S : SW	1·5	0·0	0·1	151	0·00
23	Apogee	29·809	73·3	49·8	59·8	51·4	133·8	39·1	62·1	60·8	8·4	19·5	0·8	− 0·9	SW	SW : SSW	2·6	0·0	0·2	277	0·00
24	..	29·675	68·4	51·5	57·0	51·5	138·5	46·0	62·1	60·8	5·5	14·2	1·8	− 4·2	SW	SW : SSW	6·2	0·0	0·2	258	0·47
25	..	29·636	69·2	50·7	57·2	51·1	128·6	44·1	62·6	61·0	6·1	15·1	1·8	− 4·4	SSW : SW	WSW: SW	6·5	0·0	0·4	334	0·07
26	..	29·459	61·4	52·7	55·6	53·7	85·2	49·0	62·6	61·0	1·9	5·8	0·0	− 6·1	ESE	ENE	0·3	0·0	0·0	150	0·33
27	..	29·461	71·0	54·0	59·3	55·0	130·5	52·2	62·2	60·6	4·3	13·9	0·6	− 2·3	NNE	ENE : ESE : E	0·5	0·0	0·0	154	0·00
28	..	29·600	63·7	52·7	56·1	54·1	81·1	48·8	62·6	61·0	2·0	6·7	0·0	− 5·4	ENE : NE	ENE: NW	0·5	0·0	0·0	186	0·09
29	Greatest Dec. S; Full.	29·758	71·0	50·9	58·8	54·2	145·1	43·2	62·8	61·0	4·6	17·6	0·0	− 2·6	WSW	SSW : SW	1·5	0·0	0·2	263	0·02
30	..	29·832	78·8	57·0	65·3	57·2	140·5	55·0	62·8	61·8	8·1	18·9	1·5	+ 4·2	WSW : NW : W	WSW	4·3	0·0	0·6	354	0·02
Means	..	29·939	71·1	48·3	58·0	49·5	132·7	41·1	63·6	61·5	8·5	18·6	0·8	− 1·1	...	...	..	..	..	Sum 7406	Sum 2·42

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $29^{in}\cdot996$ on the 1st; the first minimum in the month was $29^{in}\cdot787$ on the 2nd.
The second maximum ,, was $30^{in}\cdot299$ on the 4th; the second minimum ,, was $29^{in}\cdot900$ on the 6th.
The third maximum ,, was $30^{in}\cdot097$ on the 8th; the third minimum ,, was $29^{in}\cdot928$ on the 9th.
The fourth maximum ,, was $30^{in}\cdot095$ on the 10th; the fourth minimum ,, was $29^{in}\cdot926$ on the 11th.
The absolute maximum ,, was $30^{in}\cdot357$ on the 15th; the fifth minimum ,, was $29^{in}\cdot929$ on the 17th.
The sixth maximum ,, was $30^{in}\cdot131$ on the 18th; the sixth minimum ,, was $29^{in}\cdot782$ on the 21st.
The seventh maximum ,, was $29^{in}\cdot846$ on the 23rd; the absolute minimum ,, was $29^{in}\cdot446$ on the 26th.
The eighth maximum ,, was $29^{in}\cdot789$ on the 29th; the eighth minimum ,, was $29^{in}\cdot716$ on the 29th.
The range in the month was $0^{in}\cdot911$.
The mean for the month was $29^{in}\cdot939$, being $0^{in}\cdot128$ *higher* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was $83^{\circ}\cdot7$ on the 2nd; the lowest was $37^{\circ}\cdot5$ on the 13th.
The range ,, was $46^{\circ}\cdot2$.
The mean ,, of all the highest daily readings was $71^{\circ}\cdot1$, being $0^{\circ}\cdot1$ *higher* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was $48^{\circ}\cdot3$, being $1^{\circ}\cdot7$ *lower* than the average of the preceding 33 years.
The mean daily range was $22^{\circ}\cdot8$, being $1^{\circ}\cdot8$ *greater* than the average of the preceding 33 years.
The mean for the month was $58^{\circ}\cdot0$, being $1^{\circ}\cdot0$ *lower* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
June 1	0	0	ci.-cu, cu	ci.-cu, cu : 0
2	0	w : 0	ci.-s : ci, ci.-s, cu	ci, ci.-cu, ci.-s, cu, cu.-s : ci, ci.-cu, ci.-s
3	0	0	10, r : 10	ci,ci.-cu,ci.-s,cu.-s: v, h : 0, d
4	0	0	ci, ci.-cu, cu	ci, ci.-cu : 0 : 0
5	0	0 : w	0 : ci	0 : v : ci.-cu, h
6	0	wN : v	10, h	ci.-cu, h : 10, r, t : 10, r
7	0	0	10, r : 10	ci, ci.-cu, cu : v : 0
8	0	0	ci, ci.-cu	ci, ci.-s, cu.-s : ci, ci.-s, s
9	wN	0	0 : ci	0 : 0
10	0	0	ci, ci.-cu, cu.-s	10 : v : ci
11	0	0	0 : 0	ci, ci.-cu : ci, ci.-cu, cu
12	0	0	ci.-cu	ci, ci.-cu : 0
13	0	0	ci, ci.-cu, cu	ci, ci.-cu, cu : ci, ci.-s, cu.-s
14	0	0	ci, ci.-cu, cu.-s	ci.-cu, cu.-s : 0
15	0	0	ci, ci.-cu	ci.-cu, cu : v : 10
16	0	0	10 : 10, oc.-th.-r	10, oc.-th.-r : 10, r
17	0	0	10, h.-r : 10, h.-r	vv, sl.-r : cu
18	0	0	v : 10	10 : 10
19			10 : 10	ci, ci.-cu, cu, h : 0 : 10
20			10 : 10	10, th.-r : 10
21			ci, ci.-cu	0 : 0
22			ci, h	ci, ci.-cu : v : 0, l
23			0 : ci, ci.-cu	ci, ci.-cu, ci.-s : ci.-s, h
24			10, r : ci, ci.-cu, cu, t, r	ci,ci.-cu,cu.-s,t.-s : ci, ci.-cu, cu, oc.-r : ci.-s,cu.-s
25			10, sl.-r : ci, ci.-cu, cu, n, fr.-shs	ci.-cu, cu, n, fr.-shs : ci.-cu, cu.-s, fr.-shs
26	0	0	10, th.-r	10, r : 10, r : 10, r
27	0	0	10 : 10	ci, ci.-cu, cu : ci, ci.-cu
28	0	0	10 : 10, th.-r	10, r : 10, oc.-r
29	0	0	ci, ci.-cu	ci.-s, cu.-s, r : v :10,oc.-th.-r
30	0	0	10, sl.-r : ci, ci.-cu	ci, ci.-cu : v : v

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 49°·5, being 1°·2 *lower* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was 0in·355, being 0in·016 *less* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 3grs·9, being 0gr·3 *less* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 74 (that of Saturation being represented by 100), being *the same as* the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 535 grains, being 3 grains *greater* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·4.

WIND.

The proportions were of N. 8, S. 7, W. 6, E. 9, and Calm 0. The greatest pressure in the month was 6lbs·5 on the square foot on the 25th. The mean daily horizontal movement of the air for the month was 247 miles.

RAIN.

Fell on 11 days in the month, amounting to 2in·42, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·48 *greater* than the average fall of the preceding 59 years.

ELECTRICITY.

The insulating lamp was under repair from June 19 to 25.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer, with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	Thames Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Difference Greatest.	Difference Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure Least.	Pressure Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
July 1	..	29·859	71·0	54·3	59·1	57·5	115·7	46·3	63·4	62·0	1·6	10·6	0·0	− 1·8	WSW : SW	WSW : SW	2·6	0·0	0·5	329	0·04
2	..	29·699	86·7	54·3	69·3	62·1	151·1	46·0	63·6	61·8	7·2	20·2	0·2	+ 8·2	SSE : SSW	SW : WSW	3·0	0·0	0·3	292	0·00
3	..	29·855	75·9	57·1	63·4	53·6	140·4	50·7	64·2	62·6	9·8	21·6	2·1	+ 2·1	WSW	WSW : SW	6·6	0·0	1·5	460	0·00
4	..	29·913	73·8	54·5	60·4	51·7	141·5	46·7	64·6	63·0	8·7	20·6	1·4	− 1·1	SW : WSW	WSW	5·1	0·0	0·9	402	0·03
5	..	30·047	74·9	50·7	61·8	49·4	143·0	43·2	64·4	62·8	12·4	23·5	1·8	+ 0·1	WSW : W	W : WNW	4·3	0·0	0·5	332	0·00
6	In Equator: Last Quarter.	30·088	75·1	47·5	60·9	48·2	140·5	38·5	64·6	63·0	12·7	22·1	1·0	− 0·9	N : NE	NE : ESE	1·0	0·0	0·0	133	0·00
7	Perigee	29·948	76·6	48·0	61·1	47·4	141·8	40·0	64·6	63·2	13·7	26·2	0·0	− 0·8	ENE : ESE	SE : ESE	1·3	0·0	0·1	181	0·00
8	..	29·925	86·0	49·0	68·1	51·0	153·5	41·1	64·8	63·6	17·1	29·6	0·0	+ 6·4	ESE : SW	SW	0·4	0·0	0·0	136	0·00
9	..	29·949	92·0	55·0	73·7	55·7	156·5	47·1	66·6	65·0	18·0	33·1	1·4	+12·0	SSW : SW	WSW : Calm	0·2	0·0	0·0	113	0·00
10	..	29·910	89·0	63·6	74·9	58·9	147·9	57·9	67·6	66·0	16·0	27·0	0·9	+13·1	SW : WSW	WSW : ENE	1·9	0·0	0·0	193	0·29
11	..	29·805	78·4	61·5	67·1	62·2	111·5	58·0	68·6	67·0	4·9	14·0	0·4	+ 5·3	SSW : E : NE	NNE	1·2	0·0	0·0	100	1·03
12	Greatest Declination N.	29·855	80·0	59·2	66·8	58·7	120·0	57·5	69·1	67·0	8·1	23·0	0·2	+ 4·8	N	WSW : SW	0·2	0·0	0·0	138	0·00
13	New	29·941	81·6	57·0	66·5	59·0	137·9	51·0	69·6	67·3	7·5	20·9	0·2	+ 4·2	SW : WSW	SW	0·9	0·0	0·1	195	0·00
14	..	29·864	86·7	57·5	70·9	58·5	149·3	49·4	70·4	67·6	12·4	26·7	0·0	+ 8·4	SW : WSW	WSW : WNW	0·8	0·0	0·1	215	0·00
15	..	29·968	81·2	58·7	68·4	54·4	146·2	49·8	70·8	68·5	14·0	25·1	2·7	+ 5·9	N : NE	NE : SE	1·8	0·0	0·1	160	0·00
16	..	30·040	74·9	53·7	63·3	53·8	145·0	45·2	70·4	68·0	9·5	17·7	0·0	+ 0·9	Calm : ENE : E	ESE	2·1	0·0	0·2	228	0·00
17	..	30·080	76·5	49·7	62·2	51·0	150·0	40·4	70·0	68·0	11·2	22·3	0·0	0·0	ENE	E : ESE	0·7	0·0	0·0	186	0·00
18	..	30·051	76·8	46·2	61·7	51·4	154·2	37·0	70·8	68·5	10·3	21·3	0·0	− 0·2	E : ENE	E : ESE	1·1	0·0	0·1	176	0·00
19	In Equator	29·889	88·7	53·0	67·7	59·6	157·1	45·5	70·8	68·6	8·1	26·9	1·6	+ 6·1	NE	ESE : SE	1·6	0·0	0·1	159	0·00
20	Apogee	29·687	91·8	55·4	73·2	56·4	157·9	48·0	70·8	69·0	16·8	32·2	0·0	+11·8	SE : W	WSW : W	2·0	0·0	0·2	187	0·00
21	First Qr.	29·622	80·0	56·2	66·5	53·1	153·2	49·3	71·4	69·8	13·4	26·9	3·6	+ 5·0	W : WSW	WSW : W	7·8	0·0	0·9	407	0·00
22	..	29·745	75·0	52·9	60·1	50·2	142·4	44·4	70·8	69·2	9·9	21·1	3·4	− 1·4	WSW	WSW	2·8	0·0	0·4	318	0·00
23	..	29·659	79·4	56·0	64·8	50·9	146·4	53·3	69·4	68·0	13·9	25·7	3·8	+ 3·2	SW : WSW	W	3·2	0·0	0·4	285	0·05
24	..	29·650	75·4	50·1	58·2	52·9	138·0	41·0	69·4	67·2	5·3	21·1	0·8	− 3·5	WSW : W	SW : S : WSW	2·3	0·0	0·0	181	0·15
25	..	29·738	74·7	47·1	60·1	52·2	134·8	38·9	68·6	66·8	7·9	22·1	0·0	− 1·7	N : W	N : SW	0·8	0·0	0·0	114	0·00
26	Greatest Declination S.	29·536	77·1	55·4	62·1	56·4	134·0	52·5	68·2	66·6	5·7	19·0	0·0	+ 0·2	SW : S : SSW	WSW	2·3	0·0	0·3	271	0·01
27	..	29·571	73·3	54·6	60·1	55·4	133·4	47·8	68·2	66·4	4·7	16·5	0·2	− 1·9	SSW : SW	SSW	1·2	0·0	0·1	180	0·01
28	..	29·476	67·3	52·4	58·0	54·9	107·5	43·8	67·6	66·0	3·1	10·1	0·0	− 4·2	S	SW	1·4	0·0	0·1	168	0·75
29	Full	29·578	72·7	48·7	59·1	56·2	123·8	40·9	67·1	65·3	2·9	17·0	0·0	− 3·2	SSW : W	Variable	0·8	0·0	0·0	114	0·23
30	..	29·795	78·7	51·2	63·4	53·8	139·8	43·0	66·6	64·8	9·6	23·6	0·0	+ 1·0	WSW : W	W : WSW	1·2	0·0	0·1	203	0·00
31	..	29·849	78·4	51·7	63·3	56·8	135·0	43·0	66·6	64·8	6·5	20·9	0·8	+ 0·9	WSW	WSW	1·8	0·0	0·3	272	0·00
Means	..	29·826	79·0	53·6	64·4	54·6	140·3	46·4	67·9	66·0	9·8	22·2	0·9	+ 2·5	...	...	..	..	..	Sum 6828	Sum 2·59

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $29^{in}\cdot872$ on the 1st; the first minimum in the month was $29^{in}\cdot694$ on the 2nd.
The absolute maximum ,, was $30^{in}\cdot132$ on the 6th; the second minimum ,, was $29^{in}\cdot914$ on the 7th.
The third maximum ,, was $29^{in}\cdot970$ on the 9th; the third minimum ,, was $29^{in}\cdot781$ on the 11th.
The fourth maximum ,, was $29^{in}\cdot952$ on the 13th; the fourth minimum ,, was $29^{in}\cdot845$ on the 14th.
The fifth maximum ,, was $30^{in}\cdot095$ on the 17th; the fifth minimum ,, was $29^{in}\cdot596$ on the 21st.
The sixth maximum ,, was $29^{in}\cdot757$ on the 22nd; the sixth minimum ,, was $29^{in}\cdot631$ on the 23rd.
The seventh maximum ,, was $29^{in}\cdot766$ on the 25th; the seventh minimum ,, was $29^{in}\cdot527$ on the 26th.
The eighth maximum ,, was $29^{in}\cdot588$ on the 27th; the absolute minimum ,, was $29^{in}\cdot464$ on the 28th.
The ninth maximum ,, was $29^{in}\cdot903$ on the 31st.
The range in the month was $0^{in}\cdot668$.
The mean for the month was $29^{in}\cdot826$, being $0^{in}\cdot025$ *higher* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was 92°·0 on the 9th; the lowest was 46°·2 on the 18th.
The range ,, was 45°·8.
The mean ,, of all the highest daily readings was 79°·0, being 4°·7 *higher* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was 53°·6, being 0°·4 *higher* than the average of the preceding 33 years.
The mean daily range was 25°·4, being 4°·3 *greater* than the average of the preceding 33 years.
The mean for the month was 64°·4, being 2°·2 *higher* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
July 1	o	o : m	10 : 10, r	10 : v : ci
2	o	o	o : ci, cu.-s	ci, ci.-cu, ci.-s, cu.-s : ci, ci.-cu, ci.-s
3	o	w : w	ci, ci.-cu, cu.-s	ci, ci.-cu, cu : v : o
4	o	o	ci, ci.-cu, cu.-s, sl.-r	ci, ci.-cu, sl.-r : ci.-cu, r, v
5	o	o	ci, ci.-cu, cu	ci, ci.-cu, cu : ci.-s, cu.-s, s
6	o	o : m	o : ci, ci.-s	ci, ci.-cu, cu.-s : ci.-cu, cu.-s
7	o	o	li.-cl : ci, ci.-cu, cu.-s	ci, ci.-s : o
8	o	w : m	li.-cl : ci, ci.-s, cu.-s	ci, ci.-cu, ci.-s : o
9	w	w : o	o : o	ci, ci.-cu, ci.-s : ci, ci.-s, l
10	o	w :ssP,ssN,sp,g.-cur	t.-s, r : ci, ci.-cu, cu	ci, ci.-cu, cu : v : v, t.-s, m
11	o	ssP,ssN,sp,g.-cur: o	10, l, mt	10, t, r : t.-s, r
12	o	o	v : ci, h	ci, ci.-cu, cu, h : ci, ci.-cu, cu, cu.-s, m
13	o	o	10	ci, ci.-cu : o
14	o	o	o : ci, ci.-s	4, ci.-cu, cu : ci.-cu, cu.-s, v
15	o	o	ci, ci.-s	ci, ci.-s, cu, cu.-s, h : v
16	o	o	ci, ci.-cu	ci, ci.-cu, ci.-s : o
17	o	o : m	o : ci, ci.-s	o : o
18	m	w : o	o : ci, ci.-cu	o : o
19	o	o	v : 10, mt, th.-r : ci	ci, ci.-cu : o
20	o	o	ci, ci.-s, mt, h	ci, h, mt : v : 10
21	o	sN : o	ci, ci.-cu, v	ci, ci.-cu, cu.-s, sl.-r, w : ci, cu.-s, m
22	o	o	10, th.-cl	10, sl.-r : 10, sl.-r
23	o	ssN,ssP,sp,g.-cur: w	ci, ci.-cu, cu.-s, sl.-r	ci.-cu, ci.-s, t, sh.-r : t, v, ci.-cu, ci.-s
24	o	ssP,ssN,sp,g.-cur: o	ci, ci.-cu, cu, oc.-r	10, oc.-r, t, v : v
25			li.-cl, h, mt	ci, ci.-cu, cu.-s, ci.-s : 10, h
26			10, sl.-r : 10, mt	ci.-cu, cu, cu.-s : ci.-cu, cu.-s, n
27			10 : 10, shs.-r	ci.-cu, cu : v : 10
28			10 : 10, h.-r	10, sl.-r : v, cu.-s, s : o
29			mt : ci, ci.-cu, cu, mt, r	ci,ci.-cu,cu,cu.-s,fr.-h.-shs: o, mt
30			ci, mt	ci, ci.-cu, cu, cu.-s : s
31			o : ci.-cu	ci, ci.-cu : 10

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 54°·6, being 0°·7 *higher* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{\text{in}}\cdot427$, being $0^{\text{in}}\cdot010$ *greater* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $4^{\text{grs}}\cdot7$, being $0^{\text{gr}}\cdot1$ *greater* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 70 (that of Saturation being represented by 100), being 5 *less* than the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 526 grains, being 2 grains *less* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 5·7.

