RESULTS

OF THE

MAGNETICAL AND METEOROLOGICAL

OBSERVATIONS

MADE AT

THE ROYAL OBSERVATORY, GREENWICH,

1873.

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GREENWICH MAGNETICAL AND METEOROLOGICAL OBSERVATIONS, 1873.

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 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 channels cut in 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 screws in a 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″·7.

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″·85. 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″·8. A similar experiment on 1870, December 29, gave 1′. 34″·2. The value used, however, through the year 1873 is 1′. 34″·8.

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

1873, January 2. 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 100r·158. This value is used throughout the year 1873.

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″·41 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″·22 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″·2. A few experiments in 1865 seemed to show that the correction is now 36″·9. 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, January 2. 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″·7 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, January 1. 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 27′. 9″·4. This value is used in the reductions for 1873.

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	23s·888
Mean of times with damper reversed end for end..........................	24s·508
Mean of times when damper was removed..........................	23s·153

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, 100r·158..	−	2. 38. 15·0
Correction for the plane glass in front of the box, in its usual position..	+	18·7
The collimator above the magnet. Correction for error of collimation	−	27. 9·4
Constant to be used in the reduction of the observations	−	3. 5. 5·7

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

On 1868, January 22, it was found to be 30s·60; on March 19, 30s·56; on December 30, 30s·50; on 1869, November 13, 30s·50; on 1870, December 29, 30s·51; on 1871, October 25, 30s·52; on 1873, February 15, 31s·48; and on 1873, August 7, 31s·40.

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 with the silk skein lately in use, the proportion was found, on 1865, January 31, $\frac{1}{214}$; on February 17, $\frac{1}{227}$; on April 27, $\frac{1}{207}$; on December 27, $\frac{1}{230}$; and on 1869, December 29, $\frac{1}{262}$. With the new thread the proportion was found, on 1871, October 25, $\frac{1}{180}$; on 1871, December 28, $\frac{1}{170}$; and on 1873, January 1, $\frac{1}{200}$.

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

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 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 1873:—January 3; March 8, 13; April 1, 19, 26; May 12, 15, 27; July 12; August 6, 22; September 18; October 18; November 11, 12; December 8, 29, 31. 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, illuminated by a reflector of sky-light in the day and by a lamp at night,) have been taken about twenty times at nearly equal 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 therefore the same 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 vibration has been very small. When it appears to be quite 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. (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.

Three of the cylinders are $11\frac{1}{2}$ inches high, $14\frac{1}{4}$ inches in circumference; that for the thermometers is 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 light, by which the trace of each instrument is made, originates in a lamp, formerly of camphine, but, since 1849, of coal gas, sometimes charged with the vapour of coal-naphtha. Before the flame of the lamp is placed a metallic plate, with a small aperture about $0^{in}\cdot 3$ high and $0^{in}\cdot 1$ broad, independent of the lamp, and supported (for the magnetometers) by a part of the stone capping of the brick pier which carries the magnet; or (for the earth-current apparatus and thermometers) by the upper platform of the braced frame which carries the rest of the apparatus. The following arrangements are for the purpose of 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 of either galvanometer, or with the rise or fall of the mercury of the barometer or of either thermometer.

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 in the vertical direction, and is at the same time slightly curved. To diminish the length there is placed near the cylinder a plano-convex cylindrical lens of glass, with its axis 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 $11^{ft.}\ 0^{in.}\cdot 1$, 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, 2½ 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 11ft. 8in.·5; that of the pulleys of the magnet-carrier is 4ft.·2in.·5; and that of the center of the plane mirror is about 3ft. 1in.. The distance between the branches of the silk skein, where they pass over the upper pulleys, is 1in.·14; at the lower part the distance between them is 0in.·80.

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 from the plane-mirror to the scale meets it at the division 51 nearly; the distance from the center of the plane-mirror to the scale is 7ft. 6in. · 8.

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 1873, January 3:—

1873. Day.	The Marked end of the Magnet.							
	West.				East.			
	Torsion-Circle Reading.	Scale Reading.	Difference of Scale Readings for 1° of Torsion.	Mean of the Times of Vibration.	Torsion-Circle Reading.	Scale Reading.	Difference of Scale Readings for 1° of Torsion.	Mean of the Times of Vibration.
	°	div.	div.	s	°	div.	div.	s
Jan. 3	140	15·16	8·65	21·60	222	10·93	7·81	19·80
	141	23·81	9·25	21·42	223	18·74	7·42	20·00
	142	33·06	8·87	21·22	224	26·16	7·79	20·22
	143	41·93	8·30	21·04	225	33·95	8·31	20·40
	144	50·23	8·59	20·78	226	42·26	8·04	20·52
	145	58·82	7·57	20·62	227	50·30	7·40	20·66
	146	66·39	8·03	20·48	228	57·70	8·81	20·78
	147	74·42	7·93	20·32	229	66·51	8·91	20·96
	148	82·35	8·41	20·16	230	75·42	8·65	21·10
	149	90·76		20·08	231	84·07		21·20

The times of vibration and scale readings were sensibly the same, when the torsion-circle read 144°. 30′, marked end West, and 227°. 30′, marked end East, differing 83°. 0′. Half this difference, or 41°. 30′, is the angle of torsion when the magnet is transverse to the meridian.

The mean of several similar determinations gave 41°. 25′·4. The value adopted in the reduction of observations through the year 1873 was the same as that used in 1871 and 1872, namely 41°. 17′·1.

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 $51^{div.}$ on the scale to the center of the face of the plane mirror is $7^{ft.}\ 6^{in.}\cdot 84$, and that the length of $30^{div.}\cdot 85$ 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 0·0024384 through the year 1873.

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 $0^{div.}487$. On mounting a new vertical-force-magnet in 1848, similar experiments were made, and the resulting number was $0^{div.}45$. 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—

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

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—

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

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 $t = 97°·3$. 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—

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

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 H.F. 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 Lieut.-General Sir Edward Sabine and by myself.

RESULTS OF TEMPERATURE EXPERIMENTS UPON THE H.F. 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 H.F. 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 1873 is very small.

Outside the double box is suspended a thermometer which is read on every day except Sundays, at 21^h, 22^h, 23^h, 0^h, 1^h, 2^h, 3^h, and 9^h. Occasional observations have been taken at other hours. 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 1873 the adopted value of variation of horizontal force for one degree of angular motion of the magnet is sin. $1^\circ \times$ cotan. $41^\circ. 17'\!\cdot\!1 = 0\cdot019878$; and the movement of the spot of light for 0·01 part of the whole horizontal force is 2·361 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 $52\frac{3}{4}°$ 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 $2^{ft.}\ 10^{in.}\ 6$. 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 1873, vibrations of the vertical-force-magnet were observed on 170 different days, and with readings of various divisions of the scale. The mean time of vibration adopted for the year was $15^s \cdot 31$.

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 $=16^s \cdot 158$. This number is used through the year 1873.

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 $=\frac{12}{30 \cdot 85}$ inches. Hence the angle which one division subtends, as seen from the mirror, is $7'. 11'' \cdot 19$; 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 $3'. 35'' \cdot 60$.

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 $52\frac{3}{4}°$; therefore, dividing the result just obtained by sine $52\frac{3}{4}°$, we have, for the angular motion of the magnet corresponding to a change of one division of the scale, 4′. 30″·85.

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 × cotan. dip × $\frac{T'^2}{T^2}$"; where T' is the time of vibration in the horizontal plane, and T the time of vibration in the vertical plane.

For the year 1873, T' was assumed = $16^s·158$, $T = 15^s·31$, dip = 67°. 45′. 38″. 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 = 0·0005980.

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°·6	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—

$$0·172522 \times \left\{1 - 0·0002233 \times (t - 32) + 0·000001894 \times (t - 32)^2\right\}$$

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 $t = 62°$, is − 0·0001097.

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	·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 1873.

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 1873 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 day except Sundays, at 21^h, 22^h, 23^h, 0^h, 1^h, 2^h, 3^h, and 9^h. Occasional readings of the thermometer are also taken at other hours. 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 14¼ 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 $= 200{\cdot}36 \times \text{tan. dip.} \times \left(\frac{T}{T'}\right)^2 \times 0{\cdot}01$. 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 1873, = 4·399 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 1873 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 Lieut.-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 hte courteous application of Sir E. 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 commenced on 1861, June 11, and were continued through the year; and, after some slight modifications of its verniers, it is still maintained in use (1873).

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

$$0·000131261\ (t_0-35) + 0·000000259\ (t_0-35)^2$$

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 1873, the following days, three in number, were selected by Mr. Glaisher as exhibiting practically the same amount of irregularity which he had considered as defining the class of Days of Great Disturbance in the Memoirs to which I have alluded:—

January 7; March 9; June 26.

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 three days of Great Magnetic Disturbance.*

Telescope-observations of the Magnetometers have usually been made four times every day, except on Sundays, on which days two or three observations only have been taken; but, though these observations are employed in forming the base lines on the photographic sheets, their immediate results are not necessarily 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 for 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 $\frac{\text{H. F. metrical}}{\text{Former H. F.}} = 1{\cdot}791$; 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 $1{\cdot}791 \times \tan.\ 67^\circ\ 46' = 4{\cdot}380$.

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 $1{\cdot}791 \times \sin.\ 1' = 0{\cdot}0005210$.

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 1873. 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 $15\frac{3}{8}$ 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 can 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 wires within the Observatory were identified in 1871, June, again in 1872, and also on 1873, April 17.

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 the ordinary speaking telegraph (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 1873. 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.

f 2

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 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 $0^{in}\cdot05$.

The vernier subdivides the scale divisions to $0^{in}\cdot002$; 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.

The tube is $0^{in}\cdot565$ in diameter; the correction for the effect of capillary attraction is therefore only $+ 0^{in}\cdot002$. The cistern is of glass.

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 $-0^{in}\cdot006$. 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 hole 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. Results of the indications are printed in the *Maxima and Minima of the Barometer*, near the end of the Meteorological Results.

§ 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. 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		

The maximum self-registering thermometer is a mercurial thermometer, of the construction invented by Messrs. Negretti and Zambra. 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 this thermometer 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 (Negretti and Zambra No. 7537): 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 (Negretti and Zambra, No. 3627) is also free from sensible error.

The mean daily values of dry thermometer in the printed columns are found by combining 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.

For the mean daily value of dew point, the usual process is,—by observing the difference between dry and wet thermometers, and by use of the table of factors printed in page *xlviii* above, to form the difference between air-temperature and dew point at each of the hours of reading; to take the mean of the deduced dew-points; 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, however, the following process is used. The correction for diurnal range applicable to the mean of the eye-observations of the dry 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 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.

§ 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 to 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 be 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 13½ 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.

§ 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 occasionally at 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. Their ranges are now, respectively, 44° to 62°·5, and 39°·2 to 69°·5.

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.

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

§ 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.

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,	subtract 1°·4
For the minimum thermometer,	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 small weight on a cord running over a pulley.

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 is remarked that the pressures of wind per square foot appear generally greater than formerly. It has been 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 mches. 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 22^h daily; in addition, Crosley's gauge and No. 8 are read daily at 9^h p.m., 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, 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 1873 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-two 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 1873 were Mr. Nash, Mr. Wright, Mr. Cross, Mr. W. Schultz, Mr. Todd, and Mr. J. A. Greengrass. Their observations are distinguished by the initials N., W., C., S., 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 1873 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 clear 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 1873 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,
1875, March 10.

G. B. AIRY.

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

MAGNETICAL OBSERVATIONS.

1873.

ROYAL OBSERVATORY, GREENWICH.

REDUCTION

OF THE

MAGNETIC OBSERVATIONS

(EXCLUDING THE DAYS OF GREAT MAGNETIC DISTURBANCE).

1873.

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.

1873.

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	34·6	35·1	34·4	34·5	32·6	32·6	33·1	32·9	32·4	31·2	29·9	32·9
2	35·9	37·3	37·2	35·6	32·7	31·5	33·9	32·9	32·5	31·6	30·6	33·5
3	35·5	35·8	35·2	36·7	32·8	31·7	32·9	32·3	33·0	30·5	31·3	33·5
4	37·0	35·2	37·3	35·2	32·4	33·2	32·7	32·5	33·2	31·2	30·4	33·2
5	33·6	35·4	36·8	34·9	35·0	32·3	33·0	30·5	33·2	31·1	30·1	33·3
6	35·4	36·4	37·0	32·7	33·5	32·9	33·1	31·5	33·2	31·0	30·6	33·5
7	. .	36·3	37·2	34·0	32·0	32·6	32·8	34·4	31·9	31·4	30·2	33·5
8	37·4	36·3	37·0	33·8	32·1	32·0	33·1	31·9	32·1	31·0	30·5	32·1
9	36·5	35·3	. .	. .	32·0	32·6	31·6	33·5	32·3	30·7	30·0	32·6
10	35·5	36·0	34·6	34·5	33·4	31·6	33·8	33·6	32·2	32·1	30·4	33·1
11	34·5	35·2	35·3	34·1	33·3	31·8	32·7	32·2	32·1	31·2	35·2	32·0
12	35·7	35·5	36·0	34·5	33·3	33·5	32·0	33·7	31·4	30·7	34·3	32·7
13	35·2	36·1	35·8	35·8	32·1	31·9	32·9	31·6	31·7	31·8	33·7	33·3
14	35·7	36·9	35·1	34·3	32·0	34·3	33·6	33·2	31·2	31·5	33·7	31·6
15	35·9	36·2	34·1	34·1	32·1	31·9	32·0	32·1	31·9	30·9	34·7	34·8
16	36·1	36·6	36·1	33·8	33·8	31·9	33·7	33·7	32·1	30·9	34·2	32·7
17	36·7	36·2	35·6	33·4	33·3	31·7	33·6	31·9	31·2	32·3	34·5	32·7
18	35·2	36·3	34·6	35·5	32·1	31·0	33·4	33·6	31·9	31·3	34·1	33·0
19	37·0	36·4	34·9	32·5	32·0	32·9	32·5	32·3	32·0	30·6	33·7	32·7
20	35·2	34·9	34·3	33·1	31·9	33·0	31·8	32·6	29·9	32·0	34·2	32·9
21	35·5	35·5	32·5	35·0	31·8	33·3	33·1	31·7	30·7	33·8	33·5	34·0
22	35·5	36·3	33·0	33·2	32·3	32·0	34·0	33·2	32·8	30·1	34·1	34·7
23	36·1	35·9	35·1	32·6	31·7	31·9	33·7	32·8	32·9	. .	34·3	34·8
24	36·9	35·3	33·4	33·2	32·6	32·4	33·2	33·4	30·5	30·3	34·4	34·1
25	36·1	36·4	34·6	34·1	33·1	32·5	33·2	32·2	32·4	31·1	32·6	34·5
26	35·3	34·5	34·8	33·0	31·6	. .	33·0	32·6	32·1	30·8	33·5	33·9
27	34·6	34·7	35·0	33·2	31·8	30·9	33·0	31·9	31·4	31·5	34·1	33·9
28	36·1	35·4	34·0	32·8	31·8	31·9	32·2	32·2	31·7	32·4	33·8	33·3
29	35·4		34·7	32·3	32·9	32·6	32·0	32·6	31·2	31·1	33·4	34·2
30	35·3		34·8	31·8	32·8	30·9	32·7	32·0	31·9	31·8	33·2	33·6
31	35·2		34·9		32·8		31·5	32·1		30·8		33·6

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.

1873.

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	39·6	40·3	42·0	41·1	37·8	36·9	37·9	38·8	38·5	36·3	36·5	35·9
1	40·8	41·8	43·9	43·2	38·9	38·3	39·4	40·1	39·3	36·9	36·9	36·7
2	40·9	41·3	43·3	42·9	38·9	38·7	39·4	40·0	38·5	36·6	36·5	36·3
3	40·0	39·9	42·0	41·2	38·2	38·2	38·5	38·3	36·7	35·2	35·3	35·4
4	38·3	38·8	39·4	39·0	37·1	37·2	37·2	36·6	34·9	33·5	34·3	34·7
5	36·6	37·9	37·2	37·1	35·9	35·5	35·6	34·7	33·2	32·3	33·6	34·4
6	35·9	36·8	36·3	35·3	34·6	33·9	34·4	33·2	32·3	31·1	32·9	34·4
7	34·8	35·5	35·3	34·1	33·1	32·9	33·2	32·2	30·9	30·7	32·5	33·3
8	33·3	34·7	34·6	33·3	32·6	32·0	32·9	30·9	30·2	29·5	31·5	32·4
9	32·1	34·0	33·4	32·4	31·8	31·2	32·3	30·0	29·7	28·5	30·9	31·7
10	31·3	32·9	33·2	31·0	31·1	31·1	32·2	30·5	29·2	28·2	30·4	31·0
11	31·3	32·7	32·3	30·5	30·3	31·0	31·5	30·6	29·6	28·7	30·1	30·8
12	31·8	32·5	31·4	30·7	29·4	30·0	31·1	30·3	29·8	29·4	30·7	31·5
13	33·6	33·0	31·1	31·1	29·4	30·0	30·5	30·3	30·1	29·5	31·1	31·9
14	34·1	33·4	31·7	31·7	30·1	29·8	30·6	30·9	29·7	29·3	31·3	32·4
15	34·8	33·6	31·8	31·3	30·6	30·2	30·6	30·7	29·3	29·7	32·1	32·6
16	34·7	33·5	31·9	31·8	30·3	30·0	30·4	29·5	29·4	29·8	32·2	32·8
17	35·0	34·1	32·7	30·7	29·4	29·0	29·5	28·7	29·3	30·3	32·4	33·0
18	35·6	34·6	32·4	29·6	28·4	28·9	29·0	28·2	29·3	30·4	32·4	33·2
19	35·8	34·5	31·7	28·8	27·7	28·3	28·4	28·3	29·0	30·1	32·0	33·1
20	35·5	34·4	30·9	28·5	28·6	27·9	28·0	28·8	28·9	29·4	31·6	32·7
21	35·4	34·8	31·9	30·0	30·1	28·4	29·6	30·4	30·2	29·3	31·7	32·5
22	36·8	36·3	34·6	32·9	32·2	30·8	32·2	33·2	33·1	31·5	32·9	33·4
23	38·4	38·7	39·1	36·9	35·2	34·0	35·2	36·3	36·0	34·2	35·0	34·7

TABLE III.

1873.			
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. 35·7	0·0497	14·9
February	19. 35·8	·0498	12·9
March	19. 35·2	·0495	16·2
April	19. 34·0	·0489	17·2
May	19. 32·6	·0481	13·5
June	19. 32·3	·0480	13·4
July	19. 32·9	·0483	13·5
August	19. 32·6	·0481	14·2
September	19. 32·0	·0478	13·9
October	19. 31·3	·0475	11·6
November	19. 32·8	·0482	8·7
December	19. 33·4	·0486	7·3
Mean	19. 33·4	0·0485	13·1

TABLE IV.—MEAN HORIZONTAL MAGNETIC FORCE (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.