WIND.

The proportions were of N. 3, S. 8, W. 14, E. 5, and Calm 1. The greatest pressure in the month was $7^{\text{lbs}}\cdot8$ on the square foot on the 21st. The mean daily horizontal movement of the air for the month was 220 miles.

RAIN.

Fell on 10 days in the month, amounting to $2^{\text{in}}\cdot59$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{\text{in}}\cdot05$ *greater* than the average fall of the preceding 59 years.

ELECTRICITY.

The electrical apparatus was under repair from July 25 till October 14.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Aug. 1	Perigee	29·754	69·9	59·0	62·7	57·8	90·2	53·6	66·6	65·0	4·9	9·9	0·0	+ 0·3	WSW	W: SW: WSW	1·3	0·0	0·2	265	0·00
2	In Equator	29·620	79·5	59·7	67·1	62·1	126·0	51·6	66·6	65·2	5·0	14·6	1·5	+ 4·7	SW	WSW	3·2	0·0	0·6	363	0·00
3	..	29·778	73·2	50·9	60·6	48·4	135·1	41·1	66·6	65·0	12·2	22·1	0·8	— 1·8	W: NW	NW: NNW	2·3	0·0	0·3	298	0·00
4	Last Qr.	29·660	63·1	49·8	55·7	53·8	87·4	38·6	66·6	65·0	1·9	5·9	1·0	— 6·6	SW: SSW	SW: WSW	8·0	0·0	0·8	337	0·04
5	..	29·563	62·4	50·6	55·9	51·9	87·0	45·1	..	..	4·0	8·2	1·1	— 6·3	NNW: SW	SW: W	3·7	0·0	0·7	321	0·00
6	..	29·713	73·5	53·0	61·9	47·6	135·4	46·2	..	..	14·3	22·1	4·0	— 0·2	W: WNW: NW	WNW: WSW	3·7	0·0	0·6	360	0·00
7	..	29·625	71·3	52·7	61·7	58·1	99·2	42·3	..	..	3·6	10·3	2·4	— 0·3	SW	SW	5·0	0·0	0·9	351	0·00
8	Greatest Declination N.	29·494	74·9	52·5	61·2	51·0	142·0	47·3	..	..	10·2	21·9	0·4	— 0·8	SW: WSW	WSW	8·3	0·0	0·8	393	0·08
9	..	29·608	69·3	51·7	58·4	49·6	142·8	44·4	..	..	8·8	20·5	0·8	— 3·7	WSW: W	WSW: SW: SSW	3·7	0·0	0·8	409	0·04
10	..	29·387	68·5	54·3	57·6	52·9	128·6	49·7	..	..	4·7	11·5	0·6	— 4·5	WSW: W	WSW	9·0	0·0	0·9	405	0·41
11	..	29·555	68·5	50·8	58·4	47·3	128·1	44·0	..	..	11·1	18·0	3·2	— 3·7	WSW: W	W: WSW	8·1	0·2	1·8	535	0·00
12	New	29·578	69·5	47·8	57·6	49·9	138·1	42·0	..	..	7·7	20·7	1·7	— 4·4	WSW: W	W: WSW: SW	4·0	0·0	1·0	412	0·11
13	..	29·368	65·2	55·6	58·8	56·2	92·3	54·2	..	..	2·6	5·9	1·1	— 3·1	SW	SW	7·6	0·1	1·4	467	0·34
14	..	29·404	69·6	53·0	58·5	51·4	126·1	48·7	..	..	7·1	17·5	0·0	— 3·2	SW: WSW	W: WSW	8·7	0·0	1·3	469	0·14
15	In Equator	29·862	69·8	49·4	58·1	50·7	126·7	41·8	..	..	7·4	19·1	0·0	— 3·4	WSW: W	W: WSW	4·0	0·0	0·5	365	0·00
16	..	29·908	70·2	52·1	61·6	56·2	129·2	45·2	..	..	5·4	13·7	1·2	+ 0·3	SW	WSW	3·9	0·0	0·7	357	0·00
17	Apogee	30·008	69·3	49·2	58·3	49·0	116·3	40·3	..	..	9·3	16·7	0·0	— 2·8	W	W: NW	1·0	0·0	0·1	198	0·00
18	..	30·115	71·5	47·9	59·3	55·4	129·6	40·2	..	..	3·9	11·2	0·0	— 1·7	WSW	W: WSW	2·0	0·0	0·2	227	0·00
19	..	30·198	81·2	58·2	67·0	60·2	138·7	51·6	..	..	6·8	16·7	0·0	+ 6·1	NNE	ESE	0·0	0·0	0·0	87	0·00
20	First Qr.	30·211	80·9	54·7	66·9	58·5	141·5	47·2	..	..	8·4	20·2	0·0	+ 6·1	ESE	E: ESE	0·4	0·0	0·0	124	0·00
21	..	30·297	74·2	49·6	60·0	54·7	137·2	42·2	63·6	62·5	5·3	16·0	0·0	— 0·7	NE: ENE	E: ESE	2·4	0·0	0·1	252	0·00
22	..	30·246	74·1	46·2	59·9	52·1	137·2	39·2	64·4	62·0	7·8	18·9	0·0	— 0·8	ENE	E: SE	0·6	0·0	0·1	177	0·00
23	Greatest Declination S.	30·156	79·9	45·7	62·6	54·7	126·9	38·3	64·8	63·2	7·9	22·6	0·0	+ 2·0	SE: SW	NNE: ESE: NE	1·7	0·0	0·1	161	0·00
24	..	30·072	72·9	44·0	57·6	49·5	135·9	33·9	64·6	63·2	8·1	21·9	0·0	— 2·9	NE	Variable: SSW	0·1	0·0	0·0	114	0·00
25	..	29·885	76·1	53·0	61·3	55·9	126·2	47·0	64·4	62·0	5·4	17·0	1·0	+ 0·8	SW	NE: E	1·1	0·0	0·1	185	0·11
26	..	29·867	74·2	46·0	59·4	52·7	128·0	38·2	64·6	62·4	6·7	20·7	0·0	— 0·9	E	SW	0·3	0·0	0·0	105	0·00
27	Full	29·634	75·0	49·0	60·7	55·2	116·0	41·0	64·4	62·3	5·5	17·0	0·0	+ 0·6	SW	SW	2·2	0·0	0·2	244	0·02
28	..	29·701	72·5	52·0	58·7	49·2	130·9	44·2	64·6	61·0	9·5	18·9	1·0	— 1·2	SW: NNW: W	WSW	1·1	0·0	0·1	235	0·05
29	Perigee: In Equator.	29·602	68·8	50·4	55·6	50·1	128·2	43·1	62·6	61·0	5·5	14·4	0·4	— 4·1	SW: SSW	WSW: W	8·0	0·0	0·9	382	0·05
30	..	29·717	71·6	49·3	61·3	53·3	131·2	40·4	63·6	61·8	8·0	18·4	2·3	+ 1·9	WSW	SW: SSW	5·0	0·0	0·4	321	0·00
31	..	29·672	74·7	58·9	64·2	55·5	140·8	54·6	62·6	61·0	8·7	19·0	3·0	+ 5·0	SSW: SW: WSW	SW: SSW	11·6	0·0	1·2	421	0·05
Means	..	29·783	72·1	51·5	60·3	53·3	125·1	44·4	..	..	7·0	16·5	0·9	— 0·9	...	...	..	..	..	Sum 9340	Sum 1·44

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $29^{\text{in}}\cdot860$ on the 3rd; the first minimum in the month was $29^{\text{in}}\cdot595$ on the 2nd.
The second maximum ,, was $29^{\text{in}}\cdot676$ on the 5th; the second minimum ,, was $29^{\text{in}}\cdot579$ on the 4th.
The third maximum ,, was $29^{\text{in}}\cdot766$ on the 6th; the third minimum ,, was $29^{\text{in}}\cdot433$ on the 5th.
The fourth maximum ,, was $29^{\text{in}}\cdot675$ on the 9th; the fourth minimum ,, was $29^{\text{in}}\cdot460$ on the 8th.
The fifth maximum ,, was $29^{\text{in}}\cdot606$ on the 11th; the fifth minimum ,, was $29^{\text{in}}\cdot383$ on the 10th.
The absolute maximum ,, was $30^{\text{in}}\cdot311$ on the 21st; the absolute minimum ,, was $29^{\text{in}}\cdot288$ on the 14th.
The seventh maximum ,, was $29^{\text{in}}\cdot926$ on the 26th; the seventh minimum ,, was $29^{\text{in}}\cdot851$ on the 25th.
The eighth maximum ,, was $29^{\text{in}}\cdot725$ on the 28th; the eighth minimum ,, was $29^{\text{in}}\cdot599$ on the 27th.
The ninth maximum ,, was $29^{\text{in}}\cdot757$ on the 30th; the ninth minimum ,, was $29^{\text{in}}\cdot559$ on the 29th.
The range in the month was $1^{\text{in}}\cdot023$.
The mean for the month was $29^{\text{in}}\cdot783$, being $0^{\text{in}}\cdot010$ *lower* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was 81°·2 on the 19th; the lowest was 44°·0 on the 24th.
The range ,, was 37°·2.
The mean ,, of all the highest daily readings was 72°·1, being 0°·9 *lower* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was 51°·5, being 1°·6 *lower* than the average of the preceding 33 years.
The mean daily range was 20°·6, being 0°·8 *greater* than the average of the preceding 33 years.
The mean for the month was 60°·3, being 1°·1 *lower* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
August 1			10 : 10, oc.-r	10 : 10
2			10 : 10, oc.-th.-r	ci, ci.-cu, v : v
3			ci, ci.-cu	ci, ci.-cu, cu.-s : li.-cl, v, ms
4			v : 10, r	10, fr.-shs, w : v : 10, m
5			10 : 10	10, oc.-th.-r : 10, oc.-th.-r
6			ci, ci.-cu	ci, ci.-cu : s, m
7			v : 10	10 : v : v, sc
8			ci, ci.-cu, ci.-s, cu	ci.-cu, ci.-s, cu, hl, r, sqs : v, ms
9			ci, ci.-cu	ci.-cu, cu.-s, r : 10, r
10			10 : v, fr.-shs	v, fr.-shs, t, l, hl : v, r, sqs, m
11			ci.-cu, cu	ci, ci.-cu, cu, w : 0, ms
12			v, ms : 10, r : ci, ci.-cu	ci, ci.-cu, cu : 10, th.-r : 10, r
13			10, h.-r : 10, th.-r, sc	10, h.-r : v : v, sl.-r, s, ms
14			10, r : v, ci, ci.-cu	c, ci.-cu, oc.-shs, w : v
15			ci, ci.-cu	ci.-cu, ci.-s : li.-cl
16			ci.-cu, cu.-s	ci, ci.-cu, cu.-s : 10, sl.-r
17			li.-cl, h, mt	10, li.-cl : v : 0
18			0 : ci, ci.-cu, ci.-s	10 : v : li.-cl
19			10	ci, ci.-cu, cu, cu.-s, h : 0
20			0 : 0, h, mt	0 : 0
21			v : 10	ci, ci.-cu, cu.-s : li.-cl : 0
22			0 : ci, ci.-cu	0 : 0
23			0 : 0, h, mt	0 : v : 10
24			v : v : ci, ci.-s, mt	ci, ci.-s, so.-ha : ci, ci.-cu
25			10 : 10, r, h, mt	ci.-cu, cu, cu.-s, h, mt : v
26			0, f, h.-d : 0, h	ci, ci.-cu, h : ci.-cu, cu, s, h
27			v : 10	ci, ci.-cu, cu, cu.-s : 10, r
28			10, r : v, ci.-cu, cu, cu.-s, h	ci, ci.-cu, cu, cu.-s : v
29			v : 10, r	ci, ci.-cu, ci.-s, shs.-r : li.-cl
30			ci, cu, cu.-s	v, oc.-shs : 10, oc.-shs
31			10, r : ci.-cu	ci, ci.-cu, cu, cu.-s, r, w : 10

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $53^{\circ}\cdot3$, being $0^{\circ}\cdot5$ *lower* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot407$, being $0^{in}\cdot009$ *less* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $4^{grs}\cdot5$, being $0^{gr}\cdot1$ *less* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 78 (that of Saturation being represented by 100), being 2 *greater* than the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 530 grains, being 1 grain *greater* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·8.

WIND.

The proportions were of N. 3, S. 8, W. 16, E. 4, and Calm 0. The greatest pressure in the month was $11^{lbs}\cdot6$ on the square foot on the 31st. The mean daily horizontal movement of the air for the month was 301 miles.

RAIN.

Fell on 12 days in the month, amounting to $1^{in}\cdot44$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot95$ *less* than the average fall of the preceding 59 years.

ELECTRICITY.

Apparatus under repair throughout the month.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Difference. Greatest.	Difference. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Pressure. Least.	Pressure. Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Sept. 1	..	29.575	74.6	58.8	65.6	59.3	116.4	54.0	63.6	62.0	6.3	13.8	2.1	+ 6.6	SW	SW	11.6	0.0	3.1	483	0.09
2	..	29.749	72.8	53.7	62.1	53.1	129.4	45.0	64.4	63.0	9.0	18.4	0.0	+ 3.4	SW	WSW : SW	9.8	0.0	0.8	353	0.11
3	Last Qr.	29.601	65.9	54.2	58.8	55.5	84.2	46.7	64.6	63.0	3.3	9.5	0.2	+ 0.4	SSW	S : E : N	3.5	0.0	0.3	239	0.15
4	Greatest Declination N.	29.742	65.5	48.5	54.7	50.0	115.5	40.0	63.6	62.0	4.7	12.8	0.0	− 3.5	W : WSW	WSW : W	5.2	0.0	0.9	423	0.26
5	..	29.843	68.7	46.5	55.6	47.2	133.3	38.1	62.6	61.0	8.4	18.0	0.0	− 2.4	W	W : WSW	2.4	0.0	0.3	306	0.00
6	..	29.810	60.2	49.6	54.8	52.8	78.2	42.8	62.9	61.2	2.0	6.5	0.0	− 3.1	SW	SSW: SE	1.0	0.0	0.0	141	0.29
7	..	29.837	67.6	52.7	58.3	54.2	93.3	45.6	62.3	59.0	4.1	11.3	0.0	+ 0.5	WSW	WSW	0.9	0.0	0.1	210	0.03
8	..	29.760	68.1	55.9	59.9	56.7	112.8	50.9	62.3	58.8	3.2	10.6	0.2	+ 2.1	WSW	SW : SSW	1.1	0.0	0.1	219	0.02
9	..	29.339	64.7	48.8	55.7	50.8	109.3	41.5	62.1	60.0	4.9	11.2	1.0	− 2.0	WSW	WSW : SW	9.4	0.0	0.5	342	0.20
10	New	29.494	65.6	45.9	53.6	47.6	131.8	37.1	61.6	60.0	6.0	15.4	1.2	− 4.1	SW : WSW	WSW	14.5	0.0	1.3	456	0.05
11	..	29.446	64.5	50.0	55.9	55.5	71.0	41.4	61.4	59.0	0.4	5.0	0.0	− 1.7	WSW : SW	SSW : WSW	9.2	0.1	1.2	304	0.21
12	In Equator	29.546	66.2	48.6	56.4	48.9	117.2	40.0	60.6	57.5	7.5	16.9	0.0	− 1.1	WSW : WNW	NW : N : NNE	5.3	0.0	0.9	372	0.00
13	..	30.048	66.6	44.7	54.2	49.5	119.0	35.5	60.4	58.8	4.7	15.7	0.0	− 3.1	WSW : NNE	NE : ESE	0.2	0.0	0.0	128	0.00
14	Apogee	30.180	68.8	45.7	54.7	49.9	130.7	37.7	60.6	59.0	4.8	13.5	0.0	− 2.5	SE: SW	SW : SSW	1.7	0.0	0.2	206	0.00
15	..	29.964	69.4	50.2	58.6	53.2	130.7	42.5	60.4	58.8	5.4	14.4	0.0	+ 1.5	SSW: SW: WSW	WSW : SW	3.3	0.0	0.4	314	0.00
16	..	29.793	69.6	51.9	59.3	55.2	122.4	43.0	60.6	59.2	4.1	11.7	0.0	+ 2.4	SW : WSW	WSW : SW	0.2	0.0	0.0	173	0.00
17	..	29.724	59.4	48.5	52.1	49.2	90.0	40.5	60.6	59.0	2.9	8.4	0.8	− 4.6	WSW : NNW	N : WSW	0.8	0.0	0.1	192	0.00
18	First Qr.	29.803	65.6	43.6	54.0	48.8	109.0	34.7	60.0	58.0	5.2	13.7	0.7	− 2.5	WSW	WNW : WSW	2.8	0.0	0.3	287	0.00
19	Greatest Declination S.	29.864	69.2	43.4	55.1	50.3	132.2	35.2	59.6	58.2	4.8	16.9	0.0	− 1.1	WSW : SSW	SW : SSW	1.0	0.0	0.1	210	0.00
20	..	29.715	70.5	50.8	60.2	53.5	128.5	43.9	59.6	58.0	6.7	15.3	0.6	+ 4.2	S	SSE: ESE	1.0	0.0	0.1	197	0.04
21	..	29.482	70.1	52.0	59.7	56.3	102.2	44.7	60.4	58.8	3.4	12.0	0.4	+ 3.9	ESE : S	SSW : SW	3.7	0.0	0.3	245	0.02
22	..	29.752	69.0	51.0	58.7	51.2	126.7	44.0	60.2	58.6	7.5	18.2	1.4	+ 3.2	SSW	SW : S	6.2	0.0	1.0	365	0.00
23	..	29.784	62.4	47.9	55.4	55.2	73.9	40.2	60.0	58.8	0.2	2.2	0.0	+ 0.2	SSE : E	ENE : NE : N	0.8	0.0	0.0	152	0.15
24	..	30.020	69.5	52.6	59.1	56.8	110.7	45.9	60.0	58.8	2.3	9.7	0.0	+ 4.1	SW	WSW : SW	0.6	0.0	0.0	181	0.00
25	Full	30.074	78.1	55.0	65.6	58.0	134.7	47.1	60.4	59.0	7.6	17.2	0.0	+ 10.8	SW	WSW : SW	3.0	0.0	0.3	265	0.00
26	In Equator: Perigee	30.001	77.1	51.1	62.2	57.0	122.0	43.5	60.6	59.2	5.2	18.0	0.0	+ 7.6	SW : NE	S	0.0	0.0	0.0	108	0.00
27	..	29.797	76.9	49.4	60.9	56.5	126.0	41.2	61.2	60.0	4.4	18.2	0.0	+ 6.5	Calm	SW : S	0.3	0.0	0.0	124	0.00
28	..	29.642	71.1	54.4	61.0	57.3	110.3	47.8	61.0	59.8	3.7	12.9	0.0	+ 6.8	S : SW	SW : SSW	3.0	0.0	0.3	267	0.02
29	..	29.576	67.7	52.6	58.4	52.7	116.2	46.2	61.0	59.8	5.7	13.0	1.0	+ 4.3	SW	SSW : SW	7.0	0.0	0.7	358	0.05
30	..	29.613	66.3	51.4	57.3	50.2	117.2	45.0	61.0	59.8	7.1	16.2	0.2	+ 3.3	S : SSE	SW : SE : S	1.4	0.0	0.0	154	0.53
Means	..	29.752	68.4	50.3	57.9	53.1	113.2	42.7	61.3	59.6	4.8	13.2	0.3	+ 1.3	...	...	..	..	..	Sum 7774	Sum 2.22