1873.												
Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d												
1	0·1530	0·1506	0·1518	0·1524	0·1526	0·1529	0·1525	0·1510	0·1519	0·1527	0·1510	0·1534
2	·1537	·1518	·1517	·1509	·1530	·1525	·1525	·1516	·1521	·1529	·1519	·1536
3	..	·1516	·1522	·1513	·1532	·1531	·1524	·1515	·1524	·1528	·1519	·1535
4	·1514	·1518	·1527	·1522	·1534	·1528	·1526	·1519	·1519	·1523	·1521	·1531
5	·1499	·1517	·1525	·1524	·1534	·1526	·1533	·1518	·1517	·1524	·1524	·1534
6	·1498	·1520	·1527	·1517	·1537	·1520	·1527	·1514	·1516	·1530	·1527	·1537
7	..	·1520	·1533	·1523	·1535	·1527	·1522	·1512	·1515	·1528	·1531	·1531
8	·1494	·1516	..	·1528	·1533	·1531	·1525	·1511	·1516	·1522	·1531	·1528
9	·1505	·1503	..	..	·1535	·1528	·1521	·1504	·1522	·1521	·1532	·1521
10	·1511	·1518	·1501	·1521	·1535	·1530	·1517	·1512	·1520	·1530	·1533	·1521
11	·1511	·1516	·1512	·1523	·1535	·1528	·1522	·1520	·1520	·1527	·1528	·1525
12	·1505	·1519	·1515	·1524	·1537	·1521	·1524	·1522	·1519	·1523	·1516	·1525
13	·1511	·1523	·1518	·1518	·1532	·1528	·1525	·1511	·1526	·1524	·1513	·1525
14	·1511	·1519	·1518	·1525	·1530	·1527	·1522	·1515	·1524	·1526	·1516	·1522
15	·1515	·1519	·1518	·1522	·1522	·1524	·1523	·1518	·1524	·1518	·1521	·1523
16	·1518	·1524	·1522	·1525	·1519	·1520	·1523	·1513	·1526	·1517	·1519	·1530
17	·1516	·1524	·1512	·1535	·1526	·1521	·1523	·1506	·1531	·1519	·1525	·1534
18	·1507	·1524	·1517	·1517	·1528	·1526	·1521	·1519	·1527	·1514	·1536	·1536
19	·1496	·1518	·1523	·1504	·1528	·1525	·1520	·1516	·1520	·1513	·1535	·1535
20	·1503	·1517	·1527	·1506	·1527	·1525	·1522	·1521	·1516	·1512	·1529	·1535
21	·1513	·1511	·1519	·1514	·1529	·1524	·1516	·1523	·1511	·1511	·1533	·1533
22	·1515	·1514	·1514	·1517	·1530	·1519	·1517	·1526	·1510	·1517	·1527	·1537
23	·1519	·1515	·1515	·1517	·1525	·1518	·1516	·1516	·1513	..	·1529	·1530
24	·1512	·1515	·1514	·1521	·1519	·1529	·1514	·1519	·1518	·1522	·1531	·1532
25	·1502	·1519	·1522	·1523	·1526	·1518	·1513	·1519	·1519	·1520	·1519	·1532
26	·1507	·1522	·1520	·1520	·1534	..	·1515	·1516	·1523	..	·1528	·1530
27	·1507	·1521	·1521	·1521	·1529	·1511	·1515	·1512	·1521	·1519	·1525	·1529
28	·1507	·1520	·1518	·1522	·1525	·1516	·1513	·1509	·1523	·1516	·1534	·1526
29	·1509		·1521	·1523	·1525	·1519	·1517	·1514	·1515	·1519	·1536	·1524
30	·1512		·1524	·1528	·1527	·1519	·1517	·1519	·1520	·1518	·1530	·1528
31	·1516		·1530		·1529		·1510	·1521		·1529		·1529

TABLE V.—MEAN MONTHLY DETERMINATION of the HORIZONTAL MAGNETIC FORCE (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.

1873.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h 0	0·1502	0·1508	0·1506	0·1506	0·1518	0·1512	0·1512	0·1505	0·1514	0·1514	0·1521	0·1528
1	·1506	·1512	·1513	·1513	·1521	·1514	·1516	·1509	·1517	·1518	·1523	·1531
2	·1509	·1515	·1518	·1519	·1525	·1520	·1521	·1514	·1518	·1521	·1525	·1532
3	·1510	·1518	·1523	·1524	·1529	·1524	·1525	·1517	·1520	·1521	·1525	·1532
4	·1510	·1519	·1524	·1528	·1535	·1529	·1527	·1521	·1521	·1522	·1527	·1532
5	·1510	·1519	·1524	·1530	·1539	·1532	·1530	·1522	·1522	·1522	·1528	·1532
6	·1510	·1521	·1526	·1531	·1543	·1535	·1534	·1524	·1524	·1524	·1528	·1530
7	·1509	·1521	·1527	·1532	·1544	·1536	·1535	·1525	·1524	·1524	·1527	·1529
8	·1508	·1520	·1528	·1531	·1542	·1534	·1531	·1525	·1525	·1525	·1527	·1530
9	·1510	·1519	·1526	·1528	·1539	·1532	·1526	·1521	·1525	·1526	·1526	·1528
10	·1511	·1519	·1524	·1526	·1537	·1530	·1525	·1519	·1524	·1525	·1525	·1528
11	·1511	·1518	·1523	·1525	·1536	·1530	·1525	·1519	·1526	·1526	·1526	·1528
12	·1510	·1519	·1523	·1524	·1535	·1529	·1523	·1521	·1525	·1526	·1526	·1527
13	·1511	·1519	·1522	·1524	·1531	·1527	·1522	·1519	·1525	·1524	·1527	·1528
14	·1512	·1519	·1521	·1524	·1529	·1526	·1521	·1518	·1523	·1523	·1527	·1529
15	·1512	·1519	·1522	·1524	·1529	·1527	·1522	·1520	·1523	·1523	·1527	·1529
16	·1515	·1520	·1522	·1523	·1529	·1527	·1521	·1519	·1522	·1523	·1529	·1530
17	·1515	·1521	·1523	·1524	·1528	·1524	·1520	·1517	·1522	·1524	·1530	·1533
18	·1516	·1522	·1523	·1521	·1527	·1521	·1517	·1515	·1521	·1525	·1530	·1533
19	·1516	·1522	·1521	·1517	·1523	·1517	·1514	·1511	·1518	·1524	·1529	·1533
20	·1514	·1520	·1517	·1510	·1518	·1515	·1508	·1507	·1513	·1519	·1527	·1532
21	·1508	·1515	·1510	·1503	·1517	·1511	·1505	·1503	·1508	·1515	·1523	·1530
22	·1504	·1511	·1505	·1499	·1516	·1509	·1503	·1501	·1506	·1511	·1520	·1526
23	·1504	·1507	·1504	·1500	·1518	·1510	·1506	·1503	·1508	·1510	·1519	·1526

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.

1873.

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.	EXCESS OF HORIZONTAL FORCE above 0·8600, expressed in terms of GAUSS'S UNIT measured on the METRICAL SYSTEM.	Mean Temperature.
			°
January	0·1510	0·2704	62·0
February	·1518	·2718	61·4
March	·1520	·2722	62·2
April	·1520	·2722	63·1
May	·1529	·2738	63·1
June	·1524	·2729	66·0
July	·1520	·2722	67·9
August	·1516	·2715	68·6
September	·1520	·2722	65·3
October	·1521	·2724	64·2
November	·1526	·2733	62·6
December	·1530	·2740	62·7

The value 0·8600 of Horizontal Force corresponds to 1·5403 of Gauss's Unit on the Metrical System.

TABLE VII.—MEAN VERTICAL MAGNETIC FORCE (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.

1873.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d												
1	..	0·0367	0·0378	0·0378	0·0359	0·0346	0·0374	0·0361	0·0358	0·0330	0·0298	0·0274
2	0·0363	·0371	·0376	·0381	·0357	·0359	·0381	·0358	·0344	·0337	·0297	·0287
3	·0365	·0382	·0381	·0376	·0349	·0368	·0384	·0367	·0328	·0344	·0290	·0289
4	·0362	·0382	·0385	·0380	·0351	·0381	·0369	·0369	·0326	·0328	·0289	·0283
5	·0359	·0373	·0368	·0375	·0357	·0380	·0365	·0373	·0321	·0312	·0295	·0274
6	·0372	·0376	·0361	·0372	·0351	·0359	·0368	·0379	·0317	·0311	·0294	·0277
7	..	·0378	·0365	·0368	·0353	·0360	·0370	·0387	·0320	·0313	·0293	·0273
8	·0369	·0366	·0370	·0369	·0365	·0368	·0381	·0389	·0314	·0301	·0291	·0269
9	·0370	·0372	..	·0371	·0359	·0373	·0373	·0357	·0321	·0299	·0283	·0272
10	·0372	·0370	·0375	·0373	·0357	·0369	·0374	·0348	·0325	·0315	·0290	·0267
11	·0368	·0369	·0376	·0369	·0364	·0360	·0365	·0348	·0319	·0311	·0284	·0270
12	·0369	·0375	·0374	·0373	·0354	·0363	·0358	·0363	·0310	·0312	·0283	·0280
13	·0370	·0376	·0375	·0377	·0349	·0366	·0358	·0365	·0308	·0305	·0285	·0280
14	·0368	·0382	·0373	·0381	·0356	·0363	·0350	·0371	·0312	·0296	·0287	·0269
15	·0364	·0384	·0362	·0393	·0352	·0376	·0353	·0375	·0309	·0300	·0286	·0277
16	·0364	·0374	·0362	·0388	·0355	·0372	·0357	·0371	·0303	·0304	·0291	·0278
17	..	·0370	·0383	·0384	·0357	·0380	·0373	·0357	·0312	·0309	·0285	·0276
18	·0382	·0371	·0380	·0371	·0353	·0378	·0370	·0345	·0307	·0314	·0280	·0283
19	·0382	·0368	·0368	·0361	·0351	·0380	·0362	·0340	·0315	·0312	·0283	·0282
20	·0375	·0370	·0365	·0354	·0359	·0380	·0379	·0341	·0332	·0294	·0286	·0287
21	·0385	·0375	·0361	·0355	·0363	·0392	·0395	·0347	·0322	·0294	·0284	·0281
22	·0392	·0373	·0363	·0364	·0375	·0395	·0402	·0352	·0312	·0297	·0284	·0271
23	·0390	·0367	·0373	·0355	·0367	·0374	·0393	·0358	·0313	..	·0286	·0274
24	·0385	·0366	·0369	·0352	·0354	·0367	·0371	·0370	·0319	·0279	·0287	·0279
25	·0384	·0376	·0364	·0359	·0357	·0360	·0377	·0372	·0326	·0291	·0289	·0280
26	·0380	·0378	·0372	·0361	·0361	..	·0367	·0363	·0323	·0293	·0289	·0278
27	·0382	·0370	·0378	·0369	·0361	·0377	·0363	·0363	·0323	·0294	·0279	·0277
28	·0387	·0375	·0379	·0368	·0356	·0381	·0357	·0356	·0314	·0283	·0286	·0268
29	·0383		·0378	·0365	·0357	·0391	·0369	·0341	·0309	·0280	·0283	·0268
30	·0379		·0381	·0362	·0350	·0379	·0378	·0348	·0319	·0279	·0276	·0272
31	·0374		·0380		·0349		·0378	·0364		·0288		..

TABLE VIII.—MEAN MONTHLY DETERMINATION of the VERTICAL MAGNETIC FORCE (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.

1873.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h												
0	0·0373	0·0369	0·0367	0·0365	0·0350	0·0368	0·0367	0·0357	0·0315	0·0299	0·0285	0·0273
1	·0375	·0371	·0369	·0367	·0353	·0372	·0371	·0360	·0318	·0301	·0286	·0275
2	·0376	·0372	·0370	·0369	·0355	·0375	·0375	·0364	·0320	·0303	·0287	·0276
3	·0378	·0374	·0372	·0371	·0357	·0377	·0378	·0367	·0323	·0305	·0287	·0276
4	·0379	·0374	·0374	·0373	·0359	·0379	·0380	·0369	·0325	·0306	·0287	·0277
5	·0379	·0375	·0375	·0374	·0361	·0381	·0382	·0370	·0325	·0307	·0289	·0278
6	·0379	·0376	·0375	·0375	·0362	·0381	·0383	·0371	·0325	·0307	·0290	·0280
7	·0379	·0377	·0376	·0375	·0363	·0382	·0383	·0371	·0325	·0308	·0291	·0280
8	·0379	·0377	·0376	·0374	·0362	·0381	·0382	·0371	·0324	·0307	·0291	·0280
9	·0378	·0378	·0376	·0373	·0361	·0380	·0381	·0369	·0322	·0306	·0291	·0280
10	·0377	·0377	·0376	·0372	·0360	·0378	·0378	·0367	·0321	·0306	·0290	·0279
11	·0376	·0376	·0376	·0372	·0360	·0376	·0375	·0364	·0321	·0306	·0290	·0279
12	·0375	·0375	·0375	·0373	·0359	·0374	·0372	·0362	·0321	·0306	·0289	·0279
13	·0375	·0375	·0375	·0372	·0358	·0372	·0370	·0360	·0320	·0306	·0288	·0278
14	·0374	·0374	·0374	·0371	·0358	·0370	·0367	·0359	·0319	·0305	·0287	·0277
15	·0373	·0373	·0373	·0370	·0357	·0368	·0365	·0357	·0318	·0304	·0287	·0276
16	·0373	·0373	·0372	·0369	·0356	·0366	·0364	·0355	·0318	·0304	·0286	·0276
17	·0373	·0372	·0372	·0369	·0356	·0365	·0363	·0354	·0317	·0303	·0285	·0275
18	·0372	·0372	·0371	·0369	·0355	·0365	·0361	·0354	·0316	·0302	·0285	·0275
19	·0372	·0371	·0371	·0368	·0354	·0364	·0361	·0353	·0316	·0301	·0285	·0275
20	·0371	·0370	·0370	·0367	·0354	·0364	·0362	·0353	·0315	·0301	·0285	·0275
21	·0371	·0370	·0369	·0366	·0353	·0365	·0363	·0353	·0314	·0300	·0284	·0275
22	·0370	·0369	·0368	·0365	·0351	·0365	·0364	·0354	·0313	·0299	·0283	·0274
23	·0370	·0369	·0367	·0364	·0349	·0366	·0365	·0355	·0312	·0298	·0282	·0273

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.

1873.

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.	EXCESS OF VERTICAL FORCE above 0·9600, expressed in terms of GAUSS'S UNIT measured on the METRICAL SYSTEM.	Mean Temperature.
January	0·0375	0·1643	61°·6
February	·0373	·1634	61·4
March	·0372	·1630	62·0
April	·0370	·1621	63·1
May	·0357	·1564	63·1
June	·0372	·1630	66·1
July	·0371	·1625	68·3
August	·0361	·1581	68·4
September	·0319	·1397	65·0
October	·0304	·1332	63·9
November	·0287	·1257	62·5
December	·0277	·1214	62·4

The value 0·9600 of Vertical Force corresponds to 4·2049 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 1873.

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	+ 5′·08	+ 0·00264	− 0·00090	− 0·00161	− 0·00042	− 0·00184
1	+ 6·30	+ 328	− 51	− 91	− 17	− 74
2	+ 6·06	+ 315	− 14	− 25	+ 3	+ 13
3	+ 4·86	+ 253	+ 12	+ 21	+ 22	+ 96
4	+ 3·37	+ 175	+ 34	+ 61	+ 37	+ 162
5	+ 1·95	+ 101	+ 47	+ 84	+ 48	+ 210
6	+ 0·87	+ 45	+ 63	+ 113	+ 55	+ 241
7	− 0·17	− 9	+ 66	+ 118	+ 60	+ 263
8	− 1·06	− 55	+ 60	+ 107	+ 55	+ 241
9	− 1·88	− 98	+ 43	+ 77	+ 47	+ 206
10	− 2·38	− 124	+ 33	+ 59	+ 36	+ 158
11	− 2·60	− 135	+ 32	+ 57	+ 27	+ 118
12	− 2·67	− 139	+ 28	+ 50	+ 18	+ 79
13	− 2·42	− 126	+ 21	+ 38	+ 9	+ 39
14	− 2·13	− 111	+ 15	+ 27	− 3	− 13
15	− 1·94	− 101	+ 19	+ 34	− 14	− 61
16	− 2·02	− 105	+ 22	+ 39	− 22	− 96
17	− 2·21	− 115	+ 23	+ 41	− 28	− 123
18	− 2·38	− 124	+ 14	+ 25	− 34	− 149
19	− 2·74	− 142	− 7	− 13	− 39	− 171
20	− 2·95	− 153	− 45	− 81	− 43	− 188
21	− 2·19	− 114	− 88	− 158	− 46	− 201
22	− 0·06	− 3	− 119	− 213	− 52	− 228
23	+ 2·68	+ 139	− 116	− 208	− 57	− 250

ROYAL OBSERVATORY, GREENWICH.

INDICATIONS

OF

MAGNETOMETERS

ON THREE DAYS OF GREAT MAGNETIC DISTURBANCE.

1873.

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.
Jan. 7 h m	° ′ ″	
0. 0	19. 43. 20	·0538
0. 8	42. 0	·0530
0. 15	43. 40	·0539
0. 21	42. 0	·0530
	***	
0. 41	41. 5	·0525
0. 47	42. 35	·0533
0. 56	41. 20	·0527
1. 4	46. 50	·0555
1. 23	35. 55	·0499
1. 32	35. 35	·0497
1. 44	39. 50	·0519
1. 54	39. 50	·0519
2. 1	40. 20	·0522
2. 15	40. 55	·0525
2. 30	40. 0	·0520
2. 37	41. 0	·0525
2. 40	39. 40	·0518
2. 50	39. 55	·0520
3. 9	39. 30	·0518
3. 14	40. 30	·0523
3. 26	41. 0	·0525
3. 40	39. 55	·0520
3. 57	41. 45	·0529
4. 0	43. 0	·0536
4. 10	43. 10	·0537
4. 26	39. 45	·0519
4. 50	37. 45	·0508
5. 32	38. 30	·0513
5. 50	37. 55	·0509
6. 40	36. 30	·0502
7. 0	36. 45	·0503
7. 6	36. 15	·0500
7. 47	36. 0	·0499
8. 0	35. 5	·0494
8. 7	36. 0	·0499
8. 13	34. 35	·0492
8. 22	35. 0	·0494
8. 33	34. 0	·0489
8. 37	31. 0	·0473
8. 46	30. 0	·0468
	***	
9. 2	23. 15	·0433
9. 33	5. 30	·0341
9. 44	1. 40	·0320
9. 50	3. 55	·0333
10. 7	12. 40	·0377
10. 9	13. 0	·0380
10. 17	21. 35	·0424
10. 23	9. 10	·0360
10. 28	19. 5	·0411
10. 34	8. 45	·0358

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant 0·8600 nearly) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Jan. 7 h m		
0. 0	·1500	·2687
0. 4	·1503	·2692
0. 10	·1497	·2682
0. 17	·1501	·2689
0. 25	·1495	·2678
0. 31	·1489	·2667
0. 34	·1493	·2674
0. 35	·1491	·2671
0. 46	·1495	·2678
0. 53	·1486	·2662
1. 1	·1496	·2680
1. 7	·1484	·2658
1. 18	·1474	·2640
1. 33	·1493	·2674
1. 42	·1496	·2680
1. 49	·1491	·2671
2. 1	·1497	·2682
2. 2	·1496	·2680
2. 20	·1505	·2696
2. 31	·1499	·2685
2. 38	·1504	·2694
2. 43	·1503	·2692
3. 17	·1511	·2706
3. 36	·1506	·2698
3. 46	·1509	·2703
3. 55	·1517	·2717
4. 2	·1511	·2706
4. 20	·1499	·2685
4. 42	·1509	·2703
5. 3	·1513	·2709
5. 10	·1511	·2706
5. 25	·1517	·2717
5. 29	·1513	·2709
5. 32	·1516	·2715
5. 40	·1512	·2708
5. 47	·1515	·2713
	***	
6. 37	·1509	·2703
6. 59	·1515	·2713
7. 12	·1511	·2706
7. 17	·1517	·2717
7. 19	·1515	·2713
7. 22	·1521	·2724
7. 29	·1512	·2708
7. 47	·1512	·2708
7. 49	·1509	·2703
7. 52	·1516	·2715
7. 57	·1513	·2709
7. 59	·1518	·2718
8. 12	·1508	·2701
8. 28	·1512	·2708
8. 33	·1508	·2701

Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant 0·9600 nearly) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Jan. 7 h m		
0. 0	·0372	·1630
0. 15	·0373	·1634
0. 22	·0372	·1630
0. 50	·0376	·1647
0. 54	·0375	·1643
1. 2	·0378	·1656
1. 19	·0376	·1647
1. 31	·0378	·1656
2. 4	·0376	·1647
2. 28	·0374	·1639
2. 36	·0375	·1643
3. 6	·0373	·1634
3. 12	·0374	·1639
3. 39	·0372	·1630
3. 53	·0374	·1639
4. 20	·0371	·1625
4. 33	·0372	·1630
5. 20	·0372	·1630
5. 38	·0371	·1625
6. 24	·0370	·1621
	***	
7. 0	·0371	·1625
	***	
8. 30	·0370	·1621
8. 47	·0369	·1616
8. 52	·0368	·1612
9. 18	·0367	·1608
9. 29	·0365	·1599
9. 43:	·0358	·1568
9. 51	·0360	·1577
10. 0	·0368	·1612
10. 7	·0364	·1595
10. 17	·0349	·1529
10. 21	·0359	·1572
10. 27	·0344	·1508
10. 30	·0351	·1537
10. 40	·0336	·1472
10. 43	·0351	·1537
10. 50	·0340	·1490
10. 52	·0333	·1459
10. 58	·0342	·1499
11. 2	·0353	·1546
11. 6	·0348	·1525
11. 10	·0338	·1481
11. 12	·0341	·1494
11. 21	·0340	·1490
11. 30	·0325	·1424
11. 37	·0327	·1433
11. 41	·0321	·1406
11. 49	·0326	·1428
11. 57	·0317	·1389
11. 58	·0319	·1397

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.
Jan. 7 h m	° ′ ″	
10. 37	19. 17. 15	·0401
10. 41	18. 51. 0	·0265
10. 54	19. 28. 5	·0458
11. 2	16. 35	·0398
11. 18	48. 15	·0563
11. 41	6. 35	·0346
11. 50	11. 0	·0369
11. 54	9. 55	·0364
12. 2	17. 25	·0402
12. 6	16. 55	·0400
12. 8	21. 50	·0425
12. 13	40. 5	·0520
12. 18	16. 20	·0397
	(†)	
12. 40	40. 20	·0522
12. 48	29. 40	·0466
12. 51	28. 10	·0459
13. 0	30. 0	·0468
13. 1	35. 40	·0497
13. 4	37. 15	·0505
13. 14	23. 5	·0432
13. 21	20. 0	·0416
13. 30	24. 45	·0441
13. 37	25. 15	·0443
13. 50	34. 0	·0489
14. 2	39. 25	·0517
14. 5	39. 25	·0517
14. 10	45. 0	·0546
14. 21	39. 0	·0515
14. 33	34. 0	·0489
14. 39	35. 5	·0494
14. 44	33. 15	·0485
14. 50	35. 0	·0494
15. 11	49. 0	·0567
15. 20	45. 0	·0546
15. 23	45. 50	·0550
15. 31	50. 55	·0577
15. 40	45. 15	·0547
15. 49	48. 0	·0562
16. 1	46. 45	·0555
16. 4	47. 20	·0558
16. 14	42. 10	·0531
16. 17	41. 30	·0528
16. 24	44. 5	·0541
16. 30	44. 20	·0543
16. 33	42. 40	·0533
16. 40	45. 0	·0546
16. 44	44. 0	·0541
	***	
17. 1	52. 35	·0585
17. 5	54. 0	·0593
	***	

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant 0·8600 nearly) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Jan. 7 h m		
8. 39	·1516	·2715
8. 41	·1529	·2738
8. 43	·1522	·2726
8. 46	·1527	·2735
8. 47	·1519	·2720
8. 52	·1527	·2735
8. 53	·1515	·2713
9. 4	·1503	·2692
9. 12	·1490	·2669
9. 19	·1492	·2673
9. 26	·1477	·2646
9. 30	·1476	·2644
9. 36	·1447	·2592
9. 44	·1424	·2550
9. 52	·1383	·2477
9. 58	·1407	·2520
10. 2	·1398	·2504
10. 9	·1418	·2539
10. 12	·1411	·2527
10. 22	·1485	·2660
10. 28	·1466	·2626
10. 29	·1498	·2683
10. 30	·1480	·2651
10. 33	·1488	·2665
10. 37	·1425	·2552
10. 46	·1492	·2673
10. 59	·1417	·2538
11. 3	·1452	·2601
11. 7	·1442	·2583
11. 9	·1446	·2590
11. 11	·1434	·2568
11. 16	·1439	·2577
11. 23	·1382	·2476
	(†)	
11. 40	·1348*	·2414
11. 43	·1348*	·2414
11. 44	·1361*	·2438
11. 45	·1359*	·2434
11. 46	·1364*	·2443
11. 47	·1361*	·2438
11. 48	·1365*	·2445
11. 57	·1338*	·2396
11. 59	·1343*	·2405
12. 0	·1337*	·2395
12. 1	·1338*	·2396
12. 5	·1332*	·2386
12. 7	·1355*	·2427
12. 8	·1350*	·2418
12. 15	·1382	·2476
12. 24	·1430	·2561
12. 29	·1412	·2529
12. 41	·1484	·2658

Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant 0·9600 nearly) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Jan. 7 h m		
12. 0	·0311	·1362
12. 6	·0281	·1230
12. 16	·0313	·1371
12. 20	·0304	·1332
12. 22	·0314	·1376
12. 27	·0305	·1336
12. 32	·0326	·1428
12. 38	·0332	·1455
12. 42	·0328	·1437
12. 46	·0329	·1441
13. 2	·0322	·1411
13. 10	·0326	·1428
13. 16	·0320	·1402
	***	
13. 33	·0320	·1402
13. 42	·0317	·1389
13. 50	·0324	·1420
13. 57	·0321	·1406
14. 2	·0322	·1411
14. 6	·0321	·1406
14. 13	·0328	·1437
14. 26	·0323	·1415
14. 44	·0330	·1446
14. 48	·0329	·1441
15. 12	·0343	·1503
15. 20	·0342	·1499
15. 37	·0349	·1529
15. 42	·0348	·1525
15. 53	·0354	·1551
15. 58	·0352	·1542
16. 8	·0356	·1559
16. 11	·0355	·1555
16. 20	·0355	·1555
16. 23	·0358	·1568
16. 31	·0358	·1568
16. 41	·0360	·1577
16. 45	·0359	·1572
17. 2	·0363	·1590
17. 24	·0360	·1577
17. 37	·0360	·1577
17. 42	·0359	·1572
17. 49	·0360	·1577
18. 0	·0359	·1572
18. 7	·0358	·1568
18. 19	·0360	·1577
18. 28	·0359	·1572
18. 51	·0363	·1590
	***	
19. 13	·0364	·1595
	***	
19. 49	·0365	·1599
19. 53	·0364	·1595

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 observations made with the telescope in the ancient manner. The Symbol *** denotes that the magnet has been generally in a state of agitation. The Symbol (†) denotes that the register has failed between the preceding and following readings. The Symbol : attached to a time denotes that the reading will apply equally well to a considerable range of time near that which is recorded. A brace denotes that at this time the curve of the Vertical Force was dislocated, and the difference of the numbers included by the brace shows the amount of the displacement.

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

The value 0·8600 of Horizontal Force corresponds to 1·5403 of Gauss's Unit on the Metrical System.

The value 0·9600 of Vertical Force corresponds to 4·2049 of Gauss's Unit on the Metrical System.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 19°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.
Jan. 7 h m	° ′ ″	
17. 19	19. 48. 40	·0565
17. 22	46. 10	·0552
17. 31	43. 45	·0540
17. 36	46. 25	·0553
17. 41	45. 25	·0548
17. 48	50. 0	·0572
17. 56	48. 40	·0565
18. 0	49. 10	·0568
18. 6	47. 0	·0556
18. 14	47. 55	·0561
18. 27	44. 20	·0543
18. 30	45. 0	·0546
18. 34	43. 55	·0541
18. 43	43. 35	·0539
18. 48	44. 40	·0544
18. 53	43. 35	·0539
18. 59	44. 40	·0544
19. 6	44. 0	·0541
19. 10	45. 0	·0546
19. 18	42. 50	·0534
19. 20	43. 5	·0536
19. 33	40. 5	·0520
19. 41	41. 0	·0525
19. 52	38. 0	·0510
20. 1	39. 0	·0515
20. 3	36. 40	·0502
20. 12	39. 20	·0517
20. 17	36. 55	·0504
20. 22	40. 0	·0520
20. 30	38. 0	·0510
20. 36	40. 0	·0520
20. 43	39. 0	·0515
20. 54	40. 35	·0523
21. 8	39. 50	·0519
21. 13	37. 45	·0508
21. 17	40. 0	·0520
21. 24	38. 25	·0512
21. 31	39. 35	·0518
21. 39	38. 25	·0512
21. 52	37. 50	·0508
22. 7	38. 30	·0513
22. 16	37. 45	·0508
22. 20	38. 30	·0513
22. 29	38. 35	·0513
22. 38	39. 35	·0518
22. 41	39. 0	·0515
22. 48	39. 30	·0518
22. 53	38. 55	·0515
22. 57	40. 20	·0522
23. 7	39. 20	·0517
23. 12	41. 0	·0525
23. 16	39. 0	·0515

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant 0·8600 nearly) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Jan. 7 h m		
12. 42	·1458	·2611
12. 56	·1500	·2687
13. 3	·1474	·2640
13. 9	·1477	·2646
13. 13	·1459	·2613
13. 20	·1456	·2608
13. 26	·1444	·2586
13. 28	·1445	·2588
13. 41	·1412	·2529
13. 51	·1457	·2610
14. 0	·1470	·2633
14. 2	·1462	·2619
14. 4	·1465	·2624
14. 6	·1453	·2602
14. 20	·1484	·2658
14. 31	·1464	·2622
14. 40	·1442	·2583
14. 52	·1404	·2514
15. 2	·1412	·2529
15. 3	·1410	·2525
15. 13	·1428	·2557
15. 24	·1419	·2541
15. 39	·1446	·2590
15. 42	·1447	·2592
15. 53	·1467	·2628
15. 57	·1460	·2615
15. 59	·1462	·2619
16. 1	·1458	·2611
16. 8	·1467	·2628
16. 10	·1464	·2622
16. 14	·1470	·2633
16. 27	·1473	·2638
16. 33	·1464	·2622
16. 42	·1470	·2633
16. 46	·1463	·2620
16. 53	·1468	·2629
16. 57	·1465	·2624
17. 10	·1480	·2651
17. 20	·1492	·2673
17. 22	·1486	·2662
17. 30	·1490	·2669
17. 34	·1486	·2662
17. 36	·1493	·2674
17. 41	·1484	·2658
17. 47	·1494	·2676
17. 50	·1482	·2655
17. 52	·1495	·2678
17. 57	·1489	·2667
18. 2	·1486	·2662
18. 6	·1472	·2637
18. 10	·1484	·2658
	***	

Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant 0·9600 nearly) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Jan. 7 h m		
19. 59	·0365	·1599
20. 2	·0363	·1590
20. 6	·0364	·1595
	***	
20. 47	·0364	·1595
20. 56	·0365	·1599
21. 17	·0363	·1590
21. 58	·0364	·1595
22. 47	·0366	·1603
22. 59	·0367	·1608
23. 1	·0366	·1603
23. 3	·0367	·1608
23. 7	·0366	·1603
23. 11	·0369	·1616
23. 15	·0365	·1599
23. 18	·0368	·1612
23. 22	·0366	·1603
23. 27	·0369	·1616
23. 34	·0366	·1603
23. 37	·0369	·1616
23. 40	·0367	·1608
23. 44	·0369	·1616
23. 49	·0368	·1612
23. 57	·0370	·1621
23. 59	·0369	·1616

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 19°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.
Jan. 7 h m	° ′ ″	
23. 22	19. 38. 30	·0513
23. 26	40. 45	·0524
23. 36	39. 10	·0516
23. 48	40. 0	·0520
23. 56	39. 0	·0515
23. 59	39. 20	·0517

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant 0·8600 nearly) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Jan. 7 h m		
18. 38	·1469	·2631
18. 46	·1475	·2642
18. 48	·1470	·2633
18. 52	·1476	·2644
18. 56	·1471	·2635
19. 0	·1474	·2640
19. 6	·1468	·2629
19. 10	·1475	·2642
19. 12	·1469	·2631
19. 34	·1475	·2642
19. 36	·1467	·2628
19. 46	·1478	·2647
19. 54	·1469	·2631
20. 2	·1488	·2665
20. 3	·1467	·2628
20. 7	·1481	·2653
20. 9	·1474	·2640
20. 12	·1494	·2676
20. 20	·1469	·2631
20. 22	·1494	·2676
20. 26	·1476	·2644
20. 27	·1486	·2662
20. 32	·1466	·2626
20. 35	·1482	·2655
20. 36	·1465	·2624
20. 40	·1473	·2638
20. 47	·1469	·2631
21. 5	·1475	·2642
21. 8	·1470	·2633
21. 10	·1479	·2649
21. 16	·1474	·2640
21. 27	·1483	·2656
22. 14	·1483	·2656
22. 21	·1486	·2662
22. 32	·1482	·2655
22. 37	·1485	·2660
22. 47	·1479	·2649
22. 53	·1486	·2662
22. 56	·1478	·2647
23. 2	·1488	·2665
23. 5	·1477	·2646
23. 12	·1492	·2673
23. 13	·1472	·2637
23. 14	·1483	·2656
23. 19	·1478	·2647
23. 28	·1498	·2683
23. 32	·1480	·2651
23. 39	·1490	·2669
23. 44	·1478	·2647
23. 47	·1487	·2664
23. 56	·1480	·2651
23. 59	·1489	·2667

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.	Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Of V. F. Magnet.
Jan. 7 h m	°	°	Jan. 7 h m	°	°	Jan. 7 h m	°	°
0. 0	62·0	62·2	3. 0	61·7	61·8	21. 0	61·5	60·8
1. 0	62·0	62·1	9. 0	61·9	61·6	22. 0	61·6	61·0
2. 0	61·9	62·0	12. 0	61·9	61·5	23. 0	61·8	61·3

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 0·8600 nearly) 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 0·9600 nearly) 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.	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 0·8600 nearly) 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 0·9600 nearly) 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.
Mar. 9			Mar. 9			Mar. 9			Mar. 9			Mar. 9			Mar. 9		
h m	° ′ ″		h m			h m			h m	° ′ ″		h m			h m		
0. 0	19. 51. 50	·0581	0. 0	·1464	·2622	0. 0	·0386	·1691	5. 0	19. 44. 30	·0544	6. 4	·1499	·2685	6. 29	·0410	·1796
0. 3	50. 35	·0575	0. 3	·1462	·2619	0. 34	·0385	·1687	5. 6	40. 5	·0520	6. 13	·1532	·2744	6. 33	·0406	·1778
0. 7	51. 0	·0577	0. 11	·1470	·2633	0. 47	·0387	·1696	5. 9	38. 0	·0510	6. 17	·1522	·2726	6. 36	·0408	·1787
0. 14	47. 5	·0556	0. 12	·1467	·2628	1. 16	·0381	·1669	5. 17	43. 5	·0536	6. 23	·1502	·2691	6. 48:	·0397	·1740
0. 19	49. 10	·0568	0. 19	·1471	·2635	1. 18	·0382	·1674	5. 23	33. 0	·0484	6. 30	·1513	·2709	6. 54	·0394	·1727
0. 33	48. 0	·0562	0. 35	·1467	·2628	1. 32	·0380	·1665	5. 27	37. 0	·0504	6. 34	·1475	·2642	7. 0	·0396	·1735
0. 39	48. 45	·0566	0. 46	·1484	·2658	1. 42	·0385	·1687	5. 32	45. 35	·0549	6. 40	·1478	·2647	7. 10	·0403	·1765
0. 43	51. 15	·0578	0. 50	·1496	·2680	2. 0	·0381	·1669	5. 37	37. 55	·0509	6. 43	·1448	·2593	7. 22	·0397	·1740
0. 52	52. 5	·0582	1. 27	·1464	·2622	2. 6	·0382	·1674	5. 42	33. 5	·0484	6. 53	·1472	·2637	7. 27	·0400	·1752
0. 57	51. 35	·0580	1. 31	·1453	·2602	2. 10	·0381	·1669	5. 49	35. 20	·0496	6. 58	·1478	·2647	7. 40	·0389	·1704
1. 6	49. 0	·0567	1. 38	·1464	·2622	2. 30	·0387	·1696	5. 52	29. 35	·0466	7. 10	·1464	·2622	7. 49	·0392	·1718
1. 9	49. 25	·0569	1. 48	·1496	·2680	2. 33	·0386	·1691	5. 58	37. 35	·0507	7. 20	·1478	·2647	8. 4	·0386	·1691
1. 15	45. 0	·0546	1. 58	·1484	·2658	2. 39	·0392	·1718	6. 4	14. 25	·0387	7. 27	·1479	·2649	8. 10:	·0398	·1744
1. 20	47. 20	·0558	2. 6	·1488	·2665	2. 42	·0390	·1709	6. 12	34. 5	·0489	7. 33	·1462	·2619	8. 12	·0401	·1756
1. 28	45. 0	·0546	2. 10	·1484	·2658	2. 52	·0394	·1727	6. 19	23. 0	·0432	7. 37	·1475	·2642	8. 18	·0396	·1735
1. 32	41. 50	·0529	2. 22	·1488	·2665	3. 1	·0390	·1709	6. 24	18. 55	·0411	7. 43	·1478	·2647	8. 28	·0378	·1656
1. 46	55. 0	·0598	2. 30	·1500	·2687	3. 6	·0393	·1722	6. 30	44. 5	·0541	7. 49	·1462	·2619	8. 32	·0380	·1665
1. 52	55. 10	·0599	2. 32	·1496	·2680	3. 10	·0392	·1718	6. 33	37. 55	·0509	7. 56	·1460	·2615	8. 42	·0375	·1643
1. 59	51. 30	·0580	2. 40	·1519	·2720	3. 11	·0394	·1727	6. 38	43. 0	·0536	8. 1	·1470	·2633	8. 53	·0386	·1691
2. 8	52. 25	·0584	2. 46	·1511	·2706	3. 12	·0392	·1718	6. 45	29. 35	·0466	8. 7	·1472	·2637	9. 2	·0379	·1660
2. 11	50. 5	·0572	2. 53	·1533	·2745	3. 17	·0395	·1731	7. 2	42. 25	·0532	8. 12	·1454	·2604	9. 8	·0380	·1665
2. 19	51. 0	·0577	3. 9	·1511	·2706	3. 28	·0391	·1713	7. 10	32. 40	·0481	8. 17	·1467	·2628	9. 12	·0377	·1652
2. 24	49. 35	·0570	3. 12	·1522	·2726	3. 33	·0394	·1727	7. 18	31. 0	·0473	8. 18	·1472	·2637	9. 22	·0378	·1656
2. 28	51. 20	·0579	3. 21	·1537	·2753	3. 46	·0392	·1718	7. 27	37. 30	·0507	8. 22	·1449	·2595	9. 29	·0375	·1643
2. 33	48. 45	·0566	3. 34	·1503	·2692	3. 49	·0393	·1722	7. 31	29. 35	·0466	8. 27	·1457	·2610	9. 36	·0375	·1643
2. 38	50. 0	·0572	3. 42	·1516	·2715	3. 50	·0389	·1704	7. 35	33. 30	·0487	8. 30	·1486	·2662	9. 58	·0368	·1612
2. 40	53. 20	·0590	3. 50	·1512	·2708	3. 52	·0394	·1727	7. 38	33. 0	·0484	8. 39:	·1435	·2570	10. 4	·0370	·1621
2. 44	48. 30	·0565	3. 53	·1500	·2687	3. 54	·0388	·1700	7. 42	39. 0	·0515	8. 46	·1424	·2550	10. 10	·0368	·1612
2. 49	47. 35	·0559	3. 59	·1529	·2738	3. 59	·0392	·1718	7. 48	37. 50	·0508	8. 50	·1429	·2559	10. 12	·0370	·1621
2. 53	49. 55	·0572	4. 0	·1485	·2660	4. 8	·0391	·1713	7. 55	32. 35	·0481	8. 52	·1427	·2556	10. 18	·0368	·1612
2. 57	49. 0	·0567	4. 4	·1506	·2698	4. 10	·0393	·1722	8. 5	35. 15	·0495	9. 3	·1463	·2620	10. 20	·0369	·1616
2. 58	51. 35	·0580	4. 11	·1506	·2698	4. 12	·0393	·1722	8. 10	33. 30	·0487	9. 11	·1459	·2613	10. 29	·0368	·1612
3. 3	46. 0	·0551	4. 12	·1503	·2692	4. 17	·0391	·1713	8. 18	21. 0	·0421	9. 22	·1467	·2628	10. 31	·0365	·1599
3. 11	49. 50	·0571	4. 16	·1513	·2709	4. 22	·0387	·1696	8. 21	19. 8. 0	·0354	9. 33	·1463	·2620	10. 35	·0367	·1608
	***		4. 23	·1497	·2682	4. 47	·0396	·1735	8. 27	18. 59. 0	·0307	9. 39	·1466	·2626	10. 41	·0353	·1546
3. 18	53. 40	·0591	4. 31	·1470	·2633	4. 51	·0394	·1727	8. 31	19. 22. 25	·0428	9. 43	·1472	·2637	10. 56	·0346	·1516
3. 22	57. 5	·0608	4. 35	·1484	·2658	4. 56	·0400	·1752	8. 36	24. 35	·0440	9. 48	·1467	·2628	10. 59	·0348	·1525
3. 32	45. 35	·0549	4. 48	·1502	·2691	5. 7	·0406	·1778	8. 47	15. 40	·0393	10. 0	·1471	·2635	11. 2	·0344	·1508
3. 38	47. 55	·0561	4. 59	·1489	·2667	5. 10	·0405	·1774	8. 57	15. 25	·0392	10. 4	·1463	·2620	11. 12	·0348	·1525
3. 40	44. 55	·0546	5. 2	·1526	·2733	5. 12	·0409	·1791	9. 3	21. 5	·0421	10. 13:	·1451	·2599	11. 20	·0353	·1546
3. 48	40. 55	·0525	5. 6	·1515	·2713	5. 14	·0408	·1787	9. 13	26. 0	·0447	10. 27	·1476	·2644	11. 22	·0352	·1542
3. 53	42. 0	·0530	5. 10	·1535	·2749	5. 20	·0412	·1805	9. 21	30. 25	·0470	10. 38	·1472	·2637	11. 30	·0356	·1559
3. 59	34. 0	·0489	5. 17	·1544	·2765	5. 26	·0407	·1783	9. 35	28. 25	·0460	10. 43	·1498	·2683	11. 32	·0355	·1555
4. 3	41. 0	·0525	5. 20	·1517	·2717	5. 32	·0409	·1791	9. 42	29. 25	·0465	10. 50	·1478	·2647	11. 34	·0356	·1559
4. 17	46. 15	·0552	5. 23	·1512	·2708	5. 41	·0407	·1783	9. 50	28. 25	·0460	10. 57	·1510	·2704	11. 39	·0354	·1551
4. 23	45. 0	·0546	5. 30	·1545	·2767	5. 47	·0404	·1770	10. 2	19. 25	·0413	11. 1	·1490	·2669	11. 43	·0356	·1559
4. 30	37. 30	·0507	5. 34	·1526	·2733	5. 54	·0403	·1765	10. 12	8. 45	·0358	11. 10	·1500	·2687	11. 51	·0354	·1551
4. 34	40. 25	·0522	5. 39	·1509	·2703	6. 0	·0406	·1778	10. 23	24. 30	·0440	11. 16	·1503	·2692	12. 0	·0357	·1564
4. 38	39. 50	·0519	5. 42	·1515	·2713	6. 6:	·0399	·1748	10. 29	29. 0	·0463	11. 22	·1488	·2665	12. 4	·0352	·1542
4. 43	41. 0	·0525	5. 48	·1527	·2735	6. 11	·0407	·1783	10. 37	43. 0	·0536	11. 27	·1490	·2669	12. 10	·0354	·1551
4. 49	43. 30	·0539	5. 52	·1504	·2694	6. 20	·0401	·1756	10. 50	28. 0	·0458	11. 31	·1480	·2651	12. 14	·0360	·1577
4. 57	38. 0	·0510	6. 0	·1522	·2726	6. 22:	·0404	·1770	10. 56	36. 55	·0504	11. 33	·1477	·2646	12. 33	·0365	·1599

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 observations made with the telescope in the ancient manner. The Symbol *** denotes that the magnet has been generally in a state of agitation. The Symbol (†) denotes that the register has failed between the preceding and following readings. The Symbol : attached to a time denotes that the reading will apply equally well to a considerable range of time near that which is recorded. A brace denotes that at this time the curve of the Vertical Force was dislocated, and the difference of the numbers included by the brace shows the amount of the displacement.

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

The value 0·8600 of Horizontal Force corresponds to 1·5403 of Gauss's Unit on the Metrical System.

The value 0·9600 of Vertical Force corresponds to 4·2049 of Gauss's Unit on the Metrical System.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 19° 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 0·8600 nearly) 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 0·9600 nearly) 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.
Mar. 9			Mar. 9			Mar. 9		
h m	° ′ ″		h m			h m		
11. 1	19. 28. 20	·0460	11. 41	·1490	·2669	12. 37	·0364	·1595
11. 12	27. 35	·0455	11. 46	·1473	·2638	12. 41	·0367	·1608
11. 17	30. 10	·0469	11. 52	·1484	·2658	12. 44	·0366	·1603
11. 25	34. 45	·0493	12. 2	·1459	·2613	12. 50	·0367	·1608
11. 33	28. 0	·0458	12. 8	·1474	·2640	12. 58	·0365	·1599
11. 42	34. 0	·0489	12. 12	·1464	·2622	13. 0	·0366	·1603
11. 50	28. 45	·0462	12. 17	·1467	·2628	13. 8	·0363	·1590
11. 55	34. 0	·0489	12. 21	·1457	·2610	13. 11	·0365	·1599
12. 3	31. 0	·0473	12. 26	·1473	·2638	13. 17	·0363	·1590
12. 10	32. 40	·0481	12. 30	·1475	·2642	13. 31:	·0366	·1603
12. 22	17. 0	·0400	12. 34	·1469	·2631	13. 46	·0365	·1599
12. 36	27. 20	·0454	12. 40	·1475	·2642	14. 12	·0359	·1572
12. 42	30. 0	·0468	12. 43	·1470	·2633	14. 33	·0360	·1577
12. 46	28. 55	·0463	12. 47	·1484	·2658	15. 8	·0363	·1590
12. 51	30. 30	·0471	12. 50	·1481	·2653	15. 29	·0363	·1590
12. 54	29. 30	·0466	12. 59	·1489	·2667	15. 47:	·0366	·1603
12. 57	33. 0	·0484	13. 2	·1486	·2662	16. 6	·0365	·1599
13. 2	31. 0	·0473	13. 10	·1489	·2667	16. 39	·0366	·1603
13. 9	32. 30	·0481	13. 13	·1479	·2649	16. 54	·0363	·1590
13. 20	28. 45	·0462	13. 19	·1480	·2651	17. 9	·0363	·1590
13. 23	29. 0	·0463	13. 22	·1475	·2642	17. 30	·0366	·1603
13. 29	27. 0	·0452	13. 33	·1480	·2651	17. 53	·0368	·1612
13. 35	29. 0	·0463	13. 40	·1477	·2646		***	
13. 38	33. 0	·0484	13. 55	·1493	·2674	19. 2	·0368	·1612
13. 42	36. 5	·0499	14. 8:	·1477	·2646	19. 21	·0369	·1616
13. 49	35. 10	·0495	14. 17	·1485	·2660	19. 40	·0368	·1612
13. 58	40. 0	·0520	14. 20	·1482	·2655	20. 10	·0369	·1616
14. 1	37. 50	·0508	14. 23	·1485	·2660	20. 14	·0368	·1612
14. 9	35. 0	·0494	14. 29	·1484	·2658	20. 49	·0369	·1616
14. 22	33. 35	·0487	14. 40	·1490	·2669	20. 56	·0368	·1612
14. 27	34. 0	·0489	14. 47	·1489	·2667	21. 0	·0369	·1616
14. 32	33. 20	·0486	14. 52	·1490	·2669	23. 14	·0369	·1616
14. 40	36. 0	·0499	14. 59	·1487	·2664	23. 19	·0367	·1608
14. 54	36. 40	·0502	15. 11	·1499	·2685	23. 26	·0369	·1616
15. 7	33. 20	·0486	15. 20	·1487	·2664	23. 59	·0369	·1616
15. 13	35. 5	·0494	15. 31	·1489	·2667			
15. 23	32. 40	·0481	15. 43	·1499	·2685			
15. 27	33. 10	·0485	15. 49	·1495	·2678			
15. 36	31. 50	·0477	16. 16	·1500	·2687			
15. 43	34. 0	·0489	16. 27	·1494	·2676			
15. 48	37. 35	·0507	16. 32	·1495	·2678			
15. 59	39. 0	·0515	16. 40	·1498	·2683			
16. 12	38. 25	·0512	16. 53	·1492	·2673			
16. 19	39. 55	·0520	17. 6	·1497	·2682			
16. 33	39. 50	·0519	17. 16	·1488	·2665			
16. 48	42. 40	·0533	17. 23	·1483	·2656			
16. 55	38. 55	·0515		***				
17. 2	36. 5	·0499	17. 44	·1488	·2665			
17. 16	34. 45	·0493	18. 0	·1484	·2658			
17. 28	36. 15	·0500	18. 2	·1486	·2662			
17. 41	40. 10	·0521	18. 9	·1481	·2653			
17. 54	40. 25	·0522	18. 16	·1483	·2656			

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 19° 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 0·8600 nearly) 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 0·9600 nearly) 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.
Mar. 9			Mar. 9					
h m	° ′ ″		h m			h m		
18. 1	19. 42. 0	·0530	18. 22	·1488	·2665			
18. 15	40. 10	·0521	18. 29	·1484	·2658			
18. 22	41. 30	·0528	18. 39	·1484	·2658			
18. 32	39. 40	·0518		***				
18. 42	38. 20	·0512	19. 3	·1494	·2676			
18. 46	39. 0	·0515	19. 19	·1484	·2658			
18. 49	37. 50	·0508	19. 30	·1484	·2658			
18. 52	38. 55	·0515	19. 46	·1474	·2640			
19. 0	39. 0	·0515	20. 13	·1480	·2651			
19. 13	36. 55	·0504	20. 21	·1477	·2646			
19. 29	38. 0	·0510	20. 33	·1478	·2647			
19. 39	37. 45	·0508	20. 37	·1480	·2651			
19. 46	36. 0	·0499	20. 57	·1480	·2651			
19. 57	39. 0	·0515	21. 0	·1477	·2646			
20. 7	39. 25	·0517	21. 8	·1480	·2651			
20. 13	38. 20	·0512	21. 23	·1474	·2640			
20. 20	36. 0	·0499	21. 37	·1474	·2640			
20. 28	37. 55	·0509	21. 44	·1479	·2649			
20. 32	36. 40	·0502	21. 52	·1473	·2638			
20. 48	39. 20	·0517	22. 2	·1476	·2644			
20. 51	38. 35	·0513	22. 30	·1470	·2633			
20. 57	39. 5	·0515	23. 0	·1476	·2644			
20. 58	37. 20	·0506	23. 14	·1476	·2644			
21. 8	40. 15	·0521	23. 25	·1481	·2653			
21. 20	38. 0	·0510	23. 30	·1473	·2638			
21. 35	37. 45	·0508	23. 39	·1482	·2655			
21. 42	39. 35	·0518	23. 51	·1488	·2665			
21. 50	37. 55	·0509	23. 59	·1487	·2664			
22. 0	38. 35	·0513						
22. 23	37. 15	·0505						
22. 44	37. 25	·0506						
23. 8	39. 20	·0517						
23. 30	39. 30	·0518						
23. 40	41. 0	·0525						
23. 48	44. 55	·0546						
23. 59	43. 0	·0536						
June 26			June 26			June 26		
0. 0	19. 38. 20	·0512	0. 0	·1513	·2709	0. 0	·0350	·1533
0. 3	38. 45	·0514	0. 7	·1522	·2726	0. 20	·0354	·1551
0. 10	38. 20	·0512	0. 13	·1509	·2703	0. 21	·0352	·1542
0. 13	38. 55	·0515	0. 22	·1505	·2696	0. 27	·0354	·1551
0. 20	39. 0	·0515	0. 28	·1514	·2711	0. 30	·0352	·1542
0. 30	41. 0	·0525	0. 37	·1493	·2674	0. 40	·0354	·1551
0. 37	40. 5	·0520	0. 40	·1489	·2667	0. 50	·0353	·1546
0. 48	42. 5	·0530	0. 43	·1496	·2680	0. 53	·0359	·1572
0. 55	41. 55	·0530	0. 52	·1472	·2637	1. 0	·0356	·1559
0. 59	44. 0	·0541	1. 2	·1536	·2751	1. 3	·0355	·1555
1. 4	46. 40	·0554	1. 5	·1507	·2700	1. 10	·0357	·1564
1. 13	44. 0	·0541	1. 10	·1478	·2647	1. 13	·0355	·1555
1. 18	44. 45	·0545	1. 18	·1492	·2673	1. 20	·0358	·1568
1. 26	43. 20	·0538	1. 20	·1464	·2622	1. 24	·0357	·1564

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.
Mar. 9			Mar. 9			Mar. 9		
h m	°	°	h m	°	°	h m	°	°
0. 0	62·5	63·0	9. 0	61·6	61·7	23. 0	61·8	61·3
1. 0	62·1	62·2	21. 0	61·6	61·2			
6. 0	61·9	61·6	22. 0	61·6	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 0·8600 nearly) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant 0·8600 nearly) 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 0·9600 nearly) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant 0·9600 nearly) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
June 26			June 26			June 26		
h m	° ′ ″		h m			h m		
1. 32	19. 43. 45	·0540	1. 25	·1472	·2637	1. 33	·0360	·1577
1. 43	42. 0	·0530	1. 28	·1461	·2617	1. 37	·0359	·1572
1. 48	42. 25	·0532	1. 36	·1483	·2656	1. 40	·0361	·1581
2. 0	40. 20	·0522	1. 44	·1497	·2682	1. 42	·0359	·1572
2. 11	41. 5	·0525	1. 47	·1490	·2669	1. 48	·0362	·1586
2. 19	40. 5	·0520	1. 50	·1494	·2676	1. 52	·0361	·1581
2. 28	40. 20	·0522	1. 53	·1521	·2724	1. 57	·0361	·1581
2. 42	39. 45	·0519	2. 2	·1502	·2691	2. 0	·0359	·1572
3. 8	40. 30	·0523	2. 12	·1524	·2729	2. 10	·0362	·1586
3. 13	42. 25	·0532	2. 16	·1520	·2722	2. 12	·0360	·1577
3. 20	42. 0	·0530	2. 20	·1527	·2735	2. 30	·0360	·1577
3. 37	43. 0	·0536	2. 33	·1518	·2718	2. 32	·0359	·1572
3. 50	41. 35	·0528	2. 40	·1526	·2733	2. 34	·0360	·1577
4. 3	40. 30	·0523	2. 43	·1523	·2727	2. 50	·0360	·1577
4. 9	40. 45	·0524	2. 50	·1530	·2740	2. 52	·0359	·1572
4. 19	39. 0	·0515	2. 58	·1522	·2726	2. 57	·0362	·1586
4. 33	37. 55	·0509	3. 2	·1533	·2745	3. 3	·0359	·1572
4. 40	38. 0	·0510	3. 7	·1524	·2729	3. 12	·0361	·1581
4. 54	37. 5	·0504	3. 15	·1545	·2767	3. 17	·0364	·1595
5. 1	37. 45	·0508	3. 16	·1562	·2798	3. 21	·0360	·1577
5. 4	37. 0	·0504	3. 22	·1538	·2754	3. 26	·0362	·1586
5. 13	37. 45	·0508	3. 30	·1530	·2740	3. 27	·0360	·1577
5. 30	36. 0	·0499	3. 38	·1546	·2769	3. 31	·0363	·1590
5. 59	33. 30	·0487	3. 43	·1525	·2731	3. 38	·0363	·1590
6. 12	33. 15	·0485	3. 57	·1524	·2729	3. 42	·0360	·1577
6. 32	34. 35	·0492	4. 2	·1517	·2717	3. 49	·0362	·1586
6. 40	33. 35	·0487	4. 10	·1529	·2738	4. 0	·0362	·1586
6. 45	34. 0	·0489	4. 15	·1514	·2711	4. 10	·0363	·1590
7. 0	32. 0	·0478	4. 21	·1507	·2700	4. 13	·0362	·1586
7. 4	31. 50	·0477	4. 27	·1517	·2717	4. 22	·0363	·1590
7. 13	26. 10	·0448	4. 30	·1515	·2713	4. 30	·0363	·1590
7. 23	32. 40	·0481	4. 34	·1521	·2724	4. 39	·0364	·1595
7. 30	33. 0	·0484	4. 50	·1529	·2738	4. 50	·0364	·1595
7. 44	30. 35	·0471	4. 54	·1524	·2729	4. 54	·0363	·1590
7. 52	31. 15	·0474	5. 1	·1539	·2756	4. 59	·0365	·1599
8. 1	28. 45	·0462	5. 6	·1526	·2733	5. 2	·0363	·1590
8. 17	28. 0	·0458	5. 17	·1545	·2767	5. 12	·0365	·1599
8. 20	27. 5	·0452	5. 24	·1540	·2758	5. 22	·0365	·1599
8. 26	27. 35	·0455	5. 30	·1543	·2763	6. 0	·0366	·1603
8. 41	25. 20	·0444	5. 32	·1540	·2758	6. 24	·0367	·1608
8. 58	27. 0	·0452	5. 37	·1543	·2763	6. 30	·0368	·1612
9. 10	26. 5	·0447	5. 43	·1540	·2758	6. 36	·0367	·1608
9. 26	22. 55	·0431	6. 13	·1542	·2762	6. 48	·0369	·1616
9. 41	25. 25	·0444	6. 17	·1546	·2769	6. 57	·0369	·1616
9. 50	25. 45	·0446	6. 27	·1546	·2769	7. 9	·0368	·1612
10. 7	35. 15	·0495	6. 32	·1552	·2780	7. 18	·0370	·1621
10. 20	28. 10	·0459	6. 43	·1538	·2754	7. 24	·0369	·1616
10. 29	25. 0	·0442	7. 0	·1552	·2780	7. 39	·0368	·1612
10. 38	30. 15	·0469	7. 9	·1543	·2763	7. 44	·0367	·1608
10. 49	19. 35	·0414	7. 13	·1548	·2772	7. 52	·0368	·1612
11. 3	4. 0	·0333	7. 20	·1572	·2816	8. 21	·0368	·1612
11. 17	14. 10	·0386	7. 27	·1563	·2799	8. 36	·0367	·1608