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $29^{in}.808$ on the 2nd; the first minimum in the month was $29^{in}.540$ on the 1st.
The second maximum ,, was $29^{in}.858$ on the 5th; the second minimum ,, was $29^{in}.357$ on the 3rd.
The third maximum ,, was $29^{in}.863$ on the 7th; the third minimum ,, was $29^{in}.800$ on the 6th.
The fourth maximum ,, was $29^{in}.583$ on the 11th; the absolute minimum ,, was $29^{in}.303$ on the 9th.
The absolute maximum ,, was $30^{in}.214$ on the 14th; the fifth minimum ,, was $29^{in}.344$ on the 11th.
The sixth maximum ,, was $29^{in}.902$ on the 19th; the sixth minimum ,, was $29^{in}.709$ on the 17th.
The seventh maximum ,, was $29^{in}.833$ on the 22nd; the seventh minimum ,, was $29^{in}.446$ on the 21st.
The eighth maximum ,, was $30^{in}.098$ on the 25th; the eighth minimum ,, was $29^{in}.741$ on the 23rd.
The ninth maximum ,, was $29^{in}.661$ on the 30th; the ninth minimum ,, was $29^{in}.550$ on the 29th.
The range in the month was $0^{in}.911$.
The mean for the month was $29^{in}.752$, being $0^{in}.055$ *lower* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was $78^{\circ}.1$ on the 25th; the lowest was $43^{\circ}.4$ on the 19th.
The range ,, was $34^{\circ}.7$.
The mean ,, of all the highest daily readings was $68^{\circ}.4$, being $0^{\circ}.7$ *higher* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was $50^{\circ}.3$, being $1^{\circ}.2$ *higher* than the average of the preceding 33 years.
The mean daily range was $18^{\circ}.1$, being $0^{\circ}.4$ *less* than the average of the preceding 33 years.
The mean for the month was $57^{\circ}.9$, being $0^{\circ}.7$ *higher* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Sept. 1			ci, ci.-cu, sc, st.-w	10, sc, st.-w, r : 10, r
2			10, r : ci, ci.-cu, cu	ci, ci.-cu, ci.-s : v
3			10, oc.-r	10, fr.-shs : 10, fr.-shs
4			ci, ci.-cu, ci.-s, cu.-s, r, w	ci, ci.-cu, cu.-s, oc.-r : v, oc.-shs
5			ci, ci.-cu : o, h	ci, ci.-cu, ci.-s, cu : 10
6			10 : 10, th.-r	10, r : 10, c.-r, mt
7			10 : 10	10 : 10, r
8			v : ci, ci.-cu, ci.-s	10, r : v : 10
9			ci.-cu, fr.-shs	ci.-cu,cu.-s,fr.-shs: t.-s, r, hl, v : o
10			ci, ci.-s, mt, r	ci, ci.-cu, n, v, sqs : vv, r
11			10 : 10, r	10 : 10, r : 10, h.-sqs
12			ci, ci.-cu, cu, st.-w	ci, ci.-cu, cu, cu-s: v, sl.-r : o
13			o : o, h, mt	ci, ci.-cu : v
14			ci, ci.-cu, cu, cu.-s, mt	ci, ci.-cu, ci.-s, cu, cu.-s, h : o
15			o : ci, ci.-cu, cu	2, ci, ci.-cu : o : o
16			ci.-cu	v : 10 : 10
17			10 : 10, mt	10 : v : 10
18			10 : 10	ci, ci.-cu, cu, cu.-s : v
19			o : f	ci.-cu, cu.-s : v : o
20			ci, ci.-cu, cu, cu.-s	ci, ci.-cu, cu, cu.-s : 10, r
21			ci.-cu, cu.-s	v, oc.-shs : vv
22			o : ci.-cu, cu	ci, ci.-cu, ci.-s, cu.-s : li.-cl
23			10, f, r	10 : 10
24			ci, ci.-s, mt	ci, ci.-cu, ci.-s, h : o : ci, ci.-cu, h.-d
25			o	ci, ci.-cu, cu.-s : ci.-cu
26			f, ci	ci, ci.-cu, sl.-f : h.-d, li.-cl
27			ci.-cu, h, th.-f	ci.-cu, cu.-s : li.-cl, l
28			10, oc.-r	ci.-cu, cu.-s, ci, ci.-s : li.-cl, h.-d
29			10, mt	ci.-cu, cu : v, r : ci, ci.-cu
30			v, fr.-shs : v, fr.-shs	ci,ci.-cu,ci.-s,cu.-s: v : 10, t, l, r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $53^{\circ}\cdot 1$, being $2^{\circ}\cdot 1$ *higher* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot 404$, being $0^{in}\cdot 025$ *greater* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $4^{grs}\cdot 5$, being $0^{gr}\cdot 3$ *greater* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 84 (that of Saturation being represented by 100), being 4 *greater* than the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 531 grains, being 2 grains *less* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·8.

WIND.

The proportions were of N. 2, S. 12, W. 13, E. 3, and Calm 0. The greatest pressure in the month was $14^{lbs}\cdot 5$ on the square foot on the 10th. The mean daily horizontal movement of the air for the month was 259 miles.

RAIN.

Fell on 16 days in the month, amounting to $2^{in}\cdot 22$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot 24$ *less* than the average fall of the preceding 59 years.

ELECTRICITY.—Apparatus under repair throughout the month.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer, with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Greatest.	Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	P.M.	Pressure in lbs. on the square foot. Greatest.	Least.	Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Oct. 1	..	29·327	69·6	51·0	58·9	53·9	124·8	49·0	60·8	59·8	5·0	15·0	0·0	+ 5·0	SE: S: SW	S: N	2·6	0·0	0·3	242	0·29
2	Greatest Dec. N; Last Quarter.	29·162	59·6	45·0	51·2	49·8	78·0	39·5	60·6	58·0	1·4	8·4	0·0	− 2·6	W: SW: SSW	WSW	11·5	0·0	1·8	501	0·25
3	..	29·230	58·8	42·7	49·6	42·9	108·0	35·1	60·0	58·0	6·7	16·1	1·1	− 4·1	WSW: W	WNW: W: WSW	7·0	0·1	1·7	534	0·00
4	..	29·277	53·3	42·0	46·6	45·0	63·2	34·0	59·2	57·0	1·6	5·3	0·0	− 6·9	WSW: W	NW: W	2·9	0·0	0·4	295	0·45
5	..	29·819	57·1	38·3	45·5	41·4	97·9	29·9	58·4	56·2	4·1	13·5	0·7	− 7·8	WSW: W	W: SW	0·9	0·0	0·2	281	0·00
6	..	29·627	56·7	38·1	49·4	43·3	75·0	29·1	57·1	55·5	6·1	8·7	2·6	− 3·5	SSW	SSW: SW	10·5	0·0	1·7	481	0·00
7	..	29·229	58·6	44·0	50·2	49·4	88·5	35·0	56·2	54·2	0·8	6·6	0·0	− 2·3	SSW	WSW	22·5	0·0	2·5	518	0·61
8	..	29·789	59·0	38·7	46·9	40·6	91·0	29·7	56·0	54·0	6·3	15·6	0·0	− 5·2	WSW	WSW: S	0·6	0·0	0·1	212	0·00
9	In Equator	29·737	59·8	41·0	51·7	50·5	104·2	35·4	56·0	54·0	1·2	6·1	0·0	− 0·1	SSW	SSW: SW	6·5	0·0	0·5	277	0·02
10	New	29·939	62·7	44·3	53·5	49·9	93·5	36·6	55·6	53·8	3·6	9·2	0·0	+ 1·9	SSW: SW	SW	2·1	0·0	0·4	296	0·00
11	Apogee	29·980	62·8	49·6	55·5	52·9	81·0	43·1	55·2	53·0	2·6	6·5	0·0	+ 4·1	SW	SW	1·8	0·0	0·3	280	0·04
12	..	29·954	64·8	49·3	55·8	53·0	104·5	42·0	55·2	53·0	2·8	10·8	0·0	+ 4·6	WSW: SW	SSW: SE	0·4	0·0	0·0	180	0·00
13	..	29·726	67·2	50·4	57·7	55·0	100·2	43·0	55·0	53·0	2·7	8·6	0·0	+ 6·8	SSW: S: ESE	SW: WSW	0·7	0·0	0·0	170	0·00
14	..	29·617	61·1	52·1	55·9	55·5	76·8	45·0	55·6	53·5	0·4	4·4	0·0	+ 5·3	NE: SE	SE: SSW: S	0·3	0·0	0·0	133	0·19
15	..	29·310	66·7	55·7	59·3	57·5	103·7	51·7	55·6	54·0	1·8	8·3	0·4	+ 9·0	SSE: S	S	2·4	0·0	0·2	248	0·29
16	Greatest Declination S.	29·588	58·6	52·5	54·1	54·0	61·3	47·5	56·1	54·5	0·1	1·1	0·0	+ 4·1	S	NNE	0·5	0·0	0·0	110	0·06
17	..	29·708	60·0	46·4	53·1	49·3	86·8	38·8	56·4	54·8	3·8	9·7	0·0	+ 3·3	SW	SW	2·6	0·0	0·3	329	0·00
18	First Qr.	29·800	63·1	49·0	53·6	51·7	106·8	42·0	56·0	54·7	1·9	8·3	0·0	+ 4·0	SW: WSW	SW: SSW	0·7	0·0	0·0	180	0·02
19	..	29·771	60·6	45·6	52·2	47·2	108·1	38·0	56·4	54·8	5·0	13·9	0·0	+ 2·9	SW: WSW	WSW	1·8	0·0	0·1	272	0·01
20	..	30·053	56·0	39·4	47·2	41·9	104·8	30·5	56·1	54·7	5·3	12·0	0·2	− 1·9	W: WSW	WSW	2·5	0·0	0·2	278	0·00
21	..	29·425	57·5	40·5	48·2	45·5	60·7	34·4	55·6	54·3	2·7	5·7	1·6	− 0·7	WSW	WNW: WSW	24·7	0·1	4·4	690	0·06
22	..	29·567	54·5	38·8	45·5	40·1	93·0	30·2	54·8	53·0	5·4	14·0	0·0	− 3·2	WSW: W	WNW: W	3·2	0·0	0·5	354	0·00
23	In Equator	29·850	51·1	36·0	41·7	37·7	80·2	27·7	54·1	52·2	4·0	13·4	0·0	− 6·8	W: NW: N	NNW: WSW	1·3	0·0	0·1	223	0·00
24	..	29·958	56·3	38·2	46·8	41·3	78·8	30·0	53·1	51·3	5·5	10·4	1·6	− 1·4	SW: SSW	SW: S	1·7	0·0	0·1	218	0·00
25	Perigee: Full.	29·860	58·1	45·9	53·3	53·2	64·2	38·5	52·9	51·0	0·1	2·1	0·0	+ 5·4	SSW	SW	5·2	0·0	1·8	454	0·05
26	..	29·953	61·1	54·3	56·0	54·4	89·0	51·9	53·1	51·0	1·6	4·0	0·0	+ 8·4	SW: SSW	SSW	1·2	0·0	0·2	242	0·10
27	..	29·877	65·0	52·0	57·2	55·8	97·0	46·2	53·4	51·6	1·4	7·7	0·0	+ 9·9	SSW: S	SW: SSW	0·5	0·0	0·0	168	0·00
28	..	29·853	61·9	51·3	55·4	52·5	106·7	45·2	53·6	52·0	2·9	7·4	0·0	+ 8·4	SE: ESE	E: SSE	0·7	0·0	0·0	156	0·01
29	Greatest Declination N.	29·861	58·2	48·7	52·1	50·6	80·8	41·0	54·1	52·0	1·5	7·2	0·0	+ 5·3	SE: S	E: NE	0·5	0·0	0·0	199	0·01
30	..	30·006	52·3	49·2	50·3	49·5	55·2	46·7	53·8	52·0	0·8	1·8	0·0	+ 3·7	NE	ENE	2·3	0·0	0·3	327	1·12
31	..	30·084	52·5	46·0	48·7	44·8	63·5	43·0	53·8	52·0	3·9	6·0	1·3	+ 2·2	ENE: E	ENE: E	3·1	0·0	0·1	230	0·00
Means	..	29·708	59·5	45·7	51·7	48·7	88·0	39·0	55·8	54·0	3·0	8·6	0·3	+ 1·5	...	...	..	..	..	Sum 9078	Sum 3·58

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $29^{in}\cdot309$ on the 3rd; the first minimum in the month was $29^{in}\cdot114$ on the 2nd.
The second maximum ,, was $29^{in}\cdot903$ on the 5th; the second minimum ,, was $29^{in}\cdot189$ on the 4th.
The third maximum ,, was $29^{in}\cdot810$ on the 8th; the absolute minimum ,, was $29^{in}\cdot088$ on the 7th.
The fourth maximum ,, was $30^{in}\cdot014$ on the 12th; the fourth minimum ,, was $29^{in}\cdot699$ on the 9th.
The fifth maximum ,, was $29^{in}\cdot837$ on the 18th; the fifth minimum ,, was $29^{in}\cdot293$ on the 15th.
The sixth maximum ,, was $30^{in}\cdot094$ on the 20th; the sixth minimum ,, was $29^{in}\cdot727$ on the 19th.
The seventh maximum ,, was $29^{in}\cdot996$ on the 24th; the seventh minimum ,, was $29^{in}\cdot357$ on the 21st.
The eighth maximum ,, was $30^{in}\cdot011$ on the 26th; the eighth minimum ,, was $29^{in}\cdot823$ on the 25th.
The absolute maximum ,, was $30^{in}\cdot110$ on the 31st; the ninth minimum ,, was $29^{in}\cdot831$ on the 28th.
The range in the month was $1^{in}\cdot022$.
The mean for the month was $29^{in}\cdot708$, being $0^{in}\cdot009$ *higher* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was 69°·6 on the 1st; the lowest was 36°·0 on the 23rd.
The range ,, was 33°·6.
The mean ,, of all the highest daily readings was 59°·5, being 1°·1 *higher* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was 45°·7, being 2°·1 *higher* than the average of the preceding 33 years.
The mean daily range was 13°·8, being 1°·1 *less* than the average of the preceding 33 years.
The mean for the month was 51°·7, being 1°·5 *higher* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Oct. 1			10, r, t, l : ci, ci.-s	ci,ci.-cu,ci.-s,cu.-s : 10, r, l : 10, r
2			10, oc.-r : 10, r, w	10, r, ci.-cu, cu.-s : o, l
3			o : ci, ci.-cu, cu, s, st.-w	ci, ci.-cu, cu, cu.-s : v
4			v : 10, r	10, r, v : v, a
5			10, f	ci, ci.-cu, cu, s : o, h.-d
6			v : 10	10, w : 10, w
7			10, r, st.-w : 10, r, st.-w	ci.-cu, cu.-s, sc : o
8			o, h.-d : o, mt	ci, ci.-cu, cu, cu.-s : o
9			v : 10, sl.-r : ci, ci.-cu, sl.-r	10, th.-r : o, h.-d
10			o : ci, ci.-s, cu.-s, s, h	ci.-s, cu.-s, s, ci, h : o
11			v : 10, th.-r	10, oc.-r : v
12			ci, ci.-cu	ci, ci.-cu, cu, s : o : li.-cl
13			ci, ci.-s	ci, ci.-cu, cu : li.-cl
14			v : 10, th.-r	ci, cu.-s, ci.-cu : 10, th.-r, l
15	o	o : ssP,ssN,sp,g.-cur	10, r : 10, oc. r	ci, ci.-cu, cu : v, r, t, l
16	o	o	10, f	10, sl.-f, glm : 10
17	o	w : o	ci.-cu	10, oc.-shs : 10, oc.-shs
18	w	w : w	10, r : 10, mt, f	ci, ci.-cu, cu.-s, cu : v
19	m	o : s	10 : 10, r	ci, ci.-cu : ci, ci.-cu
20	o	w : m	o, mt	ci, ci.-cu : li.-cl
21	o	o	10, sc, st.-w	10, sc, st.-w, gt.-glm, r : o
22	o	o	ci, ci.-s	ci.-cu, cu.-s,cu : o, th.-f
23	o	w : o	li.-cl, h, f, h.-fr	ci, ci.-cu : li.-cl, sl.-f
24	w	m : w	10, mt	ci, ci.-cu, cu.-s : ci, ci.-cu
25	o	o	10, th.-r	10, th.-r : 10, r
26	o	w : w	10, th.-r	ci, ci.-cu, s : 10, r
27	w	w : w	10 : ci, ci.-s, s	ci, ci.-cu, cu.-s, s : 10
28	o	w : w	10, sl.-mt, sl.-r	ci : o : 10
29	o	w	v : 10, r	ci, ci.-cu, cu.-s : v, r : 10
30	o	o	10, h.-r : 10, c.-r	10, c.-r : 10
31	o	o	10 : 10	10 : 10

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 48°·7, being 2°·6 *higher* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot344$, being $0^{in}\cdot031$ *greater* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $3^{grs}\cdot9$, being $0^{gr}\cdot3$ *greater* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 90 (that of Saturation being represented by 100), being 3 *greater* than the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 537 grains, being 2 grains *less* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 7·2.