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 0·8600 nearly) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant 0·8600 nearly) 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 0·9600 nearly) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant 0·9600 nearly) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
June 26			June 26			June 26		
h m	° ′ ″		h m			h m		
11. 27	19. 9. 30	·0362	7. 37	·1556	·2787	8. 46	·0369	·1616
11. 40	26. 0	·0447	7. 40	·1558	·2790	8. 56	·0366	·1603
11. 44	27. 5	·0452	7. 47	·1550	·2776	8. 58	·0367	·1608
12. 10	26. 0	·0447	7. 57	·1550	·2776	9. 4	·0365	·1599
12. 29	26. 55	·0452	8. 7	·1544	·2765	9. 26	·0367	·1608
12. 40	34. 40	·0492	8. 37	·1536	·2751	10. 1	·0365	·1599
12. 50	27. 35	·0455	8. 43	·1529	·2738	10. 21	·0359	·1572
13. 2	16. 20	·0397	8. 50	·1549	·2774	10. 33	·0361	·1581
13. 10	13. 55	·0385	8. 57	·1541	·2760	10. 42	·0360	·1577
13. 21	16. 55	·0400	9. 0	·1549	·2774	10. 50:	·0353	·1546
13. 28	16. 0	·0395	9. 12	·1505	·2696	10. 59	·0351	·1537
13. 40	24. 30	·0440	9. 18	·1513	·2709	11. 3	·0355	·1555
14. 0	20. 20	·0418	9. 22	·1510	·2704	11. 12	·0358	·1568
14. 14	26. 5	·0447	9. 30	·1523	·2727	11. 20	·0357	·1564
14. 21	25. 10	·0443	10. 3	·1533	·2745	11. 24	·0355	·1555
14. 28	26. 0	·0447	10. 13	·1509	·2703	11. 28	·0358	·1568
14. 39	29. 0	·0463	10. 28	·1500	·2687	11. 31	·0356	·1559
14. 42	28. 5	·0458	10. 41	·1527	·2735	11. 40	·0361	·1581
14. 53	32. 0	·0478	10. 48	·1549	·2774	11. 44	·0360	·1577
15. 3	29. 20	·0465	10. 54	·1530	·2740	11. 52	·0359	·1572
15. 19	38. 40	·0513	11. 0	·1523	·2727	12. 9	·0359	·1572
15. 21	39. 5	·0515	11. 4	·1534	·2747	12. 14	·0357	·1564
15. 33	47. 5	·0556	11. 16	·1576	·2823	12. 27	·0356	·1559
15. 54	38. 35	·0513	11. 23	·1564	·2801	12. 33	·0352	·1542
16. 0	39. 55	·0520	11. 30	·1550	·2776	12. 50	·0343	·1503
16. 7	38. 40	·0513	11. 33	·1565	·2803	13. 3	·0349	·1529
16. 16	45. 0	·0546	11. 38	·1521	·2724	13. 21	·0349	·1529
16. 23	47. 55	·0561	11. 42	·1540	·2758	13. 29	·0350	·1533
16. 33	43. 55	·0541	11. 49	·1529	·2738	13. 39	·0348	·1525
16. 39	44. 25	·0543	11. 58	·1523	·2727	13. 50	·0345	·1512
16. 50	40. 10	·0521	12. 13	·1533	·2745	14. 3	·0345	·1512
17. 0	37. 30	·0507	12. 20	·1529	·2738	14. 11	·0346	·1516
17. 10	40. 5	·0520	12. 30	·1527	·2735	14. 18	·0345	·1512
17. 19	38. 55	·0515	12. 42	·1500	·2687	14. 33	·0344	·1508
17. 33	41. 0	·0525	12. 44	·1502	·2691	14. 43	·0340	·1490
17. 50	36. 5	·0499	12. 50	·1495	·2678	14. 52	·0341	·1494
18. 8	36. 0	·0499	13. 9	·1534	·2747	15. 22	·0341	·1494
18. 17	33. 55	·0489	13. 15	·1531	·2742	15. 30	·0339	·1485
18. 22	35. 35	·0497	13. 26	·1536	·2751	15. 38	·0342	·1499
18. 40	36. 10	·0500	13. 34:	·1550	·2776	15. 51	·0338	·1481
18. 49	35. 0	·0494	13. 44	·1535	·2749	16. 3:	·0337	·1477
18. 53	36. 45	·0503	13. 51	·1531	·2742	16. 22	·0342	·1499
19. 0	37. 0	·0504	14. 0	·1536	·2751	16. 37	·0338	·1481
19. 14	40. 55	·0525	14. 8	·1533	·2745	16. 40	·0340	·1490
19. 22	39. 20	·0517	14. 18	·1538	·2754	16. 47	·0339	·1485
19. 31	40. 10	·0521	14. 33:	·1533	·2745	16. 52	·0340	·1490
19. 54	40. 0	·0520	14. 51	·1511	·2706	16. 57	·0339	·1485
20. 31	36. 10	·0500	15. 9	·1529	·2738	17. 8	·0342	·1499
20. 56	37. 50	·0508	15. 22	·1508	·2701	17. 18	·0342	·1499
21. 8	37. 55	·0509	15. 26	·1507	·2700	17. 31	·0344	·1508
21. 12	37. 0	·0504	15. 31	·1501	·2689	18. 20	·0349	·1529
21. 44	36. 45	·0503	15. 44	·1527	·2735	18. 42	·0350	·1533

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 observations made with the telescope in the ancient manner. The Symbol *** denotes that the magnet has been generally in a state of agitation. The Symbol (†) denotes that the register has failed between the preceding and following readings. The Symbol : attached to a time denotes that the reading will apply equally well to a considerable range of time near that which is recorded. A brace denotes that at this time the curve of the Vertical Force was dislocated, and the difference of the numbers included by the brace shows the amount of the displacement.

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

The value 0·8600 of Horizontal Force corresponds to 1·5403 of Gauss's Unit on the Metrical System.

The value 0·9600 of Vertical Force corresponds to 4·2049 of Gauss's Unit on the Metrical System.

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.
June 26 h m	° ′ ″	
22. 0	19. 39. 5	·0515
22. 10	39. 0	·0515
22. 14	35. 0	·0494
22. 22	40. 50	·0524
	(†)	

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant 0·8600 nearly) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant 0·8600 nearly) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
June 26 h m		
16. 3	·1489	·2667
16. 12	·1494	·2676
16. 23	·1512	·2708
16. 33	·1504	·2694
16. 48	·1503	·2692
16. 52	·1508	·2701
16. 58	·1504	·2694
17. 8	·1513	·2709
17. 27	·1502	·2691
18. 10	·1489	·2667
18. 16	·1483	·2656
18. 23	·1488	·2665
18. 47	·1472	·2637
18. 52	·1476	·2644
18. 57	·1473	·2638
19. 2	·1477	·2646
19. 23	·1477	·2646
19. 43	·1486	·2662
19. 50	·1483	·2656

Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant 0·9600 nearly) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant 0·9600 nearly) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
June 26 h m		
18. 57	·0352	·1542
19. 16	·0353	·1546
19. 21	·0352	·1542
19. 52	·0353	·1546
20. 12	·0353	·1546
20. 50	·0356	·1559
21. 34	·0357	·1564
22. 21	·0362	·1586
22. 30	·0362	·1586
23. 3	·0365	·1599
23. 24	·0367	·1608
23. 59	·0373	·1634

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.
h m	° ′ ″	

Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant 0·8600 nearly) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant 0·8600 nearly) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
June 26 h m		
19. 58	·1488	·2665
20. 22	·1480	·2651
20. 43	·1481	·2653
21. 4	·1486	·2662
21. 20	·1475	·2642
21. 40	·1478	·2647
	***	
22. 11	·1476	·2644
22. 22	·1482	·2655
22. 40	·1479	·2649
22. 50	·1483	·2656
22. 56	·1481	·2653
23. 0	·1485	·2660
23. 9	·1483	·2656
23. 18	·1485	·2662
23. 29	·1487	·2664
23. 37	·1493	·2674
23. 59	·1492	·2673

Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant 0·9600 nearly) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant 0·9600 nearly) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
h m		

Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Readings of Thermometers. Of V. F. Magnet.
June 26 h m	°	°
1. 0	66·4	66·1
2. 0	66·2	65·9
3. 0	66·1	65·7
9. 0	66·8	66·6

Greenwich Mean Solar Time.	Readings of Thermometers. Of H. F. Magnet.	Readings of Thermometers. Of V. F. Magnet.
June 26 h m	°	°
21. 0	66·3	66·3
22. 0	66·7	66·9
23. 0	67·2	68·0

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

OBSERVATIONS

OF THE

MAGNETIC DIP.

1873.

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

Day and Approximate Hour, 1873.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″	
January 6. 2	C 2	6 inches	67. 47. 27	N
10. 2	D 1	3 "	67. 50. 26	N
11. 1	C 2	6 "	67. 46. 55	N
16. 0	B 1	9 "	67. 43. 1	N
16. 2	C 1	6 "	67. 48. 31	N
20. 2	D 2	3 "	67. 50. 56	N
22. 22	C 1	6 "	67. 50. 58	N
22. 23	B 2	9 "	67. 46. 16	N
23. 0	C 2	6 "	67. 47. 10	N
23. 1	D 2	3 "	67. 48. 29	N
26. 22	C 1	6 "	67. 47. 55	N
27. 3	C 1	6 "	67. 48. 31	N
31. 1	B 1	9 "	67. 47. 9	N
31. 2	D 1	3 "	67. 50. 16	N
February 6. 2	D 2	3 "	67. 48. 32	N
12. 2	C 2	6 "	67. 46. 56	N
13. 2	B 1	9 "	67. 44. 41	N
13. 3	D 1	3 "	67. 48. 22	N
16. 22	C 1	6 "	67. 48. 14	N
17. 3	C 1	6 "	67. 46. 46	N
20. 2	D 2	3 "	67. 47. 36	N
26. 2	B 2	9 "	67. 43. 52	N
28. 1	C 2	6 "	67. 44. 55	N
March 6. 1	B 1	9 "	67. 45. 20	N
7. 23	D 1	3 "	67. 46. 33	N
8. 0	C 1	6 "	67. 46. 27	N
12. 1	B 2	9 "	67. 45. 22	N
19. 22	D 2	3 "	67. 47. 38	N
20. 3	D 2	3 "	67. 46. 52	N
24. 2	B 1	9 "	67. 45. 17	N
26. 2	C 2	6 "	67. 45. 31	N
28. 2	D 1	3 "	67. 47. 0	N
April 2. 1	C 1	6 "	67. 46. 29	N
9. 1	B 2	9 "	67. 44. 22	N
10. 2	D 1	3 "	67. 46. 59	N
13. 23	B 2	9 "	67. 43. 53	N
13. 23	C 2	6 "	67. 44. 26	N
19. 1	B 1	9 "	67. 43. 35	N
22. 22	D 2	3 "	67. 47. 59	N
23. 3	D 2	3 "	67. 49. 2	N
30. 1	C 2	6 "	67. 46. 13	N
May 6. 0	D 1	3 "	67. 46. 0	N
9. 23	C 1	6 "	67. 43. 52	N
12. 2	D 2	3 "	67. 48. 36	N
15. 0	C 2	6 "	67. 45. 45	N
17. 1	B 1	9 "	67. 44. 1	N
22. 2	D 1	3 "	67. 47. 15	N
23. 21	B 2	9 "	67. 43. 38	N
23. 23	C 1	6 "	67. 46. 23	N
24. 3	B 2	9 "	67. 42. 41	N
31. 2	D 2	3 "	67. 47. 38	N

Day and Approximate Hour, 1873.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″	
June 6. 3	D 1	3 inches	67. 47. 25	N
10. 23	C 2	6 "	67. 44. 26	N
11. 22	B 1	9 "	67. 42. 39	N
12. 3	B 1	9 "	67. 42. 52	N
17. 2	D 2	3 "	67. 46. 2	N
21. 2	D 2	3 "	67. 47. 28	N
23. 2	C 1	6 "	67. 44. 2	N
27. 1	C 2	6 "	67. 45. 36	N
28. 1	B 2	9 "	67. 43. 5	N
28. 2	D 2	3 "	67. 48. 3	N
July 2. 1	B 1	9 "	67. 43. 44	N
8. 2	C 1	6 "	67. 43. 3	N
10. 2	D 2	3 "	67. 46. 54	N
12. 0	B 2	9 "	67. 41. 44	N
12. 1	C 2	6 "	67. 43. 18	N
19. 0	D 1	3 "	67. 43. 24	N
21. 1	C 1	6 "	67. 44. 2	N
21. 23	B 1	9 "	67. 43. 33	N
24. 23	D 1	3 "	67. 45. 32	N
29. 22	D 1	3 "	67. 48. 9	N
30. 2	D 2	3 "	67. 47. 14	N
August 6. 0	C 1	6 "	67. 46. 58	N
8. 22	D 1	3 "	67. 48. 52	N
9. 3	D 1	3 "	67. 45. 17	N
13. 2	B 2	9 "	67. 43. 16	N
15. 22	B 2	9 "	67. 44. 19	N
16. 3	B 2	9 "	67. 43. 42	N
20. 1	C 1	6 "	67. 44. 22	N
21. 2	C 2	6 "	67. 44. 22	N
27. 4	D 2	3 "	67. 47. 7	N
29. 22	B 1	9 "	67. 44. 17	N
30. 2	C 1	6 "	67. 43. 43	N
September 4. 23	C 2	6 "	67. 44. 20	N
9. 22	C 1	6 "	67. 46. 52	N
9. 23	D 1	3 "	67. 46. 51	N
10. 3	C 1	6 "	67. 45. 9	N
17. 2	D 2	3 "	67. 46. 32	N
19. 23	B 2	9 "	67. 45. 22	N
24. 2	C 2	6 "	67. 45. 2	N
26. 0	B 1	9 "	67. 43. 53	N
30. 2	D 2	3 "	67. 46. 54	N
October 6. 0	B 2	9 "	67. 41. 52	N
9. 2	D 2	3 "	67. 47. 45	N
10. 1	C 1	6 "	67. 45. 11	N
14. 2	C 2	6 "	67. 45. 45	N
16. 1	D 2	3 "	67. 45. 15	N
17. 0	B 1	9 "	67. 44. 40	N
20. 3	C 1	6 "	67. 46. 28	N
21. 22	B 2	9 "	67. 44. 45	N
22. 1	D 1	3 "	67. 45. 53	N
29. 22	B 1	9 "	67. 45. 0	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, 1873.	Needle.	Length of Needle.	Magnetic Dip.	Observer.	Day and Approximate Hour, 1873.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″		d h			° ′ ″	
October 30. 3	B 1	9 inches	67. 43. 53	N	December 4. 1	D 1	3 inches	67. 46. 24	N
31. 1	B 2	9 "	67. 42. 14	N	6. 1	C 2	6 "	67. 44. 57	N
					13. 1	D 1	3 "	67. 47. 1	N
November 4. 2	D 1	3 "	67. 46. 23	N	16. 1	C 1	6 "	67. 44. 32	N
10. 23	C 2	6 "	67. 44. 44	N	16. 2	B 2	9 "	67. 43. 47	N
12. 2	C 1	6 "	67. 46. 44	N	17. 23	B 1	9 "	67. 42. 39	N
16. 22	D 2	3 "	67. 47. 29	N	21. 23	B 1	9 "	67. 42. 36	N
17. 3	D 2	3 "	67. 46. 7	N	23. 22	C 2	6 "	67. 46. 4	N
22. 1	B 1	9 "	67. 45. 35	N	23. 23	D 2	3 "	67. 46. 39	N
26. 22	B 2	9 "	67. 42. 56	N	24. 3	C 2	6 "	67. 44. 5	N
27. 1	C 1	6 "	67. 45. 50	N	31. 0	B 2	9 "	67. 41. 44	N
29. 1	B 1	9 "	67. 44. 3	N					

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

MONTHLY MEANS of MAGNETIC DIPS.

Month, 1873.	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. 45. 10	2	67. 46. 16	1	67. 48. 59	4
February	67. 44. 41	1	67. 43. 52	1	67. 47. 30	2
March	67. 45. 18	2	67. 45. 22	1	67. 46. 27	1
April	67. 43. 35	1	67. 44. 7	2	67. 46. 29	1
May	67. 44. 1	1	67. 43. 10	2	67. 45. 8	2
June	67. 42. 45	2	67. 43. 5	1	67. 44. 2	1
July	67. 43. 39	2	67. 41. 44	1	67. 43. 32	2
August	67. 44. 17	1	67. 43. 46	3	67. 45. 1	3
September	67. 43. 53	1	67. 45. 22	1	67. 46. 0	2
October	67. 44. 31	3	67. 42. 57	3	67. 45. 49	2
November	67. 44. 49	2	67. 42. 56	1	67. 46. 17	2
December	67. 42. 37	2	67. 42. 46	2	67. 44. 32	1
Means	67. 44. 7	Sum 20	67. 43. 37	Sum 19	67. 46. 8	Sum 23

Month, 1873.	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. 47. 11	3	67. 50. 21	2	67. 49. 43	2
February	67. 45. 55	2	67. 48. 22	1	67. 48. 4	2
March	67. 45. 31	1	67. 46. 47	2	67. 47. 15	2
April	67. 45. 20	2	67. 46. 59	1	67. 48. 30	2
May	67. 45. 45	1	67. 46. 37	2	67. 48. 7	2
June	67. 45. 1	2	67. 47. 25	1	67. 47. 11	3
July	67. 43. 18	1	67. 45. 42	3	67. 47. 4	2
August	67. 44. 22	1	67. 47. 5	2	67. 47. 7	1
September	67. 44. 41	2	67. 46. 51	1	67. 46. 43	2
October	67. 45. 45	1	67. 45. 53	1	67. 46. 30	2
November	67. 44. 44	1	67. 46. 23	1	67. 46. 48	2
December	67. 45. 2	3	67. 46. 42	2	67. 46. 39	1
Means	67. 45. 24	Sum 20	67. 47. 3	Sum 19	67. 47. 31	Sum 23

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 1873.

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	20	67. 44. 7	67. 43. 52	67. 45. 38
	B 2	19	67. 43. 37		
6-inch Needles	C 1	23	67. 46. 8	67. 45. 46	
	C 2	20	67. 45. 24		
3-inch Needles	D 1	19	67. 47. 3	67. 47. 17	
	D 2	23	67. 47. 31		

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

Month and Day, 1873.	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 27	C 1	6 inches	67. 47. 55	67. 48. 31	− 0. 36
February 17	C 1	6 „	67. 48. 14	67. 46. 46	+ 1. 28
March 20	D 2	3 „	67. 47. 38	67. 46. 52	+ 0. 46
April 23	D 2	3 „	67. 47. 59	67. 49. 2	− 1. 3
May 24	B 2	9 „	67. 43. 38	67. 42. 41	+ 0. 57
June 12	B 1	9 „	67. 42. 39	67. 42. 52	− 0. 13
August 9	D 1	3 „	67. 48. 52	67. 45. 17	+ 3. 35
16	B 2	9 „	67. 44. 19	67. 43. 42	+ 0. 37
September 10	C 1	6 „	67. 46. 52	67. 45. 9	+ 1. 43
October 30	B 1	9 „	67. 45. 0	67. 43. 53	+ 1. 7
November 17	D 2	3 „	67. 47. 29	67. 46. 7	+ 1. 22
December 24	C 2	6 „	67. 46. 4	67. 44. 5	+ 1. 59
Means	....		67. 46. 23	67. 45. 25	+ 0. 58

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

DEFLEXION OF A MAGNET

FOR

ABSOLUTE MEASURE

OF

HORIZONTAL FORCE.

1873.

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

Month and Day, 1873.		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	22	1·0 1·3	45·2	11.35. 3 5.15. 6	5·493 5·491	100 100	47·4 44·7	N
February	22	1·0 1·3	42·5	11.35.31 5.15. 1	5·499 5·490	100 100	42·8 46·0	N
March	22	1·0 1·3	52·2	11.34.19 5.14.38	5·490 5·492	100 100	53·8 54·0	N
April	28	1·0 1·3	51·4	11.32.34 5.13.51	5·499 5·495	100 100	52·0 55·0	N
May	24	1·0 1·3	65·0	11.31.27 5.13. 9	5·499 5·499	100 100	65·7 66·7	N
June	26	1·0 1·3	68·2	11.32.46 5.13.49	5·507 5·502	100 100	69·5 69·7	N
July	24	1·0 1·3	78·9	11.26.42 5.11.22	5·509 5·514	100 100	80·8 82·2	N
August	22	1·0 1·3	69·9	11.27.11 5.11.36	5·508 5·508	100 100	70·0 73·0	N
September	20	1·0 1·3	67·9	11.27.26 5.11. 5	5·512 5·510	100 100	68·6 70·0	N
October	22	1·0 1·3	56·9	11.29. 9 5.12. 7	5·513 5·516	100 100	59·0 58·6	N
November	24	1·0 1·3	50·2	11.27.45 5.11.49	5·507 5·512	100 100	50·4 50·7	N
December	18	1·0 1·3	52·4	11.26.57 5.11.21	5·508 5·508	100 100	53·0 53·0	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 1873.