WIND.

The proportions were of N. 2, S. 12, W. 13, E. 4, and Calm 0. The greatest pressure in the month was $24^{lbs}\cdot7$ on the square foot on the 21st. The mean daily horizontal movement of the air for the month was 293 miles.

RAIN.

Fell on 17 days in the month, amounting to $3^{in}\cdot58$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot80$ *greater* than the average fall of the preceding 59 years.

ELECTRICITY.

Apparatus under repair until October 14.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Readings of Thermometers. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Greatest.	Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	Wind as deduced from Anemometers. Osler's. General Direction. A.M.	P.M.	Pressure in lbs. on the square foot. Greatest.	Least.	Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Nov. 1	Last Qr.	30·015	49·9	43·6	46·8	45·1	57·8	35·7	53·6	52·2	1·7	4·6	0·0	+ 0·4	E	ESE	1·8	0·0	0·1	217	0·00
2	..	29·921	54·0	45·0	49·4	49·0	71·8	41·8	53·6	52·0	0·4	2·6	0·0	+ 3·1	ESE	ESE : SE	1·5	0·0	0·1	166	0·00
3	..	29·954	58·0	44·0	49·4	46·2	102·0	35·5	52·6	51·2	3·2	10·6	0·0	+ 3·3	WSW	WSW	0·5	0·0	0·0	198	0·00
4	..	30·004	59·8	40·8	50·7	48·3	94·0	31·0	52·6	51·0	2·4	8·2	0·0	+ 4·8	WSW	SW : SSE	0·2	0·0	0·0	167	0·00
5	In Equator	29·937	58·5	42·2	51·1	49·9	93·6	34·8	52·6	51·0	1·2	5·7	0·0	+ 5·4	SE : SSE	SW	0·2	0·0	0·0	106	0·00
6	..	30·087	62·6	49·9	55·3	51·3	97·7	44·9	52·6	51·0	4·0	9·1	0·0	+ 9·8	SW : W	WSW	0·6	0·0	0·0	162	0·00
7	Apogee	30·272	53·0	35·0	44·0	39·1	85·7	28·0	52·6	51·0	4·9	12·0	0·0	− 1·3	WSW : NW : N	NW : N : SW	0·0	0·0	0·0	139	0·00
8	..	30·323	55·4	30·3	41·6	40·0	92·2	24·6	52·6	50·5	1·6	10·5	0·0	− 3·4	SW : ESE	SSW	0·0	0·0	0·0	91	0·00
9	New	30·158	58·5	47·0	51·7	48·8	65·8	42·5	51·8	49·2	2·9	6·8	1·7	+ 7·0	SSW	SW	0·8	0·0	0·0	182	0·00
10	..	29·958	53·1	37·0	44·5	40·2	61·4	30·0	52·0	49·4	4·3	10·3	2·1	+ 0·1	WSW	N	2·7	0·0	0·4	302	0·00
11	..	29·875	41·5	31·0	36·1	29·8	55·2	23·9	51·1	49·0	6·3	10·8	4·3	− 8·0	NNW	NW : NNE	3·0	0·0	0·6	343	0·00
12	..	29·800	41·8	29·8	35·5	30·8	80·2	23·9	50·4	47·5	4·7	9·9	0·4	− 8·3	NNE	N : NNW	5·5	0·0	1·4	397	0·00
13	Greatest Declination S.	29·667	45·0	34·3	39·4	35·8	60·2	30·0	49·1	47·0	3·6	7·9	0·5	− 4·1	W : NW : N	NNE	5·3	0·0	1·3	402	0·04
14	..	29·984	44·0	33·7	38·6	35·4	56·7	26·6	48·2	46·2	3·2	6·4	0·7	− 4·6	NNE : N	N : W	2·2	0·0	0·2	211	0·00
15	..	29·700	48·9	35·1	43·8	43·1	56·6	27·3	47·4	45·5	0·7	2·5	0·0	+ 0·9	WSW	WNW : W	1·3	0·0	0·3	318	0·15
16	..	29·493	54·6	42·0	46·6	40·7	71·2	33·5	47·1	45·0	5·9	9·5	1·1	+ 4·0	NW	WNW : WSW	7·2	0·0	1·4	527	0·03
17	First Qr.	29·657	54·8	44·2	46·9	39·1	63·0	34·8	47·1	45·0	7·8	9·7	2·7	+ 4·6	NNW	NW	10·8	0·0	1·6	472	0·07
18	..	29·658	54·8	43·7	50·9	48·7	58·8	37·5	47·1	45·0	2·2	3·8	0·0	+ 8·9	W	WSW : NW	4·7	0·0	1·2	462	0·12
19	In Equator	29·543	50·5	40·6	45·1	41·3	52·1	32·8	47·4	45·3	3·8	6·3	1·9	+ 3·3	WSW	W : WNW	7·0	0·0	0·7	407	0·07
20	..	29·755	47·8	37·6	42·3	35·2	67·9	30·7	47·4	45·5	7·1	10·9	3·2	+ 0·7	WNW : NW : N	NNW : N	..	..	..	304	0·00
21	..	29·964	37·6	31·2	33·0	32·2	38·8	23·4	46·8	45·5	0·8	3·6	0·0	− 8·4	N : W : WSW	SW : WSW	..	..	..	107	0·00
22	Perigee	29·911	36·2	27·0	30·5	30·0	55·8	20·0	46·4	45·2	0·5	0·8	0·0	−10·7	WSW : Calm	Calm	0·0	0·0	0·0	74	0·00
23	Full	29·954	41·3	25·4	32·3	27·8	68·0	18·3	45·8	45·0	4·5	8·7	0·4	− 8·8	Calm	NE	0·0	0·0	0·0	93	0·00
24	..	30·001	40·7	27·0	32·8	27·4	48·9	21·0	45·8	..	5·4	8·0	0·0	− 8·2	NW : SW	SSE	0·0	0·0	0·0	112	0·00
25	Greatest Declination N.	29·793	40·0	32·2	36·5	30·6	44·2	25·9	45·0	43·8	5·9	10·1	2·5	− 4·4	S : SSW	SSW : SSE	2·4	0·0	0·2	347	0·05
26	..	29·711	34·5	29·3	30·8	21·1	44·8	28·5	43·8	41·8	9·7	11·9	7·9	−10·1	SE	SE	0·3	0·0	0·0	206	0·00
27	..	29·509	36·4	25·0	31·0	25·1	81·0	22·7	43·8	..	5·9	8·5	1·9	−10·1	SSE	SE	0·1	0·0	0·0	175	0·00
28	..	29·334	43·3	30·6	35·9	32·3	46·7	27·0	44·0	..	3·6	7·8	0·7	− 5·4	ESE : SE	SE : SSE	0·7	0·0	0·0	210	0·15
29	..	28·614	50·0	42·5	45·0	40·5	62·0	36·1	42·4	..	4·5	7·3	1·9	+ 3·4	S : SW : WSW	WSW	15·5	0·0	2·3	703	0·57
30	Last Qr.	28·808	44·4	40·8	42·2	41·0	49·0	34·3	42·4	..	1·2	2·0	0·0	+ 0·3	SW : NE	W : ENE	2·3	0·0	0·1	182	0·60
Means	..	29·779	48·4	36·6	42·0	38·2	66·1	30·2	48·5	(25 days) (47·6)	3·8	7·6	1·1	− 1·2	...	...	..	..	..	Sum 7782	Sum 1·85

Barometer Readings from Eye-Observations.

The first maximum in the month was $30^{in}\cdot032$ on the 4th; the first minimum in the month was $29^{in}\cdot899$ on the 2nd.
the second minimum ,, was $29^{in}\cdot916$ on the 5th.
The absolute maximum ,, was $30^{in}\cdot359$ on the 8th; the third minimum ,, was $29^{in}\cdot762$ on the 11th.
The third maximum ,, was $29^{in}\cdot844$ on the 12th; the fourth minimum ,, was $29^{in}\cdot625$ on the 13th.
The fourth maximum ,, was $29^{in}\cdot990$ on the 14th; the fifth minimum ,, was $29^{in}\cdot367$ on the 16th.
The fifth maximum ,, was $29^{in}\cdot795$ on the 17th; the sixth minimum ,, was $29^{in}\cdot483$ on the 19th.
The sixth maximum ,, was $29^{in}\cdot973$ on the 21st; the seventh minimum ,, was $29^{in}\cdot890$ on the 22nd.
The seventh maximum ,, was $30^{in}\cdot042$ on the 24th; the absolute minimum ,, was $28^{in}\cdot470$ on the 29th.
The eighth maximum ,, was $28^{in}\cdot871$ on the 29th; the ninth minimum ,, was $28^{in}\cdot762$ on the 30th.
The range in the month was $1^{in}\cdot889$.
The mean for the month was $29^{in}\cdot779$, being $0^{in}\cdot025$ *higher* than the average of the preceding 33 years.

Temperature of the Air.

The highest in the month was 62°·6 on the 6th; the lowest was 25°·0 on the 27th.
The range ,, was 37°·6.
The mean ,, of all the highest daily readings was 48°·4, being 0°·6 *lower* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was 36°·6, being 0°·7 *lower* than the average of the preceding 33 years.
The mean daily range was 11°·8, being 0°·1 *greater* than the average of the preceding 33 years.
The mean for the month was 42°·0, being 1°·6 *lower* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Nov. 1	o	o	v : 10, mt	10 : 10
2	o	w : w	10 : 10, mt, f, h	li.-cl : 10
3	m	w : m	f : o, th.-f	o : o
4	m	w : w	o, h.-d, f : ci	v : 10 : o, h.-d
5	o	m : m	th.-f, d	o, sl.-mt : th.-f : 10
6	m	m : w	10, sl.-f	ci, ci.-cu, cu, cu.-s,ci.-s : v
7	w	o	ci, sl.-f	li.-cl : f : o
8			th.-f, h.-fr : ci	ci, ci.-s : v
9			10, sl.-f	ci.-cu : 2, li.-cl
10			ci, ci.-cu, v, glm	10 : v : o
11			o : o, sl.-f, h.-fr	8, ci,ci.-cu,ci.-s,cu.-s,s : 10, sl.-r
12			v : o, h.-fr	ci, ci.-cu, v : v
13			v : 10, th.-r	ci.-cu,cu,cu.-s : o : v, ms
14			ci, ci.-cu, ci.-s, sl.-f, h.-fr	ci.-cu, h, sl.-f : v : o, f
15			v : 10, sl.-f, r	10, sc, f, r : 10, f
16			ci, ci.-cu	8, ci, ci.-cu : 10, r : 10, r
17			10, fr.-shs, w : ci, ci.-s, cu.-s	ci,ci.-s,cu,cu.-s: ci.-cu, cu.-s : 10
18			10, r : 10	10, oc.-th.-r : 10, oc.-th.-r
19	o	o	10 : 10, th.-r	10, th.-r, glm : li.-cl
20	o	o : m	ci, mt	ci, ci.-cu, cu : 10, ci.-cu
21	m	ms : sN	10 : 10, th.-f	10, th.-f : 10, th.-f
22	s	s : s	th.-f : th.-f	th.-f : th.-f
23	o	m : o	th.-f : th.-f, h.-fr : o	ci.-cu : o : o, f
24	m	m : o	f, h.-fr	ci, ci.-cu, ci.-s, cu : ci.-cu, h.-fr
25	o	m : w	v : th.-r	10, oc.-th.-r, sl : 10
26	o	m : m	10 : ci.-cu, cu.-s	10 10
27	o	m : m	v : o	ci v
28	m	w : o	10	10, sl.-r : 10, r
29	wN	sN, g.-cur: o	10, h.-r : 10, h.-r, st.-w : ci.-cu, n, sc, r	10, sc, r, st.-w : v, l
30	o	o	10, h.-r : 10, sl.-f	10, f : 10, h.-r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $38^{\circ}\cdot 2$, being $1^{\circ}\cdot 4$ *lower* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{\text{in}}\cdot 231$, being $0^{\text{in}}\cdot 017$ *less* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{\text{grs}}\cdot 7$, being $0^{\text{gr}}\cdot 1$ *less* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 87 (that of Saturation being represented by 100), being 1 *less* than the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 550 grains, being 2 grains *greater* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·6.

WIND.

The proportions were of N. 6, S. 8, W. 10, E. 5, and Calm 1. The greatest pressure in the month was $15^{\text{lbs}}\cdot 5$ on the square foot on the 29th. The mean daily horizontal movement of the air for the month was 259 miles.

RAIN.

Fell on 10 days in the month, amounting to $1^{\text{in}}\cdot 85$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{\text{in}}\cdot 48$ *less* than the average fall of the preceding 59 years.

ELECTRICITY.

From November 8 to 18 the electrical apparatus was out of action.

MONTH and DAY, 1874.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	READINGS OF THERMOMETERS. Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, as shown by a Self-Registering Thermometer with blackened bulb in vacuo, placed on the Grass.	Lowest on the Grass, as shown by a Self-Registering Minimum Thermometer.	In the Water of the Thames, at Greenwich, by Self-Registering Thermometers, read at 9h A.M. Highest.	In the Water of the Thames. Lowest.	Difference between the Dew Point Temperature and Air Temperature. Mean Daily Value.	Greatest.	Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 50 Years.	WIND AS DEDUCED FROM ANEMOMETERS. OSLER'S. General Direction. A.M.	General Direction. P.M.	Pressure in lbs. on the square foot. Greatest.	Least.	Mean of 24 Obs.	ROBINSON'S. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Dec. 1	..	29·257	43·2	33·0	38·4	35·4	50·2	28·0	42·1	..	3·0	5·5	0·7	− 3·7	NE : NNE : N	NNE	2·4	0·0	0·1	280	0·32
2	In Equator	29·717	36·0	26·4	31·0	25·4	53·9	19·2	..	..	5·6	7·3	4·1	−11·2	NNE	NNE	1·6	0·0	0·1	240	0·00
3	..	29·969	37·9	23·0	31·0	24·8	56·4	12·0	..	..	6·2	10·8	4·4	−11·3	NNE : W	WSW	0·0	0·0	0·0	199	0·00
4	..	29·875	43·7	32·1	37·7	35·5	75·3	25·0	..	..	2·2	5·3	0·3	− 4·5	WSW	WSW	1·9	0·0	0·1	246	0·00
5	Apogee	29·579	50·9	37·0	45·1	41·4	54·3	32·0	39·6	..	3·7	6·5	1·8	+ 2·9	WSW	W : WSW	3·4	0·0	0·4	386	0·00
6	..	29·346	53·3	37·0	45·6	40·6	60·3	31·1	42·4	..	5·0	6·8	3·5	+ 3·5	WSW	WSW : NW	10·6	0·3	2·3	628	0·18
7	..	29·781	42·5	35·0	38·2	30·6	73·0	28·2	43·2	..	7·6	11·0	4·7	− 3·8	W : WNW	WNW : W	6·3	0·1	1·3	546	0·00
8	..	29·232	52·6	35·3	44·6	42·9	52·6	27·5	40·7	..	1·7	5·9	0·0	+ 2·9	WSW : SSW	SW : WSW	29·0	0·0	2·4	552	0·23
9	New	29·096	49·0	31·0	38·1	32·4	49·1	23·5	39·9	..	5·7	8·5	2·1	− 3·2	WSW : NW : N	NNW : WNW	20·3	0·0	3·7	619	0·17
10	Greatest Declination S.	29·545	31·5	25·8	28·8	25·5	35·6	19·2	40·4	..	3·3	5·1	0·0	−12·2	WNW : W	Calm : SSW	0·0	0·0	0·0	145	0·00
11	..	28·606	47·7	28·1	40·3	37·3	63·0	26·3	39·8	38·0	3·0	6·2	0·9	− 0·4	SSW : SW : W	WSW : SSW : W	4·0	0·0	0·6	370	0·21
12	..	28·894	40·0	35·6	38·4	36·1	40·4	30·6	40·4	38·0	2·3	3·7	0·7	− 2·2	NNW	NNW : N : NNE	3·9	0·0	0·4	353	0·03
13	..	29·245	40·6	34·2	36·7	33·7	44·7	31·0	39·4	38·0	3·0	4·1	1·7	− 3·8	NNE	NNE	6·4	0·0	1·1	337	0·02
14	..	29·708	37·7	31·0	34·1	31·0	51·8	25·1	39·2	37·8	3·1	6·0	1·4	− 6·3	NNE	NNE	8·2	0·0	1·5	454	0·00
15	..	29·817	32·9	29·1	30·7	28·2	38·8	22·2	38·8	37·4	2·5	3·9	1·6	− 9·5	NNE	NNE : S	1·8	0·0	0·1	185	0·00
16	First Qr.	29·499	34·6	29·6	31·5	29·0	36·7	28·9	38·1	35·0	2·5	5·4	0·0	− 8·5	SE	ENE : NE	3·8	0·0	0·8	453	0·33
17	In Equator	29·917	36·0	27·7	32·4	30·3	57·0	23·8	37·6	35·3	2·1	4·5	1·0	− 7·4	NE : NNE	NNE	3·1	0·0	0·6	384	0·00
18	..	29·985	36·3	25·2	31·1	26·7	59·2	22·1	37·6	35·3	4·4	7·3	1·0	− 8·5	NNE	N : WSW	1·3	0·0	0·1	234	0·01
19	..	29·639	38·9	28·0	33·5	30·3	41·8	22·5	37·2	34·2	3·2	6·0	0·9	− 5·9	WSW : N	NNE : N	1·6	0·0	0·2	282	0·14
20	..	29·359	36·0	26·7	32·1	26·5	40·8	21·1	36·2	33·0	5·6	9·2	2·8	− 7·0	NW : WNW	NW : W	1·2	0·0	0·1	326	0·00
21	Perigee	29·367	34·2	26·8	30·8	25·6	40·4	23·6	35·4	32·5	5·2	7·8	2·5	− 8·0	NNE : NNW	NNW : W	2·0	0·0	0·1	248	0·00
22	..	29·637	30·1	23·2	26·6	26·2	34·0	18·8	35·0	32·2	0·4	2·9	0·0	−11·9	WSW : ENE	ESE : ENE : NNE	0·0	0·0	0·0	101	0·00
23	Full : Greatest Dec. N.	29·796	33·5	18·9	23·5	22·3	35·9	13·2	34·6	32·0	1·2	2·6	0·0	−14·6	WSW : W	WSW ; SSW	0·4	0·0	0·0	134	0·00
24	..	29·356	36·8	33·0	34·0	32·0	37·2	32·0	34·2	31·6	2·0	3·0	0·0	− 3·8	SSW : S	S : ENE : N : NNE	3·0	0·0	0·3	255	0·03
25	..	29·578	35·7	31·6	33·1	31·3	37·0	30·3	34·2	31·6	1·8	3·7	0·9	− 4·5	N : WNW	NE : NNE	0·3	0·0	0·0	154	0·00
26	..	29·845	32·7	26·5	29·3	28·9	33·5	20·7	34·2	31·8	0·4	1·6	0·0	− 8·1	NNE : WNW	WSW : W	0·8	0·0	0·0	151	0·00
27	..	29·995	33·5	29·0	32·0	29·3	43·8	27·0	33·9	32·0	2·7	3·9	1·7	− 5·3	NNE	NNE : W	0·0	0·0	0·0	129	0·00
28	..	30·084	33·7	27·5	30·8	29·3	38·1	23·5	33·9	32·2	1·5	3·1	0·0	− 6·4	WSW : SW	ESE : SSE	0·2	0·0	0·0	143	0·02
29	..	30·061	29·1	20·0	24·8	16·1	40·2	12·9	33·4	32·0	8·7	11·8	0·0	−12·5	SSE	SE : ESE	1·1	0·0	0·1	189	0·00
30	Last Quarter : In Equator.	30·095	29·5	19·8	24·7	21·0	37·2	14·8	33·4	32·0	3·7	6·6	0·0	−12·7	SE : E	ESE : ENE	0·0	0·0	0·0	68	0·00
31	..	30·088	24·5	18·5	21·1	21·0	28·9	18·0	33·2	31·8	0·1	2·1	0·0	−16·4	Calm	E : SE	0·0	0·0	0·0	57	0·00
Means	..	29·612	37·9	28·6	33·2	29·9	46·5	23·7	(28 days) 37·4	21 days (34·0)	3·3	5·7	1·2	− 6·6	...	...	..	..	..	Sum 8848	Sum 1·69

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·989 on the 3rd; the first minimum in the month was 29in·285 on the 6th.
The second maximum ,, was 29in·852 on the 7th; the second minimum ,, was 28in·757 on the 8th.
The third maximum ,, was 29in·577 on the 10th; the absolute minimum ,, was 28in·520 on the 11th.
The fourth maximum ,, was 29in·909 on the 15th; the fourth minimum ,, was 29in·404 on the 16th.
The fifth maximum ,, was 30in·035 on the 18th; the fifth minimum ,, was 29in·281 on the 20th.
The sixth maximum ,, was 29in·827 on the 23rd; the sixth minimum ,, was 29in·299 on the 24th.
The seventh maximum ,, was 30in·125 on the 28th; the seventh minimum ,, was 30in·045 on the 29th.
The absolute maximum ,, was 30in·136 on the 30th.
The range in the month was 1in·616.
The mean for the month was 29in·612, being 0in·194 *lower* than the average of the preceding 33 years.

TEMPERATURE OF THE AIR.

The highest in the month was 53°·3 on the 6th; the lowest was 18°·5 on the 31st.
The range ,, was 34°·8.
The mean ,, of all the highest daily readings was 37°·9, being 7°·1 *lower* than the average of the preceding 33 years.
The mean ,, of all the lowest daily readings was 28°·6, being 7°·0 *lower* than the average of the preceding 33 years.
The mean daily range was 9°·3, being 0°·2 *less* than the average of the preceding 33 years.
The mean for the month was 33°·2, being 7°·1 *lower* than the average of the preceding 33 years.

MONTH and DAY, 1874.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Dec. 1	o	o : w	10, r : 10	9, ci, ci.-cu, cu.-s : 10, sl.-r
2	o	s : w	v : ci	ci, ci.-cu, cu.-s, sl.-sn : o
3	s	s : s	o : o : v, h	ci, ci.-cu, cu, cu.-s : v, th.-cl
4	o : m	s : o	v, sl.-r : ci, ci.-cu, cu	ci, ci.-s, f : o
5	o	m : o	ci, ci.-cu, cu.-s, sl.-r	10 : v : o, h.-d
6	o	o	10, oc.-th.-r	v, r, w : vv
7	o	o	o : o	ci, ci.-cu, cu, cu.-s : o
8	o	o	v : 10, th.-r	10, r, st.-w : 10, st.-w
9	o	o	10, r, st.-w : 10, r, st.-w	v, w : o
10	w	w : s	o : o, f, h.-fr	ci, ci.-cu, f : f, h.-fr
11	wN	w : mN	10, r : 10, r	ci, ci.-cu : 10, oc.-r
12	o	o	10 : 10, r	10, glm, sl.-f : 10, th.-r
13	o	o	10, fr.-shs	10, fr.-shs : v : o
14	o	o	ci, ci.-cu, ci.-s, cu.-s	ci.-cu, cu.-s : v, h.-fr
15	o	m : s	v : 10, h.-fr	10, sl.-f : 10, sl.-f
16	o	o	10, sn : 10, sn	oc.-sn : 10, oc.-sn
17	o	o	ci, ci.-s, cu.-s	ci, ci.-cu, ci.-s, cu.-s : 10, sc
18	o	m : s	ci, ci.-cu, v	ci, ci.-cu, f : v : 10, sn
19	o	wN : o	10, th.-r : ci, ci.-cu, ci.-s, sl.-f	ci, ci.-cu, sn, sl : v : o
20	o	o	v	ci, ci.-cu, ci.-s : o, h
21	o	o	o : ci, ci.-s, v	10 : 10, h, th.-cl
22	o	o	10 : 10	10 : 10, f
23	o	o	10 : v, sl.-f, sl.-sn, h.-fr	o : o : 10, f, li.-cl, r
24	o	o	10, r : 10	10, th.-r : 10, oc.-th.-r
25	o	o	10, f, glm	10, sl.-f : li.-cl, mt
26	o	m : m	10, f	10, glm : 10, sl.-sn
27	m	m : w	li.-cl, sl.-f	10 : 10, sl.-f
28	wN	m : o	10, sl.-sn	10, sl.-sn, sl : 10
29	o	o	v : ci, ci.-cu, cu.-s	v : o : o, h.-fr
30	o	s : s	ci, ci.-cu, f	ci, ci.-cu : 10 : 10
31	o	w : o	10, th.-f, h.-fr	10, f : 10, sl.-f, h.-fr

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $29^{\circ}\cdot9$, being $7^{\circ}\cdot1$ *lower* than the average of the preceding 33 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot166$, being $0^{in}\cdot056$ *less* than the average of the preceding 33 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot0$, being $0^{gr}\cdot6$ *less* than the average of the preceding 33 years.

Degree of Humidity.—The mean for the month was 88 (that of Saturation being represented by 100), being *the same as* the average of the preceding 33 years.

Weight of a Cubic Foot of Air.—The mean for the month was 557 grains, being 5 grains *greater* than the average of the preceding 33 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 7·2.

WIND.

The proportions were of N. 10, S. 4, W. 11, E. 6, and Calm 0. The greatest pressure in the month was $29^{lbs}\cdot0$ on the square foot on the 8th. The mean daily horizontal movement of the air for the month was 285 miles.

RAIN.

Fell on 12 days in the month, amounting to $1^{in}\cdot69$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot28$ *less* than the average fall of the preceding 59 years.

The following table contains the highest and lowest readings of the Barometer, reduced to 32° Fahrenheit, extracted from the photographic records. The readings are accurate; but the times are liable to some uncertainty, as the barometer frequently remains at its highest or lowest point through several hours. The time given is the middle of the stationary period. Where the symbol : follows the time, it denotes that the mercury has been sensibly stationary through a period of more than one hour.

MAXIMA.			MINIMA.			MAXIMA.			MINIMA.		
Approximate Mean Solar Time, 1874.		Reading.	Approximate Mean Solar Time, 1874.		Reading.	Approximate Mean Solar Time, 1874.		Reading.	Approximate Mean Solar Time, 1874.		Reading.
	d h m	in.		d h m	in.		d h m	in.		d h m	in.
January	1. 2.35	30·030	January	3. 1.55	29·065	March	30. 9.10	29·862	March	31. 1.25	29·650
	3. 8. 5:	29·368		3.16.20:	29·274	April	0.23.50	29·935	April	2.15.45	28·989
	5.23. 0	30·208		8.16.10:	29·596		3.19.40	29·352		4.15.20:	29·258
	9.21.50	29·930		10. 2.50:	29·862		6.19. 0	29·906		7.16.45	29·653
	10.22.30	29·973		12. 2.15	29·712		8. 9.45	29·797		11. 2.40	29·038
	12.22.20	29·985		13.18.50:	29·796		12. 9.15	29·550		13. 4.55	29·028
	14.10. 0:	29·858		16. 5. 0:	29·142		14.21.25	29·912		16. 4.30:	29·748
	17.13.55	29·747		18. 6. 0	29·380		17.10.40	29·895		17.17.55	29·815
	18.16. 0	29·502		19. 2. 0	29·443		18.21.30	29·973		21. 4.30:	29·778
	21.22. 0	30·284		23.20. 0	29·944		22. 9.10	30·024		23. 5.40	29·906
	25. 8.55	30·398		26.12.50	30·200		28.10. 0:	30·165		30. 5.40	29·723
	27.23.20	30·389		29.14.30:	30·132	May	1.11.30:	29·948	May	3. 6.40	29·598
	30.23.15	30·358	February	2.17. 0:	30·184		5.11.30:	29·768		8. 3.30	29·428
February	3.23.20	30·473		7.18.40:	29·868		12.23.40	30·198		14.20.45	29·768
	10.11.40	30·452		14.18. 0	29·268		15.19.40	30·204		23. 6. 0:	29·297
	16. 8. 0	29·390		16.22.45	29·072		28. 9.40	29·863		30. 0.45	29·683
	19.22. 0:	30·065		22. 5.30:	29·602	June	0.21.30	30·004	June	2. 4. 0	29·782
	23.21.35	29·904		26.15.20	28·808		3.21.30	30·300		6. 3. 0	29·900
	27.23.40	29·851	March	0.17. 0	29·733		7.20. 0:	30·097		9. 6.30	29·920
March	3.21.10	30·424		5. 4. 0	30·332		10.11.30	30·132		11. 6.30	29·898
	5.22.40	30·560		8.23.20	29·349		12. 9.20	30·250		13. 4.15	30·176
	11.18.40:	30·078		12. 3.20	29·930		14.19.30	30·393		16.18.45	29·919
	13.21. 0	30·335		17.23.40	29·862		18.11.50	30·155		21.14.40	29·767
	18.13. 0	29·999		19. 5.50	29·590		22.10.45	29·858		26.17. 0	29·433
	20.13.45	30·056		21.16.15	29·890		28.22. 0	29·796		29.13. 0	29·703
	23.21.50	30·172		24. 2.30	30·093	July	0.23.15	29·882	July	2. 0.35	29·680
	24.19.45	30·286		27. 6.10:	29·779		5.20. 0	30·140		8. 4.40	29·913
	27.22. 0	29·981		29. 9.40	29·630		8.20. 5	29·970		11. 5.20	29·763

MAXIMA.

Approximate Mean Solar Time, 1874.		Reading.
	d h m	in.
July	12. 22. 10	29·968
	17. 11. 50	30·105
	22. 2. 0	29·763
	24. 19. 40	29·777
	26. 20. 40	29·589
	30. 20. 50	29·903
August	3. 11. 40	29·893
	4. 18. 0	29·698
	6. 10. 30:	29·784
	8. 22. 30:	29·681
	11. 9. 5	29·606
	18. 21. 15	30·245
	20. 22. 0	30·314
	25. 10. 30	29·942
	28. 9. 30:	29·730
	29. 21. 0	29·758
	31. 4. 40	29·695
September	2. 9. 30	29·825
	4. 21. 5	29·864
	6. 21. 30	29·864
	10. 14. 30	29·623
	13. 20. 30	30·216
	18. 20. 30	29·903
	22. 11. 20	29·862
	24. 20. 30	30·105
	29. 11. 30:	29·670
October	1. 13. 30	29·390
	3. 10. 30	29·325

MINIMA.

Approximate Mean Solar Time, 1874.		Reading.
	d h m	in.
July	14. 6. 20	29·845
	20. 23. 30	29·594
	24. 0. 20	29·620
	26. 1. 30:	29·512
	28. 6. 50	29·450
August	2. 6. 30	29·578
	4. 5. 10	29·550
	5. 7. 35	29·411
	8. 2. 5	29·468
	10. 2. 0	29·366
	13. 16. 30:	29·240
	19. 5. 0	30·159
	25. 3. 0	29·851
	27. 14. 20	29·584
	29. 2. 15	29·548
	30. 15. 30	29·548
September	0. 21. 10	29·539
	3. 9. 20	29·343
	6. 4. 0	29·760
	9. 0. 35	29·295
	11. 10. 30	29·301
	16. 16. 15:	29·662
	21. 3. 40	29·435
	23. 3. 20	29·740
	28. 17. 0	29·493
October	0. 18. 0	29·270
	2. 1. 30	29·101
	4. 1. 45	29·175

MAXIMA.

Approximate Mean Solar Time, 1874.		Reading.
	d h m	in.
October	5. 8. 45	29·918
	7. 23. 30	29·820
	11. 19. 35	30·019
	17. 20. 40	29·855
	19. 22. 0	30·123
	23. 20. 50	30·008
	25. 20. 45	30·028
	30. 22. 0	30·118
November	3. 21. 20	30·038
	7. 20. 20	30·380
	10. 10. 50	30·030
	12. 8. 0	29·848
	13. 22. 0	30·000
	16. 1. 50	29·558
	17. 11. 0:	29·808
	21. 8. 30	29·986
	23. 21. 15	30·045
	29. 11. 40	28·908
December	3. 9. 10	30·000
	7. 11. 30:	29·883
	9. 23. 30	29·580
	14. 21. 40	29·922
	17. 22. 15	30·051
	22. 22. 0	29·855
	28. 9. 50:	30·131
	29. 21. 40:	30·136
	31. 9. 0	30·120

MINIMA.

Approximate Mean Solar Time, 1874.		Reading.
	d h m	in.
October	6. 22. 40	29·029
	8. 22. 0	29·698
	15. 2. 30:	29·285
	18. 18. 0:	29·688
	21. 2. 35	29·327
	24. 19. 30	29·810
	28. 3. 0	29·831
November	2. 3. 30	29·896
	5. 4. 40	29·905
	9. 18. 0	29·930
	11. 16. 40	29·737
	12. 23. 40	29·605
	15. 15. 0:	29·455
	16. 11. 50	29·340
	19. 4. 15	29·460
	22. 10. 0	29·870
	28. 21. 50	28·470
	29. 19. 45	28·744
December	6. 5. 0	29·090
	8. 16. 0	28·439
	11. 7. 0:	28·472
	15. 17. 10	29·342
	20. 13. 10	29·250
	24. 0. 45	29·290
	29. 2. 30	30·035
	30. 14. 0	30·050

ABSOLUTE MAXIMA AND MINIMA READINGS OF THE BAROMETER for each Month in the YEAR 1874.

[Extracted from the preceding Table.]