Month and Day, 1873.		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. (s)	Log. m X.	Value of X.	Value of m.	
January	22	+0·10056	0·10070	−0·00342	−0·00188	9·00337	5·4920	0·18075	3·879	0·3909	1·788
February	22	+0·10058	0·10062	−0·00097		9·00326	5·4945	0·18025	3·877	0·3906	1·788
March	22	+0·10058	0·10067	−0·00219		9·00333	5·4910	0·18144	3·882	0·3912	1·790
April	28	+0·10031	0·10040	−0·00220		9·00220	5·4970	0·18041	3·882	0·3902	1·790
May	24	+0·10039	0·10042	−0·00073		9·00238	5·4990	0·18084	3·884	0·3905	1·791
June	26	+0·10063	0·10068	−0·00122		9·00350	5·5045	0·18043	3·877	0·3908	1·788
July	24	+0·09996	0·10009	−0·00319		9·00076	5·5115	0·18020	3·888	0·3895	1·793
August	22	+0·09986	0·10001	−0·00369		9·00037	5·5080	0·18003	3·889	0·3892	1·793
September	20	+0·09986	0·09980	+0·00147		8·99992	5·5110	0·17935	3·888	0·3887	1·793
October	22	+0·09992	0·09995	−0·00074		9·00035	5·5145	0·17805	3·880	0·3883	1·789
November	24	+0·09960	0·09973	−0·00320		8·99921	5·5095	0·17831	3·886	0·3879	1·792
December	18	+0·09952	0·09962	−0·00246		8·99879	5·5080	0·17870	3·890	0·3879	1·794
Means........		..	..	..	..	..	..	..	3·883	..	1·791

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

METEOROLOGICAL OBSERVATIONS.

1873.

MONTH and DAY, 1873.	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.
Jan. 1	Perigee	29·617	48·4	41·7	45·3	39·8	73·0	35·0	45·6	44·0	5·5	8·2	3·5	+ 8·0	WSW : SW	SW : SSW	7·0	0·0	0·7	433	0·02
2	..	29·376	49·9	39·3	43·5	40·3	52·2	33·3	45·1	43·4	3·2	4·6	1·9	+ 6·5	SSW : SW	WSW	7·9	0·0	1·2	514	0·42
3	..	29·552	49·1	38·8	45·0	42·6	52·2	32·0	45·1	43·4	2·4	5·0	2·1	+ 8·3	SW	SW	11·0	0·1	1·7	588	0·09
4	..	29·613	52·6	41·1	47·8	46·7	53·7	35·3	44·8	42·6	1·1	4·6	0·4	+11·4	SW : SSW	SSW	30·0	0·0	3·5	655	0·10
5	In Equator: First Quarter.	29·688	50·7	40·0	44·5	37·8	74·9	36·0	44·4	41·3	6·7	8·2	4·6	+ 8·3	SW : WSW	WSW	8·0	0·0	1·5	611	0·34
6	..	29·905	51·7	43·5	48·5	44·1	63·0	36·9	44·8	42·7	4·4	7·0	4·2	+12·5	SW : WSW	SW	4·0	0·0	0·7	552	0·00
7	..	29·914	51·7	42·9	46·5	40·5	82·7	37·9	44·6	43·2	6·0	10·8	2·1	+10·7	SW	SSW	2·2	0·0	0·2	387	0·00
8	..	29·595	52·1	43·8	47·5	41·7	82·0	39·0	44·9	43·2	5·8	8·6	3·2	+11·8	SSW	SSW : S	3·3	0·0	0·8	474	0·00
9	..	29·467	51·7	45·4	48·8	47·2	56·3	41·1	44·8	43·0	1·6	3·4	0·0	+13·0	SSW : SW	SSW	16·8	0·1	1·9	624	0·22
10	..	29·598	53·8	47·0	49·7	47·1	72·0	43·9	45·3	43·3	2·6	5·6	0·0	+13·8	SSW	SW : SSW	7·4	0·0	1·1	513	0·36
11	..	29·664	52·2	48·5	49·8	45·6	74·4	41·8	46·4	44·0	4·2	5·2	2·9	+13·8	SSW	SSW	2·5	0·0	0·4	405	0·00
12	Greatest Declination N.	29·788	50·0	41·9	45·8	41·9	59·6	35·2	47·6	44·8	3·9	5·9	1·8	+ 9·7	SW : WSW	W by S : SW	2·3	0·0	0·3	401	0·00
13	Full	29·884	52·0	44·6	49·2	46·7	59·0	35·9	47·1	44·3	2·5	4·4	2·4	+13·0	SW	WSW	15·8	0·2	2·1	677	0·07
14	..	30·000	52·2	45·4	48·7	44·9	59·9	42·9	47·0	45·5	3·8	5·0	3·4	+12·4	WSW	WSW : SW	4·2	0·1	1·1	531	0·00
15	..	29·875	48·7	43·5	45·8	42·1	53·2	37·2	47·4	45·8	3·7	5·5	1·8	+ 9·4	SW	WSW : SW	1·2	0·0	0·2	317	0·00
16	Apogee	29·878	51·7	44·3	48·1	44·8	70·0	40·0	47·2	45·5	3·3	11·2	0·0	+11·6	SW : SSW	SSW	1·8	0·0	0·2	311	0·00
17	..	29·839	49·2	40·0	43·1	37·1	67·8	33·2	46·9	45·4	6·0	9·5	3·7	+ 6·5	SW: WNW: NW	WSW : SW	1·7	0·0	0·2	320	0·09
18	..	29·448	47·3	37·1	42·0	37·2	76·6	31·4	47·0	45·4	4·8	8·1	2·9	+ 5·3	WSW : SW	SW	30·0	0·0	1·4	506	0·10
19	..	28·515	50·9	37·0	42·0	39·6	50·9	33·6	46·6	45·0	2·4	3·1	1·1	+ 5·1	SW : WSW	WSW : SW	17·9	0·0	1·3	534	0·43
20	In Equator	28·357	40·4	31·8	35·2	27·8	66·7	26·0	45·2	43·8	7·4	10·1	5·3	− 1·8	WSW : SW	WSW : SSW : SW	5·0	0·0	0·6	452	0·00
21	Last Qr.	28·822	41·7	30·4	35·1	30·6	61·0	24·3	44·6	41·5	4·5	8·6	0·0	− 2·1	NW: WNW	WNW : W : WSW	2·7	0·0	0·5	453	0·00
22	..	28·655	44·7	33·9	39·6	36·0	78·9	27·8	42·6	39·0	3·6	8·1	0·0	+ 2·2	SSW : WSW	W : NW	4·2	0·0	0·5	390	0·10
23	..	29·325	44·2	32·3	37·9	33·5	63·1	25·0	40·8	38·2	4·4	7·3	2·5	+ 0·2	WNW : WSW	SW : SE : ESE	3·5	0·0	0·3	287	0·00
24	..	29·407	43·0	35·1	39·1	37·5	47·0	30·4	39·2	37·3	1·6	4·4	0·0	+ 1·2	ENE : NE	NNE	1·6	0·0	0·3	311	0·09
25	..	29·834	41·7	26·0	33·2	31·4	53·0	18·5	38·9	37·0	1·8	7·5	0·0	− 4·9	NNE : Calm	S : S by E	0·4	0·0	0·0	132	0·00
26	Greatest Declination S.	29·785	43·1	31·8	36·9	32·4	76·9	24·8	37·9	36·3	4·5	8·4	2·6	− 1·4	SSE	S : SE	2·0	0·0	0·2	260	0·01
27	..	29·933	40·9	27·7	33·7	30·7	68·1	23·8	37·6	35·6	3·0	6·7	0·0	− 4·7	SE : Calm	E : ESE	0·8	0·0	0·1	174	0·00
28	New	29·879	36·7	27·3	32·1	28·0	80·0	19·0	37·4	35·2	4·1	6·8	3·4	− 6·3	E : SE	ESE : Calm	0·9	0·0	0·1	145	0·00
29	Perigee	29·905	36·0	31·3	33·1	28·9	45·0	29·0	36·8	35·0	4·2	8·5	0·0	− 5·2	Calm	S : ESE	0·7	0·0	0·0	125	0·00
30	..	29·812	35·0	31·1	33·5	29·1	37·8	27·2	36·6	33·7	4·4	6·5	3·1	− 4·6	ESE	E : ENE	9·8	0·0	0·7	373	0·00
31	..	29·921	36·7	32·1	34·2	30·8	37·8	31·0	36·4	33·6	3·4	5·3	2·2	− 3·7	ENE	E : ENE : ESE	2·9	0·0	0·5	351	0·01
Means	..	29·576	46·8	38·0	42·1	38·2	62·9	32·5	43·4	41·4	3·9	6·8	2·0	+ 5·2	...	...	..	..	..	Sum 12806	Sum 2·45

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was $29^{\text{in}}\cdot660$ on the 1st; the first minimum in the month was $29^{\text{in}}\cdot298$ on the 2nd.
The second maximum ,, was $29^{\text{in}}\cdot590$ on the 3rd; the second minimum ,, was $29^{\text{in}}\cdot494$ on the 3rd.
The third maximum ,, was $29^{\text{in}}\cdot735$ on the 4th; the third minimum ,, was $29^{\text{in}}\cdot540$ on the 4th.
The fourth maximum ,, was $29^{\text{in}}\cdot976$ on the 7th; the fourth minimum ,, was $29^{\text{in}}\cdot460$ on the 9th.
The absolute maximum ,, was $30^{\text{in}}\cdot029$ on the 14th; the fifth minimum ,, was $29^{\text{in}}\cdot855$ on the 15th.
The sixth maximum ,, was $29^{\text{in}}\cdot923$ on the 16th; the absolute minimum ,, was $28^{\text{in}}\cdot317$ on the 19th.
The seventh maximum ,, was $28^{\text{in}}\cdot380$ on the 20th; the seventh minimum ,, was $28^{\text{in}}\cdot331$ on the 20th.
The eighth maximum ,, was $28^{\text{in}}\cdot988$ on the 21st; the eighth minimum ,, was $28^{\text{in}}\cdot587$ on the 22nd.
The ninth maximum ,, was $29^{\text{in}}\cdot370$ on the 23rd; the ninth minimum ,, was $29^{\text{in}}\cdot242$ on the 23rd.
The tenth maximum ,, was $29^{\text{in}}\cdot849$ on the 25th; the tenth minimum ,, was $29^{\text{in}}\cdot771$ on the 26th.
The eleventh maximum ,, was $29^{\text{in}}\cdot945$ on the 27th; the eleventh minimum ,, was $29^{\text{in}}\cdot857$ on the 28th.
The twelfth maximum ,, was $29^{\text{in}}\cdot927$ on the 29th; the twelfth minimum ,, was $29^{\text{in}}\cdot795$ on the 30th.
The thirteenth maximum ,, was $29^{\text{in}}\cdot950$ on the 31st.

The range in the month was $1^{\text{in}}\cdot712$.
The mean for the month was $29^{\text{in}}\cdot576$, being $0^{\text{in}}\cdot164$ *less* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 53°·8 on the 10th; the lowest was 26°·0 on the 25th.
The range ,, was 27°·8.
The mean ,, of all the highest daily readings was 46°·8, being 3°·7 *higher* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 38°·0, being 4°·5 *higher* than the average of the preceding 32 years.
The mean daily range was 8°·8, being 0°·8 *less* than the average of the preceding 32 years.
The mean for the month was 42°·1, being 4°·0 *higher* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Jan. 1	0 : m	s : s : w	0 : 0, mt	li.-cl : 10, ci.-s, a : 10, r, w
2	0 : ssP,ssN,sp	ssP,ssN,sp : 0	10, r, w : 9, ci.-s, cu.-s, r	10, r, hl : 4, oc.-r : 0
3	0	0 : m	10, ci.-s, cu.-s, st.-w	v, f.-h.-shs : v : 10
4	0 : w	0 : 0	10, r	10, r, st.-w, sc : 10, h.-g, th.-r
5	0	0	10, r, h.-g : 0	ci, ci.-cu, r : r : 10
6	0	0 : 0	10 : 10	10 : 10
7	0	w : w	10 : li.-cl	ci, ci.-cu : li.-cl : li.-cl, a, lu.-co
8	0 : w	0 : w : 0	a : ci, cu.-s, li.-cl	ci, ci.-cu : li.-cl, lu.-co
9	0	0	0 : 10, r, w : 10, oc.-th.-r, w	10,oc.-th.-r,st.-w: 10, r, w : 10, r, st.-w
10	0	0 : 0 : w	10, r : oc.-r, ci, ci.-cu, cu, cu.-s	ci, ci.-cu, cu, cu.-s : lu.-ha, lu.-co, h.-d
11	0	0	ci, ci.-cu, cu.-s : 10, th.-r	10, oc.-th.-r : ci, ci.-s
12	0	0 : 0 : m	10, mt	ci, ci.-cu, s : 0, h.-d, mt
13	0	0	10, r : 10, st.-w	10, st.-w : 10
14	0	w : 0 : 0	10 : 10	10 : 10, th.-r
15	0	0	10 : 10, mt	10 : li.-cl
16	0	w : 0	ci.-s, cu.-s	ci.-cu, cu.-s : ci.-cu,ci.-s,cu.-s: 10
17	0	0	ci.-cu, cu, cu.-s	sl.-f : ci, ci.-cu, cu.-s : li.-cl
18	0	0	ci.-cu, cu.-s, mt, sl.-r	ci, ci.-s, cu.-s : 10, st.-w, th.-r : 10, h.-g
19	0	0	h.-g : 10, r	v : 10, r, l
20	0	0	ci, ci.-s	ci, ci.-s, cu, cu.-s: ci.-cu, ci.-s, sn : w, l
21			ci, ci.-s, f, h.-fr	ci, ci.-s, cu.-s : ci, cu.-s : 0
22	0	0	10, r : ci, ci.-s	ci, ci.-cu, cu, cu.-s : 10, oc.-th.-r
23	0 : w	0	0, h.-fr, mt, h, mt	0 : 10 : 10
24	0	0	10, r : 10, r	10 : 0, h.-d
25	0 : s	0	0, th.-f, h.-fr	0 : 0, h.-fr
26	0	0	ci, ci.-cu	ci, ci.-cu : 0, h.-d
27	m : m	w : 0	ci, ci.-cu, h.-fr	0 : 10
28	0	0 : 0 : w	ci.-cu, h.-fr, h : ci, ci.-cu, cu	ci.-cu, cu.-s : 10 : 10
29	0	0	10 : 10	10 : 10 : h
30	0	0	10 : 10	10 : 10
31	0	m : 0 : 0	10 : 10, th.-r	10, th.-r : 10

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was 49°·5 on the 10th; and the lowest was 25°·8 on the 28th.

The mean ,, was 38°·2, being 3°·3 *higher* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was 0in·231, being 0in·029 *greater* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2grs·7, being 0gr·3 *greater* than the average of the preceding 32 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 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 546 grains, being 8 grains *less* than the average of the preceding 32 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·9.

WIND.

The proportions were of N. 1, S. 12, W. 12, E. 5, and Calm 1. The greatest pressure in the month was 30lbs·0 on the square foot on the 4th and 18th.

RAIN.

Fell on 15 days in the month, amounting to 2in·45, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·55 *greater* than the average fall of the preceding 58 years.

MONTH and DAY, 1873.	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.
Feb. 1	In Equator	29·841	33·4	27·0	29·3	18·3	43·0	27·0	36·3	34·2	11·0	16·2	3·0	− 8·5	E : ESE	ESE : SE	12·3	0·0	0·7	367	0·00
2	..	29·227	33·2	25·8	29·0	28·4	36·7	25·1	35·9	33·2	0·6	2·8	0·0	− 8·7	SE	ESE : E : NE	18·3	0·0	1·9	519	0·49
3	..	29·511	33·3	31·9	32·2	28·7	35·0	30·5	35·0	32·8	3·5	4·7	0·6	− 5·6	NNE	N : NNW	3·7	0·0	0·7	460	0·00
4	First Qr.	29·815	37·0	32·2	34·7	34·5	38·0	30·4	34·8	33·0	0·2	1·8	0·0	− 3·3	NNW : N by E	NNE : NE	2·3	0·0	0·3	294	0·09
5	..	29·933	36·7	27·8	31·6	31·5	45·7	27·0	34·8	33·2	0·1	1·7	0·0	− 6·7	Calm	Calm	0·0	0·0	0·0	51	0·00
6	..	29·889	36·9	26·5	31·8	29·4	48·4	26·5	35·0	33·6	2·4	5·9	0·0	− 6·8	Calm	NNE : NE	1·1	0·0	0·1	167	0·00
7	..	29·921	40·8	33·6	36·3	30·7	64·0	29·6	35·6	33·6	5·6	8·1	3·1	− 2·5	NE	NE	9·8	0·1	1·9	624	0·00
8	Greatest Declination N.	29·985	36·5	33·8	34·6	28·4	38·0	32·2	36·1	34·0	6·2	7·0	3·2	− 4·3	NE : ENE	ENE	18·3	0·1	1·6	580	0·01
9	..	30·014	35·4	33·1	33·7	28·1	41·3	31·3	36·3	34·4	5·6	7·5	3·5	− 5·2	NE	NNE	2·1	0·0	0·5	419	0·00
10	..	30·072	41·1	31·4	35·0	31·7	48·1	26·0	36·0	34·2	3·3	5·5	0·0	− 3·8	NNE	NNE	7·3	0·0	0·7	411	0·02
11	..	30·127	37·9	30·6	33·2	28·3	59·5	25·5	36·0	34·6	4·9	7·0	4·2	− 5·4	NNE	N : NW : WNW	2·8	0·0	0·6	384	0·00
12	Apogee ; Full	29·917	42·4	32·3	36·6	32·2	64·9	29·0	36·0	34·6	4·4	10·1	1·8	− 1·8	N : NNE	NNE	19·7	0·0	1·0	462	0·02
13	..	29·996	42·0	33·1	37·5	31·7	58·3	28·9	36·1	34·7	5·8	9·9	3·6	− 0·8	N by E : N	N	1·1	0·0	0·1	227	0·00
14	..	30·121	45·1	31·3	37·9	35·1	51·0	24·3	36·6	35·0	2·8	9·0	0·0	− 0·3	N : WNW	N : NW : WNW	0·3	0·0	0·0	163	0·00
15	..	30·297	43·4	34·9	38·4	32·5	51·7	25·0	37·2	35·2	5·9	10·6	3·4	+ 0·3	NW : Calm	WSW : WNW	0·0	0·0	0·0	81	0·00
16	In Equator	30·440	39·1	35·2	36·6	31·1	40·8	32·3	38·0	35·6	5·5	7·1	4·2	− 1·5	N : NW	NNE : NE : Calm	0·1	0·0	0·0	113	0·00
17	..	30·542	36·5	33·1	34·1	29·5	40·9	32·0	38·9	36·2	4·6	8·7	3·4	− 4·1	Calm	NW : Calm	0·0	0·0	0·0	52	0·00
18	..	30·593	37·7	31·7	33·6	29·2	49·5	30·3	38·3	36·3	4·4	7·2	2·8	− 4·7	W : Calm	Calm	0·0	0·0	0·0	62	0·00
19	..	30·517	35·0	30·0	32·1	29·7	43·0	29·0	39·2	36·7	2·4	3·1	1·1	− 6·4	Calm	ENE : NNE	0·0	0·0	0·0	45	0·00
20	Last Qr.	30·380	34·7	28·6	31·1	29·9	41·6	28·3	39·6	37·2	1·2	1·7	0·4	− 7·6	NNE : Calm	Calm : E	0·3	0·0	0·0	88	0·00
21	..	30·083	31·9	27·8	29·3	25·0	36·3	27·0	39·6	37·3	4·3	5·3	1·2	− 9·5	ESE : Calm	WSW : W	0·6	0·0	0·0	159	0·00
22	..	29·710	46·8	29·8	36·8	32·1	71·0	29·8	39·2	37·4	4·7	11·6	0·5	− 2·2	W : WSW	W by S : NNE : SW	0·8	0·0	0·1	245	0·08
23	Greatest Declination S.	29·671	40·7	27·1	33·5	29·7	50·1	19·5	39·0	37·0	3·8	7·5	2·9	− 5·7	WSW : Calm	SSW : WSW : W	1·5	0·0	0·1	230	0·01
24	..	29·624	36·2	25·0	27·6	25·3	39·1	25·0	39·0	37·2	2·3	4·1	0·0	−11·8	NNW : ENE	NNE : ENE : E	1·7	0·0	0·1	235	0·43
25	..	29·372	46·5	25·0	36·6	36·6	53·2	25·0	38·8	37·2	0·0	1·3	0·0	− 3·0	E : SE	SSW	2·7	0·0	0·4	350	0·47
26	Perigee	28·742	50·1	43·8	45·6	43·2	68·0	40·0	39·0	36·8	2·4	5·9	0·8	+ 5·8	SSW : SW	SW : WSW	10·7	0·1	1·2	519	0·29
27	New	29·289	44·9	31·0	37·4	31·7	55·0	26·0	39·6	37·4	5·7	10·3	4·8	− 2·5	NW : NNW	NNW : N	2·6	0·0	0·4	360	0·00
28	..	29·593	42·7	28·4	34·2	25·6	86·2	21·5	40·9	38·5	8·6	15·8	4·5	− 5·9	NNE	N : Calm	0·6	0·0	0·1	189	0·02
Means	..	29·901	39·2	30·8	34·3	30·3	49·9	28·0	37·4	35·4	4·0	7·1	1·9	− 4·4	...	...	..	..	..	Sum 7856	Sum 1·93