1874, MONTH.	Readings of the Barometer.		Range of Reading in each Month.
	Maxima.	Minima.	
	in.	in.	in.
January	30·398	29·065	1·333
February	30·473	28·808	1·665
March	30·560	29·349	1·211
April	30·165	28·989	1·176
May	30·204	29·297	0·907
June	30·393	29·433	0·960
July	30·140	29·450	0·690
August	30·314	29·240	1·074
September	30·216	29·295	0·921
October	30·123	29·029	1·094
November	30·380	28·470	1·910
December	30·136	28·439	1·697

The highest reading in the year was $30^{in.}560$ on March 6. The lowest reading in the year was $28^{in.}439$ on December 9.
The range of reading in the year was $2^{in.}121$.

MONTHLY MEANS of RESULTS for METEOROLOGICAL ELEMENTS.

1874, MONTH.	Mean Reading of the Barometer.	Temperature of the Air. Highest.	Lowest.	Range in the Month.	Mean of all the Highest.	Mean of all the Lowest.	Mean Daily Range.	Mean Temperature.	Mean Temperature of Dew Point.	Mean Elastic Force of Vapour.	Mean Weight of Vapour in a Cubic Foot of Air.	Mean additional Weight required to saturate a Cubic Foot of Air.
	in.	°	°	°	°	°	°	°	°	in.	grs.	gr.
January ..	29·891	55·0	28·1	26·9	47·3	36·2	11·1	41·7	38·0	0·229	2·6	0·4
February..	29·852	55·9	21·0	34·9	45·0	33·5	11·5	38·7	34·2	0·197	2·3	0·5
March	30·013	65·4	22·6	42·8	52·8	36·6	16·2	43·7	38·2	0·231	2·7	0·6
April	29·704	79·7	30·5	49·2	61·5	41·3	20·2	50·0	43·6	0·284	3·3	0·8
May	29·803	77·6	31·1	46·5	63·2	40·7	22·5	50·5	42·8	0·275	3·2	1·0
June	29·939	83·7	37·5	46·2	71·1	48·3	22·8	58·0	49·5	0·355	3·9	1·5
July......	29·826	92·0	46·2	45·8	79·0	53·6	25·4	64·4	54·6	0·427	4·7	2·0
August ...	29·783	81·2	44·0	37·2	72·1	51·5	20·6	60·3	53·3	0·407	4·5	1·3
September.	29·752	78·1	43·4	34·7	68·4	50·3	18·1	57·9	53·1	0·404	4·5	0·8
October ...	29·708	69·6	36·0	33·6	59·5	45·7	13·8	51·7	48·7	0·344	3·9	0·4
November .	29·779	62·6	25·0	37·6	48·4	36·6	11·8	42·0	38·2	0·231	2·7	0·4
December .	29·612	53·3	18·5	34·8	37·9	28·6	9·3	33·2	29·9	0·166	2·0	0·2
Means	29·805	Highest. 92·0	Lowest. 18·5	Annual Range. 73·5	58·8	41·9	16·9	49·3	43·7	0·296	3·4	0·8

1874, MONTH.	Mean Degree of Humidity. (Saturation = 100.)	Mean Weight of a Cubic Foot of Air.	Mean Amount of Cloud. (0—10.)	Rain. Number of Rainy Days.	Amount collected on the Ground. Gauge read Daily.	Gauge read Monthly.	Wind. From Osler's Anemometer. Number of Hours of Prevalence of each Wind, referred to different Points of Azimuth. N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Number of Calm or nearly Calm Hours.	Mean Daily Pressure in lbs. on the Square Foot.	From Robinson's Anemometer. Mean Daily Horizontal Movement of the Air in Miles.
		grs.			in.	in.											
January.........	87	552	6·6	12	1·00	1·00	61	9	4	14	71	265	256	59	5	0·59	334
February........	85	555	7·1	9	0·94	1·01	86	39	46	64	107	177	75	45	33	0·44	261
March	81	552	6·5	11	0·45	0·58	85	48	28	36	26	203	221	76	21	0·72	339
April...........	79	539	5·8	12	1·35	1·33	46	66	111	36	36	214	161	50	0	0·56	306
May.............	76	541	6·8	7	0·42	0·50	183	171	101	36	19	100	121	13	0	0·17	226
June............	74	535	6·4	11	2·42	2·43	81	195	101	48	38	172	70	15	0	0·24	247
July............	70	526	5·7	10	2·59	2·38	34	58	81	60	50	220	216	12	13	0·24	220
August	78	530	6·8	12	1·44	1·42	17	43	56	44	25	311	213	35	0	0·54	301
September.......	84	531	6·8	16	2·22	2·40	27	20	34	43	126	318	137	15	0	0·44	259
October.........	90	537	7·2	17	3·58	3·60	20	39	53	35	136	288	148	25	0	0·59	293
November.......	87	550	6·6	10	1·85	1·78	98	36	37	106	65	136	127	81	34	0·42	259
December	88	557	7·2	12	1·69	1·75	144	139	41	44	36	90	168	70	12	0·53	285
Sums	..	..	..	139	19·95	20·18	882	863	693	566	735	2494	1913	496	118	..	..
Means	82	542	6·6	..	..	..	..	..	..	..	..	..	..	..	..	0·46	277

(I.)—Reading of a Thermometer whose bulb is sunk to the depth of 25·6 feet (24 French feet) below the surface of the soil, at Noon on every Day.

Days of the Month, 1874.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	52·62	51·95	51·33	50·60	50·05	49·87	50·10	50·72	51·64	52·43	52·97	53·13
2	52·59	51·95	51·28	50·60	50·04	49·90	50·13	50·75	51·64	52·40	53·00	53·11
3	52·57	51·92	51·27	50·53	49·99	49·88	50·15	50·76	51·67	52·46	53·02	53·12
4	52·54	51·88	51·23	50·50	49·99	49·89	50·13	50·77	51·68	52·48	53·04	53·14
5	52·52	51·85	51·21	50·49	50·02	49·87	50·17	50·82	51·72	52·45	53·06	53·15
6	52·52	51·83	51·18	50·48	49·96	49·91	50·18	50·83	51·77	52·52	53·07	53·16
7	52·48	51·81	51·14	50·48	49·97	49·90	50·20	50·86	51·79	52·53	53·07	53·13
8	52·42	51·78	51·14	50·50	49·94	49·92	50·25	50·90	51·83	52·50	53·04	53·15
9	52·47	51·76	51·10	50·43	49·96	49·92	50·26	50·93	51·84	52·57	53·07	53·11
10	52·47	51·74	51·11	50·37	49·93	49·90	50·27	50·93	51·87	52·57	53·07	53·08
11	52·42	51·72	51·06	50·33	49·93	49·92	50·29	50·97	51·88	52·65	53·04	53·11
12	52·37	51·68	51·00	50·35	49·91	49·93	50·28	51·01	51·92	52·71	53·05	53·12
13	52·41	51·69	51·01	50·33	49·90	49·93	50·31	51·03	51·95	52·71	53·07	53·08
14	52·37	51·66	50·97	50·31	49·87	49·93	50·36	51·05	51·98	52·70	53·10	53·07
15	52·35	51·65	50·98	50·30	49·90	49·93	50·37	51·10	52·03	52·74	53·10	53·06
16	52·33	51·63	50·95	50·27	49·87	49·95	50·45	51·13	52·05	52·75	53·11	53·07
17	52·27	51·58	50·91	50·26	49·88	49·91	50·40	51·16	52·05	52·76	53·12	53·04
18	52·27	51·61	50·92	50·26	49·89	49·97	50·43	51·18	52·10	52·78	53·16	53·03
19	52·26	51·53	50·88	50·27	49·86	49·96	50·43	51·23	52·14	52·78	53·13	53·03
20	52·25	51·49	50·85	50·23	49·87	49·92	50·43	51·28	52·17	52·80	53·07	53·00
21	52·25	51·50	50·85	50·21	49·87	49·97	50·47	51·28	52·18	52·83	53·12	53·00
22	52·17	51·50	50·84	50·19	49·90	50·01	50·49	51·33	52·22	52·82	53·08	52·96
23	52·20	51·50	50·82	50·18	49·84	49·99	50·50	51·35	52·23	52·84	53·13	52·95
24	52·17	51·42	50·77	50·16	49·87	50·01	50·55	51·38	52·26	52·87	53·10	52·95
25	52·13	51·38	50·74	50·14	49·88	50·03	50·55	51·43	52·31	52·88	53·13	52·97
26	52·10	51·36	50·73	50·15	49·86	50·02	50·59	51·44	52·33	52·90	53·10	52·92
27	52·10	51·36	50·69	50·11	49·87	50·04	50·59	51·47	52·33	52·94	53·13	52·92
28	52·04	51·28	50·70	50·10	49·87	50·09	50·61	51·50	52·36	52·95	53·12	52·90
29	52·03		50·67	50·07	49·87	50·07	50·64	51·52	52·41	52·94	53·15	52·88
30	52·00		50·63	50·08	49·87	50·07	50·67	51·56	52·40	52·95	53·14	52·86
31	51·95		50·62		49·91		50·72	51·60		52·91		52·82
Means.	52·32	51·65	50·95	50·31	49·91	49·95	50·39	51·14	52·03	52·71	53·09	53·03

(II.)—Reading of a Thermometer whose bulb is sunk to the depth of 12·8 feet (12 French feet) below the surface of the soil, at Noon on every Day.

Days of the Month, 1874.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	50·93	49·25	48·04	47·41	48·22	49·95	52·45	55·07	56·40	56·63	55·76	53·81
2	50·92	49·22	47·98	47·45	48·30	50·05	52·58	55·23	56·47	56·58	55·70	53·66
3	50·87	49·22	47·94	47·40	48·36	50·07	52·64	55·27	56·46	56·56	55·69	53·60
4	50·78	49·14	47·89	47·40	48·43	50·14	52·66	55·31	56·43	56·54	55·65	53·56
5	50·69	49·10	47·86	47·44	48·56	50·22	52·75	55·38	56·52	56·54	55·62	53·42
6	50·70	49·10	47·86	47·49	48·61	50·31	52·78	55·49	56·54	56·54	55·57	53·34
7	50·61	49·04	47·88	47·53	48·71	50·36	52·90	55·57	56·58	56·50	55·51	53·16
8	50·57	49·00	47·79	47·50	48·74	50·44	53·00	55·63	56·58	56·55	55·38	53·15
9	50·49	48·96	47·78	47·55	48·87	50·55	53·07	55·63	56·58	56·54	55·41	52·93
10	50·47	48·89	47·72	47·54	48·90	50·63	53·16	55·69	56·67	56·56	55·32	52·79
11	50·40	48·90	47·73	47·64	48·97	50·74	53·20	55·74	56·63	56·57	55·20	52·68
12	50·33	48·83	47·65	47·68	49·05	50·81	53·22	55·81	56·65	56·55	55·15	52·60

(II.)—Reading of a Thermometer whose bulb is sunk to the depth of 12·8 feet (12 French feet) below the surface of the soil, at Noon on every Day—*concluded.*

Days of the Month, 1874.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
13	50 ·25	48 ·84	47 ·68	47 ·67	49 ·10	50 ·90	53 ·31	55 ·80	56 ·70	56 ·57	55 ·14	52 ·52
14	50 ·19	48 ·77	47 ·66	47 ·64	49 ·19	50 ·96	53 ·45	55 ·87	56 ·72	56 ·45	55 ·12	52 ·34
15	50 ·14	48 ·76	47 ·70	47 ·70	49 ·20	51 ·07	53 ·50	55 ·95	56 ·75	56 ·47	55 ·09	52 ·25
16	50 ·05	48 ·75	47 ·65	47 ·71	49 ·26	51 ·15	53 ·60	55 ·96	56 ·75	56 ·42	55 ·04	52 ·17
17	49 ·94	48 ·71	47 ·60	47 ·77	49 ·31	51 ·26	53 ·61	56 ·02	56 ·67	56 ·35	54 ·98	52 ·02
18	49 ·90	48 ·65	47 ·60	47 ·80	49 ·38	51 ·40	53 ·77	56 ·02	56 ·70	56 ·33	54 ·98	51 ·94
19	49 ·87	48 ·57	47 ·57	47 ·85	49 ·39	51 ·48	53 ·87	56 ·11	56 ·77	56 ·25	54 ·85	51 ·86
20	49 ·81	48 ·45	47 ·60	47 ·85	49 ·44	51 ·55	54 ·07	56 ·16	56 ·75	56 ·19	54 ·80	51 ·78
21	49 ·71	48 ·40	47 ·55	47 ·87	49 ·49	51 ·70	54 ·03	56 ·11	56 ·71	56 ·22	54 ·66	51 ·58
22	49 ·68	48 ·33	47 ·53	47 ·90	49 ·56	51 ·86	54 ·13	56 ·15	56 ·70	56 ·09	54 ·55	51 ·50
23	49 ·68	48 ·26	47 ·50	47 ·93	49 ·51	51 ·88	54 ·24	56 ·21	56 ·70	56 ·06	54 ·51	51 ·40
24	49 ·56	48 ·24	47 ·48	47 ·95	49 ·63	51 ·93	54 ·34	56 ·20	56 ·69	56 ·10	54 ·42	51 ·33
25	49 ·52	48 ·20	47 ·41	47 ·96	49 ·64	52 ·05	54 ·41	56 ·24	56 ·74	56 ·04	54 ·40	51 ·26
26	49 ·49	48 ·15	47 ·51	48 ·01	49 ·64	52 ·09	54 ·54	56 ·24	56 ·69	56 ·03	54 ·23	51 ·10
27	49 ·51	48 ·12	47 ·46	48 ·04	49 ·72	52 ·18	54 ·61	56 ·30	56 ·65	56 ·02	54 ·20	51 ·01
28	49 ·49	48 ·17	47 ·45	48 ·10	49 ·73	52 ·28	54 ·71	56 ·28	56 ·65	56 ·00	54 ·07	50 ·86
29	49 ·36		47 ·52	48 ·10	49 ·77	52 ·33	54 ·80	56 ·29	56 ·68	55 ·78	54 ·07	50 ·80
30	49 ·37		47 ·38	48 ·20	49 ·85	52 ·42	54 ·96	56 ·38	56 ·61	55 ·84	53 ·95	50 ·68
31	49 ·27		47 ·37		49 ·93		55 ·06	56 ·39		55 ·80		50 ·58
Means .	50 ·08	48 ·71	47 ·66	47 ·74	49 ·18	51 ·16	53 ·66	55 ·89	56 ·64	56 ·31	54 ·97	52 ·18

(III.)—Reading of a Thermometer whose bulb is sunk to the depth of 6·4 feet (6 French feet) below the surface of the soil, at Noon on every Day.

Days of the Month, 1874.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	48 ·62	47 ·29	45 ·83	47 ·17	50 ·80	53 ·07	56 ·83	60 ·83	60 ·58	59 ·10	55 ·90	50 ·42
2	48 ·49	47 ·29	45 ·88	47 ·33	51 ·00	53 ·29	57 ·01	60 ·82	60 ·51	59 ·07	55 ·87	50 ·28
3	48 ·39	47 ·24	45 ·89	47 ·39	51 ·11	53 ·49	57 ·07	60 ·78	60 ·45	59 ·04	55 ·80	50 ·25
4	48 ·29	47 ·17	45 ·94	47 ·45	51 ·21	53 ·72	57 ·15	60 ·71	60 ·38	59 ·01	55 ·75	50 ·12
5	48 ·19	47 ·17	46 ·09	47 ·54	51 ·33	53 ·99	57 ·35	60 ·72	60 ·44	58 ·92	55 ·68	50 ·09
6	48 ·17	47 ·11	46 ·17	47 ·71	51 ·31	54 ·29	57 ·48	60 ·79	60 ·42	58 ·80	55 ·58	49 ·92
7	48 ·05	47 ·04	46 ·19	47 ·80	51 ·32	54 ·48	57 ·67	60 ·79	60 ·50	58 ·60	55 ·47	49 ·73
8	47 ·93	46 ·96	46 ·25	47 ·79	51 ·25	54 ·73	57 ·85	60 ·71	60 ·28	58 ·40	55 ·31	49 ·62
9	47 ·79	46 ·89	46 ·29	47 ·81	51 ·27	55 ·01	58 ·01	60 ·61	60 ·16	58 ·20	55 ·31	49 ·41
10	47 ·72	46 ·71	46 ·27	47 ·82	51 ·22	55 ·20	58 ·13	60 ·61	60 ·12	58 ·01	55 ·17	49 ·23
11	47 ·63	46 ·67	46 ·23	47 ·92	51 ·22	55 ·42	58 ·20	60 ·56	60 ·02	57 ·89	54 ·98	49 ·20
12	47 ·54	46 ·48	46 ·13	47 ·93	51 ·10	55 ·54	58 ·61	60 ·51	59 ·94	57 ·69	54 ·88	49 ·12
13	47 ·50	46 ·33	46 ·11	48 ·02	51 ·18	55 ·70	58 ·82	60 ·42	60 ·01	57 ·60	54 ·76	48 ·92
14	47 ·45	46 ·17	45 ·97	48 ·00	51 ·09	55 ·80	59 ·07	60 ·41	59 ·79	57 ·40	54 ·60	48 ·79
15	47 ·48	46 ·05	45 ·88	48 ·02	51 ·11	55 ·98	59 ·27	60 ·38	59 ·73	57 ·39	54 ·39	48 ·67
16	47 ·39	45 ·92	45 ·79	48 ·05	51 ·12	56 ·09	59 ·46	60 ·29	59 ·61	57 ·31	54 ·09	48 ·61
17	47 ·37	45 ·91	45 ·75	48 ·10	51 ·19	56 ·11	59 ·66	60 ·22	59 ·42	57 ·27	53 ·83	48 ·41
18	47 ·42	46 ·00	45 ·68	48 ·15	51 ·22	56 ·19	59 ·85	60 ·12	59 ·40	57 ·26	53 ·67	48 ·28
19	47 ·47	45 ·99	45 ·72	48 ·24	51 ·21	56 ·20	60 ·06	60 ·18	59 ·42	57 ·22	53 ·44	48 ·10
20	47 ·45	46 ·03	45 ·82	48 ·30	51 ·31	56 ·21	60 ·28	60 ·17	59 ·37	57 ·18	53 ·28	47 ·90
21	47 ·39	46 ·10	45 ·98	48 ·43	51 ·40	56 ·29	60 ·28	60 ·17	59 ·26	57 ·20	53 ·12	47 ·72
22	47 ·45	46 ·03	46 ·06	48 ·60	51 ·61	56 ·37	60 ·44	60 ·12	59 ·19	57 ·05	52 ·98	47 ·51
23	47 ·50	45 ·97	46 ·11	48 ·79	51 ·51	56 ·41	60 ·66	60 ·23	59 ·13	56 ·97	52 ·87	47 ·32
24	47 ·47	45 ·86	46 ·20	48 ·91	51 ·71	56 ·39	60 ·78	60 ·31	59 ·13	56 ·90	52 ·70	47 ·18
25	47 ·46	45 ·82	46 ·26	49 ·29	51 ·82	56 ·47	60 ·88	60 ·40	59 ·18	56 ·68	52 ·49	47 ·07
26	47 ·46	45 ·82	46 ·43	49 ·57	51 ·96	56 ·51	60 ·96	60 ·46	59 ·09	56 ·50	52 ·19	46 ·80

(III.)—Reading of a Thermometer whose bulb is sunk to the depth of 6·4 feet (6 French feet) below the surface of the soil, at Noon on every Day—*concluded.*

Days of the Month, 1874.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
27	47·50	45·82	46·62	49·81	52·19	56·61	60·95	60·56	59·04	56·33	51·98	46·67
28	47·42	45·82	46·70	50·10	52·31	56·63	61·05	60·51	59·05	56·20	51·68	46·46
29	47·37		46·82	50·31	52·47	56·73	60·99	60·50	59·10	56·08	51·51	46·33
30	47·37		46·88	50·62	52·67	56·83	61·04	60·59	59·05	56·00	51·18	46·17
31	47·28		46·99		52·90		60·98	60·58		55·90		46·00
Means.	47·68	46·42	46·16	48·37	51·49	55·52	59·25	60·49	59·73	57·52	54·02	48·40

(IV.)—Reading of a Thermometer whose bulb is sunk to the depth of 3·2 feet (3 French feet) below the surface of the soil, at Noon on every Day.

Days of the Month, 1874.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	44·12	44·20	43·33	47·02	53·32	56·41	59·43	63·22	62·30	59·93	54·38	45·30
2	44·18	44·12	43·60	47·04	53·20	57·01	60·18	63·47	62·49	59·80	54·10	45·49
3	44·37	44·16	43·83	47·13	52·92	57·59	60·50	63·61	62·39	59·48	53·92	45·20
4	44·32	44·02	44·09	47·23	52·42	58·09	61·01	63·61	62·04	58·73	53·84	44·80
5	44·28	43·90	44·11	46·99	52·04	58·42	61·28	63·36	61·81	58·05	53·67	44·42
6	43·98	43·61	44·11	46·86	51·70	58·87	61·19	63·03	61·36	57·31	53·58	44·57
7	43·50	43·21	44·09	46·86	51·53	59·33	61·30	62·89	61·10	56·58	53·67	44·75
8	43·40	42·98	44·00	46·90	51·34	59·50	61·58	62·91	60·90	56·42	53·48	44·88
9	43·19	42·75	43·80	47·15	51·36	59·53	62·02	62·80	60·88	56·10	53·03	44·65
10	43·46	42·42	43·65	47·07	51·05	59·69	62·72	62·61	60·77	55·98	52·75	44·79
11	43·50	42·10	43·20	47·20	50·92	59·99	63·46	62·41	60·30	55·90	52·52	44·40
12	44·03	41·58	42·43	47·08	50·88	59·76	64·19	62·12	60·00	55·93	51·89	44·02
13	44·00	41·18	42·05	47·03	50·83	59·73	64·24	61·83	59·89	56·13	51·03	43·92
14	43·83	41·40	41·82	46·81	50·77	59·55	64·47	61·78	59·78	56·20	50·43	43·80
15	44·00	42·00	42·13	46·83	51·02	59·35	64·70	61·60	59·70	56·50	49·94	43·65
16	44·32	42·71	42·41	46·96	51·19	59·21	65·02	61·39	59·60	56·70	49·61	43·31
17	44·54	43·22	42·97	47·28	51·23	59·21	65·14	61·40	59·62	56·76	49·50	42·89
18	44·37	43·30	43·45	47·72	51·50	58·90	65·19	61·39	59·70	56·64	49·70	42·59
19	44·20	43·02	43·98	48·00	51·71	58·72	65·32	61·58	59·59	56·51	49·77	42·33
20	44·34	42·70	44·18	48·56	51·99	58·60	65·68	62·02	59·40	56·39	49·88	42·10
21	44·69	42·43	44·23	49·24	52·10	58·73	65·90	62·42	59·45	56·10	49·57	41·79
22	44·91	42·36	44·33	50·00	52·43	58·84	66·22	62·95	59·68	55·60	49·00	41·60
23	44·80	42·30	44·70	50·73	52·83	58·91	66·11	63·10	59·60	55·01	48·50	41·21
24	44·62	42·53	45·19	51·21	53·48	59·21	65·70	63·11	59·42	54·42	47·80	40·96
25	44·54	42·80	45·54	51·91	53·80	59·32	65·31	63·17	59·51	53·90	47·19	40·75
26	44·47	42·67	45·60	52·15	54·12	59·22	64·80	63·10	59·59	53·90	46·69	40·48
27	44·27	42·72	45·74	52·69	54·28	59·11	64·61	62·98	59·75	54·22	46·38	40·46
28	44·25	43·10	45·82	53·16	54·59	59·13	64·49	62·82	59·90	54·51	45·88	40·31
29	44·27		46·20	53·49	55·02	59·40	64·02	62·67	60·09	54·74	45·62	40·26
30	44·39		46·53	53·54	55·51	59·39	63·69	62·50	60·03	54·80	45·62	40·08
31	44·29		46·80		55·97		63·37	62·20		54·60		39·78
Means.	44·18	42·84	44·13	48·73	52·49	58·96	63·64	62·58	60·35	56·25	50·43	42·89

(V.)—Reading of a Thermometer whose bulb is sunk to the depth of 1 inch below the surface of the soil, at Noon on every Day.

Days of the Month, 1874.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	41·0	44·0	45·2	47·0	53·3	63·7	62·1	65·0	65·8	60·8	50·3	41·5
2	44·9	41·8	44·2	50·8	51·0	66·0	67·3	66·7	63·4	57·3	50·3	37·0
3	43·0	41·3	44·1	48·9	49·9	63·3	65·8	64·4	61·9	53·7	51·8	35·2
4	40·8	39·6	41·5	44·3	49·0	63·0	64·9	62·2	59·5	53·3	51·0	38·0
5	38·7	37·3	41·9	45·4	48·3	64·9	63·0	61·0	58·5	51·2	51·8	43·2
6	38·0	35·6	43·9	46·1	51·5	67·0	64·0	62·2	59·0	51·9	53·9	45·8
7	40·1	36·0	40·9	46·7	51·0	62·9	64·0	64·9	60·0	53·7	51·2	40·5
8	38·8	40·0	40·5	47·8	49·8	62·4	67·0	64·0	61·5	50·8	45·0	42·3
9	42·9	35·5	42·2	47·9	48·3	62·7	69·9	62·0	60·0	54·0	51·0	41·9
10	44·2	35·7	37·2	46·9	48·8	65·0	72·2	62·9	57·1	54·0	50·5	36·0
11	41·0	34·5	33·0	46·1	49·2	62·6	71·6	60·3	57·0	55·3	43·0	40·6
12	43·0	35·1	35·6	46·0	48·4	60·4	67·8	60·0	59·0	56·0	41·5	40·2
13	39·9	41·3	38·0	44·6	50·5	59·8	68·6	61·8	57·1	57·1	43·0	38·0
14	44·5	44·3	45·6	46·9	52·0	59·0	70·0	60·3	58·1	56·0	42·0	37·9
15	46·0	48·0	44·0	46·2	51·2	59·2	70·2	60·2	59·0	58·2	44·5	35·8
16	45·4	45·5	44·9	48·7	50·3	60·0	68·7	62·6	60·9	57·1	45·8	36·4
17	40·9	44·0	47·5	49·0	51·0	57·9	67·1	61·0	57·2	55·0	46·2	35·7
18	42·3	39·5	47·0	51·2	52·0	58·8	67·0	61·9	57·8	55·5	48·0	35·9
19	43·8	38·9	44·9	53·2	54·3	57·2	69·3	66·0	58·0	55·3	48·2	36·0
20	47·7	36·0	44·0	54·0	53·9	59·5	72·1	66·0	60·2	52·0	45·0	35·0
21	44·9	38·9	45·0	56·8	55·0	58·0	71·0	65·5	62·0	54·0	40·7	34·4
22	40·0	43·0	48·2	58·0	58·6	60·1	67·6	63·9	60·8	50·0	38·9	32·5
23	44·1	42·6	49·0	57·2	56·9	62·9	67·5	64·0	57·7	47·0	38·1	30·6
24	44·9	42·3	47·0	56·4	58·7	61·1	65·6	62·5	60·0	49·1	36·2	35·0
25	41·0	38·0	45·9	58·9	61·0	60·1	64·0	64·2	62·2	52·9	39·8	35·7
26	41·5	42·0	45·0	58·4	57·9	60·1	64·2	62·0	61·4	54·2	37·2	32·8
27	44·1	44·3	47·4	59·4	58·8	61·0	64·3	63·7	60·2	55·0	37·0	34·8
28	43·1	42·0	48·3	58·0	61·3	60·1	63·3	62·5	62·3	56·2	38·0	34·0
29	42·8		51·0	54·2	61·5	62·0	62·8	61·0	61·2	54·0	44·0	31·9
30	43·0		49·2	53·3	61·2	63·1	63·4	61·8	58·9	52·6	43·1	30·8
31	39·3		50·6		61·7		64·0	63·6		51·7		30·0
Means.	42·4	40·3	44·3	50·9	53·8	61·5	66·8	62·9	59·9	54·0	44·9	36·6

(VI.)—Reading of a Thermometer within the case covering the deep-sunk Thermometers, whose bulb is placed on a level with their scales, at Noon on every Day.

Days of the Month, 1874.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	44·7	46·0	54·1	53·1	57·0	74·4	62·9	66·9	73·3	67·4	49·4	40·5
2	49·5	42·1	48·2	55·8	54·8	79·0	82·5	71·5	69·4	56·4	51·7	33·8
3	45·0	41·8	47·1	51·8	50·4	68·0	71·3	67·2	63·9	56·1	56·1	33·8
4	40·0	41·5	45·4	45·4	50·5	73·9	69·5	60·2	58·3	51·7	58·3	43·6
5	38·9	32·4	42·7	47·5	52·8	76·5	70·2	61·3	63·5	54·0	57·9	49·6
6	42·6	31·5	47·2	52·9	54·7	76·0	71·3	68·4	59·6	55·8	58·6	51·2
7	44·8	35·6	42·3	55·2	58·0	68·3	73·0	71·4	64·2	52·2	52·4	41·9
8	40·2	41·0	48·7	53·2	50·7	71·0	80·2	70·2	65·4	54·5	44·1	44·4
9	48·3	34·7	39·8	51·3	52·2	75·0	84·9	66·5	61·5	58·1	54·0	40·2
10	50·0	34·7	35·2	50·6	52·4	70·5	84·3	66·1	59·0	60·2	50·2	30·4
11	36·0	34·7	32·7	47·8	54·5	73·5	74·0	63·6	58·6	61·0	40·0	45·6
12	46·9	39·5	34·6	46·3	53·0	63·8	71·7	64·9	62·3	61·7	41·0	38·8
13	42·0	47·8	42·5	42·7	55·0	64·0	74·6	62·8	63·6	64·8	43·5	37·8
14	50·4	50·0	48·7	50·4	55·6	61·8	78·8	62·6	63·7	58·0	42·2	36·8
15	49·2	50·0	50·9	48·3	50·0	66·2	77·0	65·6	66·8	63·2	47·9	30·5

(VI.)—Reading of a Thermometer within the case covering the deep-sunk Thermometers, whose bulb is placed on a level with their scales, at Noon on every Day—*concluded.*

Days of the Month, 1874.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
16	49·7	47·2	51·6	52·9	56·2	64·8	74·3	67·4	66·9	57·4	47·3	33·4
17	39·7	44·5	53·0	55·0	57·9	61·6	73·7	66·5	55·6	57·9	47·0	34·5
18	44·0	40·7	52·2	58·7	58·8	60·0	75·0	66·5	62·5	60·7	53·3	34·9
19	45·0	42·5	49·4	64·2	60·3	59·4	79·9	75·7	66·0	57·7	49·0	38·3
20	53·2	32·1	46·1	65·6	63·3	60·2	85·0	76·0	69·2	55·5	46·0	33·8
21	49·8	45·7	50·9	73·8	64·3	65·0	76·4	69·1	67·4	56·3	35·2	32·4
22	36·8	45·3	55·7	68·7	70·9	69·6	69·5	71·6	67·2	51·3	34·8	29·1
23	50·0	43·2	57·3	70·9	58·0	69·4	73·5	71·2	59·2	47·9	37·0	24·8
24	42·5	43·6	46·7	60·2	68·6	63·9	69·2	68·0	66·9	54·8	34·9	35·0
25	40·5	44·3	52·4	67·2	66·8	64·2	71·1	71·8	75·0	56·9	38·7	34·2
26	45·5	44·7	48·7	70·3	67·4	63·1	68·0	69·6	70·6	57·6	33·2	30·2
27	48·4	50·5	60·4	71·5	70·9	66·2	64·3	71·6	67·0	60·4	37·0	33·0
28	45·7	48·1	56·8	64·5	69·6	59·8	64·4	66·6	68·1	60·8	37·5	33·4
29	42·7		57·0	58·5	68·5	67·3	66·7	62·0	65·8	55·8	45·7	27·9
30	46·2		53·2	62·0	71·2	74·2	72·5	71·2	63·5	51·8	44·2	28·0
31	42·3		54·5		73·0		71·1	69·5		51·5		24·1
Means .	44·9	42·0	48·6	57·2	59·6	67·7	73·6	67·9	64·8	57·1	45·6	35·7

WEEKLY MEANS of READINGS of THERMOMETERS.

1874. Period.		Thermometers sunk in the ground. Bulb 24 French Feet deep.	Bulb 12 French Feet deep.	Bulb 6 French Feet deep.	Bulb 3 French Feet deep.	Bulb 1 Inch deep.	Thermometer inclosed in the box which covers the scales of the deep-sunk Thermometers, and placed on a level with their scales.
	d d	°	°	°	°	°	°
January	1 to January 7	52·55	50·79	48·31	44·11	40·9	43·6
	8 to 14	52·42	50·39	47·65	43·63	42·0	44·8
	15 to 21	52·28	49·92	47·42	44·35	44·4	47·2
	22 to 28	52·13	49·56	47·47	44·55	42·7	44·2
	29 to February 4	51·95	49·26	47·29	44·21	41·7	43·2
February	5 to 11	51·78	49·00	46·94	43·00	36·4	34·9
	12 to 18	51·64	48·76	46·12	42·20	42·5	45·7
	19 to 25	51·47	48·36	45·97	42·59	40·0	42·4
	26 to March 4	51·30	48·04	45·86	43·33	43·3	48·3
March	5 to 11	51·13	47·80	46·21	43·85	39·9	41·2
	12 to 18	50·96	47·65	45·90	42·47	43·2	47·6
	19 to 25	50·82	47·52	46·02	44·59	46·3	51·2
	26 to April 1	50·66	47·44	46·80	46·24	48·4	54·8
April	2 to 8	50·51	47·46	47·57	47·00	47·1	51·7
	9 to 15	50·35	47·63	47·93	47·02	46·4	48·2
	16 to 22	50·24	47·82	48·27	48·25	53·0	62·7
	23 to 29	50·13	48·01	49·54	52·19	57·5	66·2
	30 to May 6	50·02	48·38	51·05	52·73	50·9	54·6
May	7 to 13	49·93	48·91	51·22	51·13	49·4	53·7
	14 to 20	49·88	49·31	51·18	51·34	52·1	57·4
	21 to 27	49·87	49·60	51·74	53·29	58·1	66·7
	28 to June 3	49·88	49·91	52·89	56·01	62·7	72·0
June	4 to 10	49·90	50·38	54·49	59·06	64·0	73·0
	11 to 17	49·93	50·98	55·81	59·54	59·8	65·1
	18 to 24	49·98	51·69	56·29	58·84	59·7	63·9
	25 to July 1	50·06	52·26	56·66	59·29	61·2	65·4
July	2 to 8	50·17	52·76	57·37	60·86	65·1	74·0
	9 to 15	50·31	53·27	58·59	63·69	70·0	77·9
	16 to 22	50·44	53·87	60·00	65·50	69·0	76·3
	23 to 29	50·58	54·52	60·90	65·01	64·5	68·2
	30 to August 5	50·74	55·18	60·84	63·48	63·8	67·2
August	6 to 12	50·92	55·65	60·65	62·68	62·3	67·3
	13 to 19	51·13	55·96	60·29	61·57	62·0	66·7
	20 to 26	51·36	56·19	60·27	62·84	64·0	71·0
	27 to September 2	51·56	56·36	60·55	62·57	63·1	69·1
September	3 to 9	51·76	56·53	60·38	61·50	60·1	62·3
	10 to 16	51·95	56·70	59·89	60·01	58·3	63·0
	17 to 23	52·16	56·71	59·31	59·58	59·1	63·9
	24 to 30	52·34	56·67	59·09	59·76	60·9	68·1
October	1 to October 7	52·47	56·56	58·93	58·55	54·6	56·2
	8 to 14	52·63	56·54	57·88	56·09	54·7	59·8
	15 to 21	52·78	56·32	57·26	56·51	55·3	58·4
	22 to 28	52·89	56·05	56·66	54·51	52·1	55·7
	29 to November 4	52·98	55·75	55·90	54·34	51·7	53·5
November	5 to 11	53·06	55·43	55·36	53·24	49·5	51·0
	12 to 18	53·10	55·07	54·32	50·30	44·4	46·0
	19 to 25	53·11	54·60	52·98	48·80	41·0	39·4
	26 to December 2	53·13	54·00	51·32	45·85	39·7	38·8
December	3 to 9	53·14	53·31	49·88	44·75	41·0	43·5
	10 to 16	53·08	52·48	48·93	43·98	37·8	36·2
	17 to 23	53·00	51·73	47·89	42·07	34·3	32·5
	24 to 31	52·90	50·95	46·59	40·39	33·1	30·7

ABSTRACT of the CHANGES of the DIRECTION of the WIND, as derived from OSLER'S ANEMOMETER.