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·982 on the 5th; the first minimum in the month was 29in·152 on the 2nd.
The second maximum ,, was 30in·222 on the 11th; the second minimum ,, was 29in·881 on the 6th.
The third maximum ,, was 30in·047 on the 13th; the third minimum ,, was 29in·875 on the 12th.
The absolute maximum ,, was 30in·615 on the 18th; the fourth minimum ,, was 29in·975 on the 13th.
The fifth maximum ,, was 29in·738 on the 23rd; the fifth minimum ,, was 29in·674 on the 22nd.
The sixth maximum ,, was 29in·700 on the 24th; the sixth minimum ,, was 29in·586 on the 23rd.
The seventh maximum ,, was 29in·638 on the 28th; the absolute minimum ,, was 28in·686 on the 26th.
The range in the month was 1in·929.
The mean for the month was 29in·901, being 0in·108 *greater* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 50°·1 on the 26th; the lowest was 25°·0 on the 24th and 25th.
The range ,, was 25°·1.
The mean ,, of all the highest daily readings was 39°·2, being 6°·5 *lower* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 30°·8, being 3°·5 *lower* than the average of the preceding 32 years.
The mean daily range was 8°·4, being 3°·0 *less* than the average of the preceding 32 years.
The mean for the month was 34°·3, being 5°·2 *lower* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Feb. 1	o	o	10 : 10, oc.-sn	10 : 10, st.-w
2	o	o	10, sn	10, sn : 10, sn
3			10, oc.-sn	10, sl.-sn : 10, sl.-sn
4			10	10, r, mt : 10, oc.-th.-r : 10, r, f
5			10, th.-f	10, th.-f : 10, th.-f
6			10, th.-f : 10, f	sl.-f : ci, ci.-cu, fr
7			10	ci.-cu, cu.-s, so.-ha : 10
8			10 : 10, th.-r	10 : 10
9			10 : 10, sl.-sn	10, sl.-sn : 10, sl.-sn, w
10			10 : 10, sn, r	10 : ci.-cu, cu, cu.-s : 10, oc.-sn
11			10 : 10, sl.-sn, v	v : 10, sl.-sn
12			ci, ci.-cu, cu.-s, sl.-r	v, hl : ci.-cu, cu.-s
13	w	o : w	ci.-cu, cu.-s	ci.-cu, cu.-s. : 10
14	o	w : o	10 : o : o, f, h	10 : 10 : 10, f, h
15	o	o	10, f	li.-cl, h, th.-f : li.-cl, h : 10, th.-f
16	o	o : w	10, sl.-f	10, sl.-f : 10
17	o	o : o : w	10, f, glm	10 : 10, h, f
18	o	o : o : m	10, h, f	10, h, f : 10
19	o	o : w : m	10 : 10	10 : 10
20	w	w : o : o	10, f	10 : 10
21	o	o	10 : 10	10 : 10
22	o	o	10	ci.-cu, cu, s : 10, r : 10, r
23	o : w	o	10, cu.-s	sl.-sn : v
24	o : ssP, ssN, sp	m : m	10 : 10, sn	10, sn : 10, oc.-sn
25	o	o	10, sn : 10, r	10, f : 10, r : r, v
26	o	o	ci.-cu, cu, cu.-s, s	10, r : v
27	o	o	10	10, r, glm, sl.-sn : o
28	o	o	ci.-cu, ci.-s, cu.-s : v	ci.-cu, cu : o, h.-d, f

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was $45^{\circ}\cdot 6$ on the 26th; and the lowest was $12^{\circ}\cdot 2$ on the 1st.
The mean ,, was $30^{\circ}\cdot 3$, being $4^{\circ}\cdot 9$ *lower* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot 169$, being $0^{in}\cdot 039$ *less* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot 0$, being $0^{gr}\cdot 4$ *less* than the average of the preceding 32 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 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 561 grains, being 8 grains *greater* than the average of the preceding 32 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 9·2.

WIND.

The proportions were of N. 10, S. 2, W. 4, E. 6, and Calm 6. The greatest pressure in the month was $19^{lbs}\cdot 7$ on the square foot on the 12th.

RAIN.

Fell on 11 days in the month, amounting to $1^{in}\cdot 93$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot 39$ *greater* than the average fall of the preceding 58 years.

ELECTRICITY.

From February 3 to 12 the electrical apparatus was out of order.

MONTH and DAY, 1873.	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 ... 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	In Equator	29·073	45·7	29·6	36·8	36·6	49·5	21·1	40·9	38·7	0·2	3·0	0·0	− 3·4	S by E	S	3·0	0·0	0·3	302	0·22
2	..	29·588	49·5	36·0	40·8	32·6	87·5	28·0	40·4	38·7	8·2	15·8	5·0	+ 0·6	SW : N	NW : WSW	10·8	0·0	0·5	351	0·00
3	..	29·645	49·2	34·3	41·7	41·1	49·8	28·0	40·6	39·3	0·6	3·2	0·0	+ 1·5	SSW	SSW : WSW	3·0	0·0	0·3	313	0·06
4	..	29·595	59·0	45·7	50·1	46·0	93·9	39·5	41·8	39·7	4·1	9·7	0·0	+10·0	W	WNW : W : WSW	1·3	0·0	0·1	278	0·02
5	..	29·731	50·4	37·9	43·8	42·3	60·1	36·0	42·6	40·5	1·5	5·3	0·0	+ 3·7	Calm : NE	NE : NNE	0·8	0·0	0·1	168	0·03
6	First Qr.	29·817	49·7	35·0	40·9	37·0	87·5	29·9	44·4	41·3	3·9	11·3	1·8	+ 0·8	Variable	SW : SSW	0·7	0·0	0·1	174	0·00
7	Greatest Declination N.	29·179	50·9	37·6	43·1	38·9	84·8	33·7	44·6	41·8	4·2	11·6	0·0	+ 2·9	S by W : SW	WSW	21·7	0·0	1·8	543	0·11
8	..	29·528	54·2	35·8	43·0	37·1	115·0	30·0	45·0	42·8	5·9	15·6	1·6	+ 2·7	WSW	SW	2·8	0·0	0·4	381	0·02
9	..	29·477	52·2	40·7	45·6	40·8	83·0	35·0	45·2	42·8	4·8	9·4	3·6	+ 5·2	SW	SW	11·1	0·0	1·4	535	0·13
10	..	29·244	48·5	35·4	39·1	34·1	88·1	28·0	45·2	43·2	5·0	15·8	3·1	− 1·5	WSW : SW	WSW : SW	7·1	0·0	0·8	438	0·02
11	Apogee	29·031	50·1	32·6	39·6	35·9	87·2	27·9	44·6	43·2	3·7	12·6	0·0	− 1·3	WSW : SW	W : WSW	17·1	0·0	0·8	454	0·12
12	..	29·218	43·7	35·5	39·0	32·0	80·1	28·8	44·3	42·2	7·0	12·3	2·3	− 2·2	WNW : NNE : N	N : NNE	1·7	0·0	0·2	237	0·00
13	..	29·394	43·0	29·4	35·3	32·2	96·1	22·4	43·8	41·8	3·1	8·8	0·0	− 6·1	NNE	NE : Calm	0·5	0·0	0·0	132	0·13
14	Full	29·627	41·9	27·2	34·5	33·7	86·0	18·2	43·6	41·6	0·8	3·7	0·0	− 7·0	Calm : NE	ENE : E	0·8	0·0	0·0	175	0·00
15	In Equator	29·726	43·4	31·7	37·3	32·8	78·0	28·7	42·9	40·8	4·5	7·8	1·4	− 4·4	E	E by N	23·0	0·0	2·0	584	0·00
16	..	29·584	45·7	33·3	38·0	36·7	46·3	31·3	42·4	40·0	1·3	2·9	0·4	− 3·9	E by N	E by N : SSW	21·0	0·1	1·1	463	0·20
17	..	29·725	47·4	37·0	40·7	37·0	90·9	29·8	41·6	39·8	3·7	8·0	0·5	− 1·3	SW : WSW	NNE : NE	1·3	0·0	0·1	228	0·00
18	..	29·723	47·7	36·0	40·6	39·2	71·5	30·0	41·4	39·5	1·4	5·3	0·0	− 1·5	NE	NE	2·9	0·0	0·5	422	0·00
19	..	29·714	41·5	36·1	38·2	33·0	51·5	34·2	41·4	39·8	5·2	6·9	4·8	− 4·0	NE	NNE	8·0	0·2	1·7	587	0·00
20	..	29·798	45·1	36·9	39·5	34·6	87·0	31·0	41·8	40·0	4·9	8·6	3·5	− 2·7	NNE	NNE	4·6	0·0	0·8	451	0·00
21	Last Qr.	29·713	42·7	34·6	36·8	33·4	82·8	29·7	41·6	40·2	3·4	7·5	1·0	− 5·5	NNE : NE	NE : ESE	1·6	0·0	0·3	292	0·12
22	Greatest Declination S.	29·782	49·5	32·0	39·9	34·2	103·1	26·5	41·4	39·4	5·7	12·6	1·8	− 2·3	ESE : E	E : ENE	6·7	0·0	0·4	334	0·00
23	..	29·817	52·1	35·1	41·8	41·0	83·1	29·2	41·8	40·0	0·8	7·4	0·0	− 0·4	ENE : E	E	0·5	0·0	0·0	183	0·01
24	..	29·891	61·0	33·0	46·7	41·7	110·8	26·5	41·9	40·3	5·0	15·8	0·9	+ 4·5	Calm : ENE	ENE : ESE	0·3	0·0	0·0	157	0·00
25	..	29·975	57·8	34·9	45·7	37·9	118·7	25·3	43·2	41·0	7·8	16·7	1·4	+ 3·4	E	E by S	1·5	0·0	0·2	236	0·00
26	Perigee	29·991	58·3	33·6	44·1	40·8	113·9	27·4	43·9	41·8	3·3	11·4	0·0	+ 1·6	E : ENE	ESE : SE	0·2	0·0	0·0	146	0·00
27	..	29·841	60·9	36·0	45·2	42·5	105·0	29·0	45·1	42·5	2·7	13·3	0·0	+ 2·3	Calm : NE	NE : ESE	0·4	0·0	0·0	97	0·00
28	In Equator: New.	29·736	64·5	31·0	45·6	42·5	103·0	24·5	45·9	44·0	3·1	19·6	0·0	+ 2·4	Calm	SE : N : Calm	0·1	0·0	0·0	87	0·00
29	..	29·822	64·6	36·2	47·9	43·0	109·7	27·9	46·1	44·0	4·9	18·4	0·0	+ 4·3	Calm	ESE	0·6	0·0	0·0	101	0·00
30	..	29·754	62·9	37·7	50·9	44·6	109·0	29·2	47·4	44·4	6·3	17·9	0·0	+ 6·9	E	E : SE	1·3	0·0	0·1	182	0·09
31	..	29·579	55·8	42·3	47·8	47·7	84·0	35·0	49·0	45·6	0·1	3·6	0·0	+ 3·4	W by S : S	SW	0·1	0·0	0·0	119	0·05
Means	..	29·623	51·3	35·2	41·9	38·2	87·0	29·1	43·4	41·3	3·8	10·4	1·1	+ 0·3	...	...	..	..	..	Sum 9150	Sum 1·33

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The absolute minimum in the month was 28in·985 on the 1st.

The first maximum in the month was 29in·819 on the 2nd; the second minimum ,, was 29in·587 on the 4th.
The second maximum ,, was 29in·900 on the 6th; the third minimum ,, was 29in·110 on the 7th.
The third maximum ,, was 29in·568 on the 8th; the fourth minimum ,, was 29in·021 on the 11th.
The fourth maximum ,, was 29in·747 on the 15th; the fifth minimum ,, was 29in·514 on the 16th.
The fifth maximum ,, was 29in·777 on the 17th; the sixth minimum ,, was 29in·701 on the 19th.
The sixth maximum ,, was 29in·827 on the 20th; the seventh minimum ,, was 29in·672 on the 21st.
The absolute maximum ,, was 30in·035 on the 26th; the eighth minimum ,, was 29in·720 on the 28th.
The eighth maximum ,, was 29in·858 on the 29th; the ninth minimum ,, was 29in·544 on the 31st.
The range in the month was 1in·050.
The mean for the month was 29in·623, being 0in·123 *less* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 64°·6 on the 29th; the lowest was 27°·2 on the 14th.
The range ,, was 37°·4.
The mean ,, of all the highest daily readings was 51°·3, being 1°·4 *higher* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 35°·2, being *the same as* the average of the preceding 32 years.
The mean daily range was 16°·1, being 1°·5 *greater* than the average of the preceding 32 years.
The mean for the month was 41°·9, being 0°·3 *higher* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
March 1	o	o	10 : 10, r, sn	10 : 10, oc.-th.-r
2	o	o	10, w	ci, ci.-cu, ci.-s, h : o, h
3	o	o : o : m	h : 10, oc.-th.-r	10, oc.-th.-r : 10, oc.-th.-r
4	o : w	o	10 : ci, ci.-cu, cu.-s	ci, ci.-cu, cu, s : 10
5	o	w : o	10, r, f	10, oc.-th.-r : 10
6	o	w : o	10 : 10, f	ci, cu, cu.-s : ci, ci.-cu : 10
7	o	o	10, r : 10	ci, ci.-cu, ci.-s, cu.-s, st.-w, fr.-shs : o
8	o	sN, sp : o	o : li.-cl, h.-fr	ci, ci.-cu, oc.-r : o, h.-d
9	o	o	ci.-cu, cu, cu.-s, s	10 : 10, oc.-h.-shs, w
10			ci, ci.-cu, v	v, oc.-r, hl, w : li.-cl, a
11		ssP, ssN, sp : o	o : o : v, fr.-shs	v, fr.-shs, hl : ci.-cu, cu.-s, n, oc.-r, v
12		o	ci.-cu, cu, cu.-s, s	ci.-cu : 10
13	o	o : o : m	sn : ci.-cu, cu.-s	ci.-cu, cu, cu.-s : o, f
14	o	w : w	li.-cl, f, h	ci.-cu, h, r : ci, ci.-s, h.-fr
15	o	o	ci.-cu, cu.-s, sl.-f : 10, st.-w	10, st.-w : 10, w
16			10	10 : 10, r
17	o	o : o	10 : 10, sl.-f, h, mt	ci, ci.-cu, cu, f : o, sl.-f, h
18	o : o	w : m	10, sl.-f : 10	v : v : 10
19	o	o	10 : 10	10 : 10
20		s, sp	10, ci, ci.-s, cu.-s : 10	10 : v, sl.-r : 10
21	o : sN, sp, v	ssP, ssN, sp : w	10 : 10	10, sn, r, sl : v : 10
22	w	w : s	ci, ci.-cu, cu : v	v : o
23	o	w : m	10, r : 10	v : o, h.-d
24	o	m	o : ci, ci.-cu	li.-cl : o
25	m : w	o : s, sp, g.-cur	o, h.-fr : o	o : o
26	o	m	ci, h, f	o : o : o, h.-d, f
27	m	m	th.-f : th.-f	o : o : o, d
28	m	m : o	o, th.-f : o	o : ci, ci.-cu, ci.-s, h : o
29	o	w : m	o, th.-f : o, th.-f	o : o
30	m	w	th.-cl	v : 10, r
31	w	o : w	10, th.-r : 10	10, r : oc.-th.-r : v

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The highest in the month was $50^{\circ}\cdot 2$ on the 31st; and the lowest was $27^{\circ}\cdot 2$ on the 14th.
The mean ,, was $38^{\circ}\cdot 2$, being $1^{\circ}\cdot 8$ *higher* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot 231$, being $0^{in}\cdot 015$ *greater* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot 7$, being $0^{gr}\cdot 2$ *less* than the average of the preceding 32 years.

Degree of Humidity.—The mean for the month was 87 (that of Saturation being represented by 100), being 5 *greater* than the average of the preceding 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 547 grains, being 3 grains *less* the average of the preceding 32 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·5.

WIND.

The proportions were of N. 6, S. 5, W. 6, E. 11, and Calm 3. The greatest pressure in the month was $23^{lbs}\cdot 0$ on the square foot on the 15th.

RAIN.

Fell on 15 days in the month, amounting to $1^{in}\cdot 33$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot 27$ *less* than the average fall of the preceding 58 years.