1874, Month.	Direction of the Wind. At beginning of Month.	At end of Month.	Apparent Motion.	Times of Shifts of the Recording Pencil.	Amount of Motion.	Monthly Excess of Motion. Direct.	Retro-grade.
			°	d h m	°	°	°
January	W.	N.W.	+ 45	11. 0. 0	+360	765	
				19. 9. 0	+360		
February	N.W.	S.S.E.	−157½	11. 22. 0	+360	562½	
				20. 0. 0	−360		
				20. 8. 30	+360		
				26. 23. 30	+360		
March	S.S.E.	W.S.W.	+ 90	2. 22. 0	−360	1170	
				4. 3. 0	+360		
				6. 22. 0	+360		
				7. 9. 0	+360		
				25. 22. 0	+360		
April	W.S.W.	N.N.E.	+135	11. 22. 0	−360		225
				12. 9. 0	+360		
				13. 22. 0	−360		
				14. 8. 45	−360		
				22. 3. 0	+360		
				25. 9. 0	+360		
				26. 0. 30	−720		
				28. 3. 0	+360		
				29. 0. 0	−360		
				29. 21. 0	+360		
May	N.N.E.	S.W.	+202½	3. 8. 45	−360	922½	
				8. 3. 0	+360		
				11. 22. 0	−360		
				13. 21. 0	+360		
				14. 8. 45	+360		
				16. 8. 50	+360		
				22. 5. 15	−360		
				22. 9. 0	+360		
				22. 22. 0	−360		
				26. 8. 50	+360		
June	S.W.	W.S.W.	−337½	0. 22. 0	+360	22½	
				4. 0. 0	+360		
				5. 0. 0	+360		
				5. 9. 0	+360		
				8. 22. 0	−360		
				15. 0. 0	−360		
				26. 8. 50	−360		
				27. 8. 50	+360		
				28. 8. 50	−360		

1874, Month.	Direction of the Wind. At beginning of Month.	At end of Month.	Apparent Motion.	Times of Shifts of the Recording Pencil.	Amount of Motion.	Monthly Excess of Motion. Direct.	Retro-grade.
			°	d h m	°	°	°
July	W.S.W.	W.S.W.	0	7. 22. 0	+360	1800	
				11. 0. 0	−360		
				11. 5. 30	+720		
				11. 9. 0	−360		
				12. 8. 40	+360		
				16. 8. 55	+360		
				16. 22. 0	−360		
				19. 7. 45	+360		
				23. 8. 45	−360		
				25. 22. 0	+360		
				27. 22. 0	+360		
				29. 8. 45	+360		
August	W.S.W.	S.W.	− 22½	22. 22. 0	+360	1417½	
				24. 0. 50	+360		
				24. 22. 0	+360		
				26. 3. 0	+360		
September	S.W.	E.S.E.	+247½	14. 3. 0	+360	967½	
				17. 8. 40	+360		
				22. 22. 0	−360		
				25. 22. 0	+360		
				26. 2. 45	+360		
				26. 22. 0	−360		
				26. 23. 30	+360		
				30. 8. 45	−360		
October	E.S.E.	E.	− 22½	0. 22. 0	+360	337½	
				6. 22. 0	−360		
				12. 9. 30	−360		
				12. 22. 0	+360		
				14. 8. 40	+360		
				16. 22. 0	+360		
				28. 22. 0	−360		
November	E.	N.E.	− 45	2. 9. 0	+360		405
				23. 0. 0	−360		
				24. 1. 0	−360		
				24. 22. 0	+360		
				29. 22. 0	−360		
December	N.E.	S.E.	+ 90	10. 8. 55	+360		270
				15. 8. 50	+360		
				15. 22. 0	−360		
				24. 9. 10	−360		
				29. 22. 0	−360		

The whole excess of direct motion for the year was 7065°.

The sign + implies that the change in the direction of the wind has taken place in the order N., E., S., W., N., &c., or in *direct* motion; the sign − implies that the change has taken place in the order N., W., S., E., N., &c., or in *retrograde* motion.

The times of shifts of the recording pencil as given above, refer to the shifts made by hand, when, by the turning of the vane, the trace tends to travel out of range.

The revolution-counter which is attached to the vertical spindle of the vane, whose readings increase with change of direction of the wind in *direct* motion, and decrease with change of direction in *retrograde* motion, gave the following readings:—

	revs.
On 1873, December 31ᵈ. 12ʰ	10·75
On 1874, December 31ᵈ. 12ʰ	30·70

Implying an excess of direct motion, during the year, of 19·95 revolutions, or 7182°.

AMOUNT OF RAIN COLLECTED IN EACH MONTH OF THE YEAR 1874.

1874, MONTH.	Monthly Amount of Rain collected in each Gauge.							
	Self-registering Gauge of Osler's Anemometer.	Second Gauge at Osler's Anemometer.	On the Roof of the Octagon Room.	On the Roof of the Library.	On the Roof of the Photographic Thermometer Shed.	Crosley's.	Cylinder partly sunk in the Ground read daily.	Cylinder partly sunk in the Ground read Monthly.
	in.	in.	in.	in.	in.	in.	in.	in.
January	0·47	0·49	0·76	0·78	0·96	..	1·00	1·00
February	0·58	0·55	0·65	0·62	0·91	..	0·94	1·01
March	0·12	0·11	0·33	0·33	0·43	..	0·45	0·58
April	0·72	0·69	1·05	0·89	1·28	..	1·35	1·33
May	0·30	0·32	0·36	0·42	0·43	..	0·42	0·50
June	1·78	1·82	2·13	2·38	2·43	..	2·42	2·43
July	2·06	2·16	2·40	2·47	2·62	2·84	2·59	2·38
August	0·97	0·95	1·18	1·08	1·44	1·87	1·44	1·42
September	1·63	1·74	2·00	2·28	2·23	2·53	2·22	2·40
October	2·60	2·73	2·96	3·39	3·54	4·37	3·58	3·60
November	1·20	1·27	1·42	1·59	1·77	2·14	1·85	1·78
December	0·71	0·73	1·12	1·32	1·59	1·90	1·69	1·75
Sums	13·14	13·56	16·36	17·55	19·63	..	19·95	20·18

The heights of the receiving surfaces are as follows:

	Above the Mean Level of the Sea. Ft.	In.	Above the Ground. Ft.	In.
The Two Gauges at Osler's Anemometer	205	6	50	8
Gauge on the Roof of the Octagon Room	193	2½	38	4½
Gauge on the Roof of the Library	177	2	22	4
Gauge on the Roof of the Photographic Thermometer Shed	164	10	10	0
Crosley's Gauge	156	6	1	8
The Two Cylinder Gauges partly sunk in the Ground	155	3	0	5

OBSERVATIONS of the AURORA BOREALIS of 1874, February 4.

At $6^h. 50^m.$ a bright light blue auroral arch was observed stretching from North to West to an altitude of 20° at its apex.

At $7^h. 5^m.$ the principal brightness of the aurora was to the right of Ursa Major and at the same altitude as δ Ursæ Majoris: the light then appeared to be phosphorescent, but the arch was not perfect.

At $7^h. 30^m.$ the arch was again complete and about 4° broad: in colour it was bluish-white.

From $8^h.$ to $9^h.$ the arch generally continued perfect, but varied in brightness; its breadth was generally 1° or 2°.

At $8^h. 30^m.$ the arch was observed to extend from a point vertically below η Ursæ Majoris, passing close to γ Draconis and just below α Cygni, to a point near α Pegasi.

No streamers were seen at any time.

At $9^h. 30^m.$ dense fog came over and prevented further observation.

Observer, N.

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

LUMINOUS METEORS.

1874.

Month and Day, 1874.		Greenwich Mean Solar Time.	Observer.	Apparent Size of Meteor in Star-Magnitudes.	Colour of Meteor.	Duration of Meteor in Seconds of Time.	Appearance and Duration of Train.	Length of Meteor's Path in Degrees.	No. for Reference.
		h m s						°	
July	10	11. 38. 0	N.	2	Bluish-white	0·5	Train	. .	1
July	12	10. 18. 0	N.	Venus	Bluish-white	2	Train	. .	2
July	21	10. 56. 0	N.	1	Bluish-white	0·6	Train	15	3
August	3	10. 40. 15	C.	3	Bluish-white	0·7	None	7	4
	”	10. 43. 0	J.A.G.	2	Bluish-white	0·6	Slight	. .	5
August	4	10. 26. 20	N.	> 1	Bluish-white	1·5	Train	. .	6
August	6	10. 10. 0	C.	>Jupiter	Bluish-white	1	Train ; sparks	12	7
August	8	9. 41. 0	C.	2	Bluish-white	0·6	Slight	6	8
	”	10. 26. 0	C.	2	Bluish-white	0·5	None	5	9
August	10	10. 36. 0	T.	4	Bluish-white	0·4	None	9	10
August	11	9. 15. 0	J.A.G.	2	Blue	0·8	None	15	11
	”	9. 31. 18	N.	2	White	0·5	Train	. .	12
	”	10. 9. 59	T.	3	Bluish-white	0·7	None	5	13
	”	10. 12. 0	C.	2	Bluish-white	0·4	None	4	14
	”	10. 29. 5	T.	4	Bluish-white	0·5	None	. .	15
	”	10. 32. 10	C.	2	Bluish-white	0·6	None	8	16
	”	10. 36. 20	T.	4	Bluish-white	0·7	None	8	17
	”	10. 44. 20	N.	3	Bluish-white	0·5	Faint	. .	18
	”	10. 44. 30	N.	> 1	White	0·4	Train	5	19
	”	10. 45. 25	T.	2	Bluish-white	0·5	None	7	20
	”	10. 53. 10	N.	4	Bluish-white	0·4	. . .	4	21
	”	10. 55. 20	C.	2	Bluish-white	0·7	Train	11	22
	”	10. 58. 25	N.	4	. . .	0·3	None	5	23
	”	11. 2. 45	T.	2	Bluish-white	0·7	None	7	24
	”	11. 10. 30	C.	1	Bluish-white	0·8	. . .	14	25
	”	11. 13. 25	T.	1	Bluish-white	0·7	Faint	8	26
	”	11. 19. 40	N.	> 1	White	0·5	Train	7	27
	”	11. 22. 25	N., T.	> 1	Bluish-white	0·6	Train	10	28
	”	11. 25. 45	N.	1	Bluish-white	0·4	Train	7	29
	”	11. 27. 35	N.	Jupiter	. . .	0·9	Fine	. .	30
	”	11. 30. 55	T.	2	Bluish-white	0·8	None	9	31
	”	11. 33. 45	T.	3	White	0·8	None	. .	32
	”	11. 43. 55	N.	2	Bluish-white	0·5	None	5	33
	”	11. 50. 28	N.	3	Bluish-white	0·4	None	6	34
	”	11. 59. 5	N.	2	White	0·5	Train	3	35
	”	12. 5. 9	N.	2	Bluish-white	0·6	Train	10	36
	”	12. 10. 37	N.	2	Bluish-white	0·7	Train	. .	37
	”	12. 13. 57	N.	2	Bluish-white	0·5	Train	7	38
	”	12. 22. 5	N.	3	Bluish-white	0·4	Slight	5	39
	”	12. 23. 11	N., T.	2	Bluish-white	0·5	None	6	40
	”	12. 27. 0	N.	1	Bluish-white	0·7	Train	10	41
	”	12. 33. 0	T.	2	White	0·8	None	8	42
	”	12. 45. 0	N.	2	Bluish-white	0·6	. . .	10	43
August	13	9. 23. 0	J.A.G.	3	Bluish-white	0·4	None	. .	44
	”	10. 0. 0	J.A.G.	2	Bluish-white	0·6	Slight	5	45
	”	10. 0. 0	J.A.G.	2	Bluish-white	0·8	Fine	10	46
	”	10. 13. 10	C.	1	Bluish-white	. . .	Train	9	47
	”	10. 14. 40	T.	2	Bluish-white	0·8	None	7	48
	”	10. 15. 40	J.A.G.	3	Bluish-white	0·6	Slight	. .	49
	”	10. 27. 0	C.	2	Bluish-white	0·6	Slight	8	50
	”	10. 28. 30	J.A.G.	3	Bluish-white	0·7	Slight	. .	51
	”	10. 30. 0	J.A.G.	3	Bluish-white	. . .	Slight	. .	52

No. for Reference.	Path of Meteor through the Stars.
1	From direction of Polaris, passed between λ Draconis and α Ursæ Majoris and disappeared a little below and to the left of [α Ursæ Majoris.
2	Passed between γ Ursæ Majoris and α Canum Venaticorum, and across ψ Ursæ Majoris.
3	Passed across α and γ Ursæ Majoris.
4	From about 10° east of α Aquilæ to a point a little below that star.
5	From α Coronæ Borealis towards γ Boötis.
6	From direction of κ Cassiopeiæ towards ο Ursæ Majoris.
7	From a little above η Pegasi towards α Cassiopeiæ.
8	From about 1° below β Boötis towards ε Coronæ Borealis.
9	From near η Ursæ Majoris fell perpendicularly downwards.
10	From 5° north of γ Aquilæ to θ Serpentis.
11	Appeared at δ Ursæ Majoris and disappeared at α Canum Venaticorum.
12	From direction of γ Ursæ Majoris passed across α Canum Venaticorum.
13	From direction of β Boötis towards α Canum Venaticorum.
14	From about 4° south of Polaris disappeared about 1° east of that star.
15	From γ Lyræ to a point a little to the left of α Ophiuchi.
16	From near α Canum Venaticorum fell towards horizon to left at an angle of 45°.
17	From π Herculis to near α Herculis.
18	Passed across σ Ursæ Majoris moving towards β Ursæ Majoris.
19	Passed across κ Ursæ Majoris from direction of *c* Camelopardali.
20	From direction of *h* Ursæ Majoris, fell perpendicularly towards horizon.
21	Passed midway between δ and ε Ursæ Majoris from direction of λ Draconis.
22	From a little below β Herculis disappeared near α Herculis.
23	Passed midway between Delphinus and ε Pegasi from direction of ι Pegasi.
24	From direction of π towards β Ursæ Majoris.
25	From θ passed by α Coronæ Borealis and fell towards horizon.
26	From direction of π towards χ Ursæ Majoris.
27	Moved across *b* Lyncis to a point near φ Ursæ Majoris.
28	Moving from direction of ξ Herculis, disappeared near α Ophiuchi.
29	Disappeared near γ Boötis moving from direction of θ Draconis.
30	Passed between ζ and ε Cygni and disappeared close to α Delphini.
31	Passed nearly midway between β and θ Aquilæ, falling at right angles to line joining those stars.
32	From direction of a point slightly below α Lyræ towards a point about 5° left of α Ophiuchi.
33	Moving from direction of α Pegasi towards ε Pegasi.
34	Passed between λ and κ Draconis, moving from Q Camelopardali.
35	Appeared near λ Persei and moved northwards.
36	From direction of ι Pegasi disappeared near ζ Pegasi.
37	Passed across α Andromedæ to a few degrees below α Pegasi. (Thin cloud.)
38	From near ζ Aquilæ towards δ Herculis. (Thin cloud.)
39	Moving from direction of γ Persei passed a little below γ Trianguli towards α Arietis.
40	From direction of β towards γ Pegasi.
41	Passed across γ Pegasi from direction of γ Andromedæ.
42	From a little to right of α Lyræ moved towards B Herculis.
43	From direction of α Persei passed towards horizon about 5° to left of Aldebaran. (Cloudy.)
44	Shot from η Ursæ Majoris towards ε Boötis.
45	Shot from α Coronæ Borealis towards γ Boötis.
46	Shot from γ Ursæ Minoris towards ζ Ursæ Majoris.
47	Appeared about 7° below γ Ursæ Majoris and fell almost perpendicularly towards horizon.
48	Shot from a little below α in direction of ε Ursæ Majoris.
49	From ο Ursæ Majoris to about midway between α and β Ursæ Majoris.
50	From about 6° east of Polaris passed a little north of that star.
51	Shot from ε Ursæ Majoris towards α Canum Venaticorum.
52	Fell perpendicularly in north, its situation with regard to stars could not be ascertained on account of clouds.

Month and Day, 1874.		Greenwich Mean Solar Time.	Observer.	Apparent Size of Meteor in Star-Magnitudes.	Colour of Meteor.	Duration of Meteor in Seconds of Time.	Appearance and Duration of Train.	Length of Meteor's Path in Degrees.	No. for Reference.
		h m s						°	
August	13	10. 53. 40	J.A.G.	3	Bluish-white	0·4	None	6	1
	"	10. 54. 0	T.	1	Bluish-white	0·9	Train; 1 sec.	6	2
November	13	10. 19. 2	J.A.G.	3	Bluish-white	0·6	Train	3	3
	"	11. 35. 0	J.A.G.	2	Bluish-white	0·6	Train	5	4
	"	11. 44. 0	J.A.G.	2	Bluish-white	0·5	None	..	5

No. for Reference.	Path of Meteor through the Stars.
1	Shot midway between α and ξ Pegasi, at right angles to line joining those stars.
2	Passed from direction of ξ Serpentis towards δ Ophiuchi.
3	Passed about midway between β and γ Piscium.
4	Shot from β Orionis to κ Orionis.
5	Shot downwards from α Ursæ Majoris towards γ Ursæ Majoris.