MONTH and DAY, 1873.	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.
Apr. 1	..	29·852	61·8	41·4	49·3	41·1	115·3	33·4	50·4	46·0	8·2	19·0	0·0	+ 4·7	SW : W	WSW : NE : SE	0·1	0·0	0·0	136	0·00
2	..	30·068	63·4	37·0	49·0	39·9	120·3	30·1	51·0	47·0	9·1	20·3	5·7	+ 4·2	WSW : W	WSW : WNW	1·3	0·0	0·1	207	0·00
3	..	30·065	57·8	37·0	47·1	42·0	79·0	26·8	51·6	47·3	5·1	14·4	4·2	+ 2·1	WSW	WNW : N by E	2·1	0·0	0·2	301	0·00
4	First Quarter: Greatest Dec. N.	29·914	57·7	39·2	48·5	43·5	94·0	29·2	51·8	48·4	5·0	14·1	0·0	+ 3·3	WSW	WSW : W	1·5	0·0	0·2	289	0·06
5	..	29·603	54·8	41·8	47·3	38·7	77·2	35·0	51·9	49·0	8·6	13·4	4·0	+ 1·9	W : WNW	NW	3·3	0·0	0·7	456	0·01
6	..	29·430	56·8	37·6	41·6	35·7	106·1	29·4	51·6	48·5	5·9	18·6	0·0	− 3·8	W : WNW : NW	NW : NNW : N	9·1	0·0	0·5	390	0·02
7	Apogee	29·661	50·7	37·1	41·0	34·7	101·0	32·1	51·1	47·7	6·3	9·8	4·4	− 4·4	N : N by E	N by E : N	5·5	0·0	0·8	359	0·11
8	..	29·917	51·6	36·1	42·7	35·5	111·0	29·0	50·3	48·3	7·2	13·9	2·8	− 2·7	NNE	NE : NNE	7·6	0·0	0·6	412	0·01
9	..	30·115	50·5	35·0	40·7	34·7	108·6	29·5	49·8	47·7	6·0	13·4	4·1	− 4·6	NE : ENE	ENE	2·7	0·0	0·6	375	0·00
10	..	30·082	53·9	33·8	41·9	33·6	105·1	28·5	49·2	46·6	8·3	20·2	0·0	− 3·3	NE	ENE : NE	8·8	0·0	0·7	444	0·00
11	In Equator	29·896	48·7	35·7	41·3	38·8	62·3	29·4	48·6	45·8	2·5	7·1	0·0	− 3·8	NNE : NE	NNE : NE	1·6	0·0	0·2	306	0·00
12	Full	29·904	47·8	40·0	42·6	36·8	70·1	37·7	47·6	44·8	5·8	8·8	4·6	− 2·4	NE	NNE : SW	1·3	0·0	0·1	180	0·00
13	..	29·802	50·2	38·1	42·0	36·7	71·7	29·1	47·4	44·5	5·3	11·6	0·0	− 2·9	SSW : S	SSE : ESE	0·3	0·0	0·0	127	0·00
14	..	29·682	66·5	37·1	50·0	44·7	121·5	27·9	47·2	44·2	5·3	17·1	0·0	+ 5·0	ESE : E	ESE	1·3	0·0	0·1	213	0·00
15	..	29·511	76·8	43·0	59·0	45·7	134·0	39·3	46·8	44·0	13·3	29·2	0·0	+13·7	E by S	S : SSW : SSE	0·7	0·0	0·0	130	0·00
16	..	29·403	72·7	47·0	57·9	50·9	133·7	38·3	48·8	45·4	7·0	19·6	0·0	+12·4	Calm : SE	ESE : E	1·7	0·0	0·0	148	0·03
17	..	29·366	66·2	45·4	54·8	50·4	114·8	35·1	50·6	47·5	4·4	13·3	1·4	+ 9·1	NE	ESE : NE	0·7	0·0	0·0	141	0·00
18	Greatest Declination S.	29·571	62·5	45·9	51·5	46·6	92·3	43·6	52·3	49·2	4·9	13·9	1·9	+ 5·5	N : NNE	NE	1·4	0·0	0·1	257	0·03
19	..	29·848	62·8	39·0	49·3	34·2	114·9	29·2	53·0	49·4	15·1	27·7	4·4	+ 2·9	NE : ENE	NE	2·7	0·0	0·5	395	0·00
20	Last Qr.	29·983	64·6	35·4	50·4	35·3	128·6	24·6	53·0	50·0	15·1	23·2	3·4	+ 3·7	NNE : NE	ENE : NE	13·6	0·0	0·7	372	0·00
21	..	29·980	62·7	41·2	49·8	39·5	131·7	32·3	54·1	51·0	10·3	21·5	5·1	+ 2·8	NE	ENE : ESE	2·2	0·0	0·3	342	0·00
22	..	29·800	55·6	37·4	43·4	38·3	110·8	24·5	54·1	51·0	5·1	13·8	1·0	− 3·8	NE	NE : E by S	1·3	0·0	0·1	266	0·00
23	Perigee	29·737	52·5	34·6	40·8	32·5	121·6	27·3	53·9	51·0	8·3	16·8	4·0	− 6·6	NNE	NNE	6·8	0·0	0·4	340	0·03
24	In Equator	29·764	50·7	31·3	37·0	30·5	102·8	23·4	53·0	50·0	6·5	15·4	2·8	−10·6	NNE	NNE : ENE : E	2·2	0·0	0·3	283	0·01
25	..	29·987	48·6	29·3	37·5	30·0	122·1	19·5	51·9	49·3	7·5	16·4	0·0	−10·2	ENE : NE	NE : E : ESE	3·8	0·0	0·1	240	0·00
26	New	30·041	50·7	28·7	38·6	35·1	100·8	17·4	51·1	48·8	3·5	13·8	0·0	− 9·3	N	NNE : W	2·6	0·0	0·1	210	0·03
27	..	29·814	51·2	36·9	40·8	36·5	98·0	28·7	50·3	47·4	4·3	12·6	0·0	− 7·3	WNW : NNE	NNE	13·9	0·0	0·9	459	0·10
28	..	29·929	56·6	36·8	46·0	39·5	91·0	29·7	49·9	47·4	6·5	15·8	4·1	− 2·4	N by E : NW	WNW : W	2·5	0·0	0·3	365	0·00
29	..	29·955	55·8	39·5	45·4	40·7	92·4	37·7	49·1	47·0	4·7	13·9	0·0	− 3·4	NW : NNE	NNE : NE : S	2·5	0·0	0·3	268	0·17
30	..	29·976	59·8	37·7	48·7	44·9	100·4	27·2	49·1	47·2	3·8	13·1	0·0	− 0·6	WSW : WNW	NW	2·0	0·0	0·2	328	0·00
Means	..	29·822	57·4	37·9	45·9	38·9	104·4	30·2	50·7	47·7	7·0	16·1	1·9	− 0·4	...	...	..	..	..	Sum 8739	Sum 0·61

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·097 on the 2nd ; the first minimum in the month was 29in·427 on the 6th.
The absolute maximum ,, was 30in·144 on the 9th ; the absolute minimum ,, was 29in·346 on the 17th.
The third maximum ,, was 30in·042 on the 20th ; the third minimum ,, was 29in·726 on the 23rd.
The fourth maximum ,, was 30in·086 on the 26th ; the fourth minimum ,, was 29in·774 on the 27th.
The fifth maximum ,, was 29in·985 on the 28th ; the fifth minimum ,, was 29in·873 on the 28th.
The sixth maximum ,, was 30in·038 on the 29th.
The range in the month was 0in·798.
The mean for the month was 29in·822, being 0in·054 *greater* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 76°·8 on the 15th; the lowest was 28°·7 on the 26th.
The range ,, was 48°·1.
The mean ,, of all the highest daily readings was 57°·4, being 0°·4 *lower* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 37°·9, being 1°·4 *lower* than the average of the preceding 32 years.
The mean daily range was 19°·5, being 0°·9 *greater* than the average of the preceding 32 years.
The mean for the month was 45°·9, being 1°·3 *lower* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
April 1	0	0	li.-cl	ci, cu : 0, d
2	0	0	0, d, h, sl.-f	ci, ci.-cu, ci.-s, cu, cu.-s : 0, f
3	0	0	10, r	10 : 10, ci, ci.-cu, cu, cu.-s
4	0	0	10 : 10, ci, ci.-cu	10, oc.-th.-r : 10, oc.-th.-r
5	0	0	10 : 10	10, cu, cu.-s, oc.-th.-r : ci, ci.-s, v, lu.-ha
6	0	0 : m	v : 10, r	v, w : v
7	sN, sp	sP, sN : 0	ci.-cu, cu, cu.-s, s, v	ci.-cu, cu.-s, fr.-h.-shs, w : 0
8	w : 0	s, sp	10, ci, ci.-cu, cu, cu.-s	v, r, hl : v, oc.-shs
9			10 : 10 : ci.-cu, cu, cu.-s, v	ci.-cu, cu, cu.-s : 0, d
10			ci, ci.-cu, cu	ci, v : 0
11			10 : 10	10 : 10, oc.-m.-r
12			10 : 10	10 : 10 : 10, sl.-f
13			10 : 10	10 : v : 0
14			ci, ci.-cu, ci.-s	ci, ci.-s : cu.-s, d
15			ci, ci.-s, v	10 : v, oc.-shs : v, l
16		ssP, ssN, sp, g.-cur : s	10, r : v : v, ci, ci.-cu, ci.-s, cu	v, t, l, r : v, l : v, l
17	0	w : 0	ci, ci.-cu	ci, ci.-cu, h : 10, oc.-th.-r : v
18	0	0	10, r : 10, th.-r	ci, ci.-s : 10 : v
19	0	0	0 : 0	0 : 0
20	0	0	0 : 0, w	0, st.-w : 0
21	0	0	ci, ci.-cu, s	0 : 0
22	0	0	0 : 10, oc.-th.-r	10 : 10, oc.-th.-r
23	0	ssP, ssN, sp, g.-cur : 0	ci, ci.-cu, cu, oc.-th.-r, hl	v, fr.-shs, hl : 0
24	0	ssP, ssN, sp, g.-cur : 0	ci, ci.-cu, cu.-s, v	v, hl : v : fr
25	0	ssP, ssN, sp, g.-cur : 0	ci.-cu, cu, cu.-s, s, v : v, sn	v, oc.-sn : vv
26	0	0	ci, ci.-cu, cu, h.-fr	v, r : v, oc.-r
27	0	0	10, r : 10, fr.-shs	v, fr.-shs, hl : 0
28	0	0	10 : 10	*10 : 10
29	0	0	10, fr.-h.-shs : 10, fr.-h.-shs	ci.-cu, ci.-s, cu : v : 10
30			10 : 10	10 : 10, oc.-th.-r : 10

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was $55^{\circ}\cdot7$ on the 16th; and the lowest was $28^{\circ}\cdot7$ on the 26th.

The mean „ was $38^{\circ}\cdot9$, being $1^{\circ}\cdot8$ *lower* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot237$ being $0^{in}\cdot017$ *less* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot7$, being $0^{gr}\cdot2$ *less* than the average of the preceding 32 years.

Degree of Humidity.—The mean for the month was 77 (that of Saturation being represented by 100), being 2 *less* than the average of the preceding 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 546 grains, being 3 grains *greater* than the average of the preceding 32 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·5.

WIND.

The proportions were of N. 12, S. 3, W. 6, E. 9, and Calm 0. The greatest pressure in the month was $13^{lbs}\cdot9$ on the square foot on the 27th.

RAIN.

Fell on 12 days in the month, amounting to $0^{in}\cdot61$, as measured in the simple cylinder gauge partly sunk below the ground; being $1^{in}\cdot10$ *less* than the average fall of the preceding 58 years.

ELECTRICITY.

From April 9 to 15 the insulating lamp was out of action.

MONTH and DAY, 1873.	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.
May 1	Greatest Declination N.	29.936	66.9	50.5	56.4	46.6	107.6	39.0	49.1	47.0	9.8	18.4	2.1	+ 6.6	WNW : NNW	NNW : NNE	2.0	0.0	0.3	321	0.00
2	..	29.777	68.6	40.5	53.3	43.8	132.1	28.3	50.0	47.7	9.5	23.2	3.2	+ 3.0	WSW : W	WNW : W	1.6	0.0	0.2	285	0.00
3	..	29.502	61.9	41.9	48.7	41.7	115.4	32.3	50.4	48.0	7.0	13.7	1.8	− 2.1	W : WNW	NW : N : NNW	5.8	0.0	0.6	393	0.00
4	First Qr.	29.566	54.5	41.6	45.1	38.2	95.7	34.8	52.3	49.3	6.9	16.4	4.2	− 6.1	NW	Variable	1.5	0.0	0.1	206	0.00
5	Apogee	29.290	54.8	41.8	46.3	44.9	71.2	35.0	52.8	49.3	1.4	7.8	0.0	− 5.2	S by W	SSW	3.2	0.0	0.6	317	0.12
6	..	29.397	58.9	40.0	48.2	39.2	124.1	33.4	53.0	49.3	9.0	18.1	1.8	− 3.5	WNW : W by S	W : WSW	2.8	0.0	0.4	339	0.05
7	..	29.351	60.8	41.1	47.7	43.7	112.3	31.7	53.4	49.5	4.0	18.2	0.0	− 4.0	SW	SW : E : NNW	2.4	0.0	0.2	236	0.63
8	..	29.464	59.7	43.0	48.7	44.8	95.2	41.5	53.4	50.0	3.9	14.8	0.0	− 3.0	W : N	NW : WNW	1.5	0.0	0.1	192	0.03
9	In Equator	29.843	63.7	41.1	50.7	45.7	124.8	31.0	53.6	51.0	5.0	15.7	0.0	− 0.8	W : WSW	W : WNW	2.6	0.0	0.1	237	0.07
10	..	29.971	67.5	40.0	51.9	44.9	118.1	31.0	53.6	51.2	7.0	19.3	1.4	+ 0.6	WSW	WSW : SW	1.2	0.0	0.0	202	0.00
11	..	29.972	70.4	48.6	58.1	52.4	133.0	43.0	54.4	51.5	5.7	16.9	1.5	+ 6.9	WSW	W	3.8	0.0	0.4	396	0.00
12	Full	30.002	70.6	47.2	56.7	47.5	130.1	36.0	55.4	52.4	9.2	21.8	0.0	+ 5.5	WSW : NW	NW : E	0.8	0.0	0.1	197	0.00
13	..	30.010	63.3	40.8	50.8	40.7	132.3	31.2	56.3	52.6	10.1	20.3	1.8	− 0.6	NE : ENE	NNE : NE	2.2	0.0	0.1	229	0.00
14	..	30.014	52.0	34.1	43.9	38.4	75.8	24.1	56.0	52.4	5.5	12.2	0.0	− 7.8	NNE	NE	0.8	0.0	0.0	171	0.00
15	Greatest Declination S.	29.907	59.2	41.2	47.4	39.3	133.7	34.0	56.6	52.3	8.1	18.8	4.6	− 4.6	NE : E	E : ESE	1.3	0.0	0.0	172	0.00
16	..	29.758	55.9	37.4	46.3	39.9	133.7	28.1	56.6	53.5	6.4	13.1	2.6	− 6.0	E	ESE : E	4.7	0.0	0.7	339	0.00
17	..	29.472	59.8	41.9	47.8	41.1	131.2	34.7	56.2	52.5	6.7	17.3	2.0	− 4.8	E	E : ENE	17.6	0.0	0.8	421	0.15
18	..	29.468	51.4	43.3	46.2	44.1	69.0	42.0	55.9	53.0	2.1	5.4	1.7	− 6.7	NE	NNE : N	1.5	0.0	0.2	296	0.06
19	Last Qr.	29.843	53.6	35.4	42.9	37.0	91.0	25.0	55.3	52.6	5.9	13.2	4.0	−10.4	N by W : NNE	NNE	2.7	0.0	0.3	344	0.00
20	Perigee	30.121	60.9	34.0	47.2	39.7	128.4	23.3	54.6	52.0	7.5	19.4	0.0	− 6.3	NNE	E : SSW	1.3	0.0	0.1	157	0.00
21	..	29.896	53.0	43.8	48.0	47.3	71.2	37.0	54.6	51.7	0.7	4.4	0.0	− 5.8	SSW : SW	SW	2.1	0.0	0.2	299	0.11
22	In Equator	29.772	69.6	49.4	56.1	48.8	131.2	48.1	54.8	52.0	7.3	18.7	0.0	+ 2.0	WSW	WNW : WSW	3.3	0.0	0.3	282	0.00
23	..	29.591	67.3	45.9	54.6	49.6	125.1	39.8	55.6	53.2	5.0	15.7	0.0	+ 0.3	SW	W	23.1	0.0	1.5	575	0.10
24	..	29.962	64.7	40.3	52.4	43.1	129.0	30.9	55.8	53.0	9.3	20.7	3.0	− 2.2	NW : WNW	NNW : N	1.1	0.0	0.1	240	0.00
25	..	30.060	69.1	40.7	54.5	44.9	127.8	30.0	56.6	53.5	9.6	22.9	0.0	− 0.4	NNW : WSW : NNE	WSW : SW	0.4	0.0	0.0	145	0.00
26	New	29.730	70.9	49.6	57.9	48.9	122.2	41.7	57.0	54.0	9.0	21.4	1.1	+ 2.7	SSE : SSW	SSW : W	2.9	0.0	0.2	252	0.01
27	..	29.686	67.8	46.7	53.6	47.3	122.1	36.7	57.6	54.5	6.3	17.6	2.9	− 1.8	WSW	WNW : N : NNE	3.1	0.0	0.2	294	0.07
28	Greatest Declination N.	30.085	60.5	45.8	50.5	43.5	92.8	37.0	57.9	54.8	7.0	12.4	2.3	− 5.2	NNE	N : NNE	0.7	0.0	0.2	259	0.00
29	..	30.206	63.5	42.8	52.5	43.2	137.1	31.7	57.6	54.8	9.3	16.5	2.2	− 3.5	NNE : NE	NE : ESE : SE	0.3	0.0	0.0	145	0.00
30	..	30.057	64.8	43.5	51.6	40.6	140.2	40.2	58.2	55.0	11.0	21.1	2.5	− 4.7	Calm : NNE	NNE	2.2	0.0	0.2	194	0.09
31	..	29.927	66.7	42.7	53.2	42.6	138.9	34.1	58.4	55.5	10.6	22.0	3.5	− 3.4	NNE: NNW	NNE	2.4	0.0	0.2	234	0.00
Means	..	29.795	62.3	42.5	50.6	43.7	115.9	34.4	54.9	51.9	7.0	16.7	1.6	− 2.3	...	...	..	..	..	Sum 8369	Sum 1.49

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·581 on the 4th; the first minimum in the month was 29in·457 on the 3rd.
The second maximum ,, was 29in·457 on the 6th; the absolute minimum ,, was 29in·203 on the 5th.
The third maximum ,, was 30in·043 on the 13th; the third minimum ,, was 29in·265 on the 7th.
The fourth maximum ,, was 30in·153 on the 20th; the fourth minimum ,, was 29in·431 on the 18th.
The fifth maximum ,, was 30in·111 on the 25th; the fifth minimum ,, was 29in·548 on the 23rd.
The absolute maximum ,, was 30in·230 on the 29th; the sixth minimum ,, was 29in·645 on the 27th.

The range in the month was 1in·027.

The mean for the month was 29in·795, being 0in·016 *greater* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 70°·9 on the 26th; the lowest was 34°·0 on the 20th.
The range ,, was 36°·9.
The mean ,, of all the highest daily readings was 62°·3, being 2°·3 *lower* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 42°·5, being 1°·6 *lower* than the average of the preceding 32 years.
The mean daily range was 19°·8, being 0°·7 *less* than the average of the preceding 32 years.
The mean for the month was 50°·6, being 2°·3 *lower* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
May 1			v : ci, ci.-cu, cu, cu.-s	v : v, ci.-cu
2			o : o, h, mt	ci.-cu, cu, cu.-s : ci.-cu
3		sP,sN,sp : w	o : o : ci,ci.-cu,cu,cu.-s	v, oc.-shs : v, oc.-th.-r
4	o	s,sp,g.-cur: w	10, mt	10, oc.-r : v
5			10, th.-r : 10, oc.-r	10, oc.-r : v : v, r
6		o : w	v, ci, ci.-cu, cu	ci, ci.-cu, cu, sl.-r : v
7	o	m : o	v : ci, ci.-cu, cu, oc.-r	10, r : 10, r
8	o	o : o	10 : v, ci, ci.-cu, cu.-s, cu	v : 10, r
9	o	w : o	v : o, mt	10, ci.-cu, cu.-s, h.-r, v : 10
10	o	o : o : m	10 : 10	10 : 10
11	w	w : m	ci.-cu : ci.-cu, cu, w	v : li.-cl, d
12	o	o : o	ci.-cu, h	ci.-cu, h : o
13	o	o : o : w	o, h	ci.-cu, cu, cu.-s : o
14	w	o	v : 10	10 : 10
15	o	o : w : w	10 : v	ci, ci.-cu : o
16	o	o	ci, ci.-cu, cu, cu.-s	o : o
17	o	s,sp,g.-cur: o	o : ci.-s, w	10, r : 10, fr.-h.-r
18	o	o	10, r : 10, mt	10 : 10
19	o : w	w : w	10 : 10	10 : v : o
20	o	o : o : w	o, h.-fr : o	li.-cl, h : h
21	o	w : o : w	10 : 10, r	10, r : 10, oc.-th.-r
22	w	o : o : m	10 : 10	ci, ci.-s, cu.-s, h : o, mt
23	o	wN : m	v : 10, r, vv	ci, ci.-cu, cu, st.-w : vv
24	o	o	o : ci, ci.-cu, cu	ci.-cu : v
25	w	o	o : o : v	ci, ci.-s, cu, cu.-s : 10
26	o	sN,sp,g.-cur: o	v : v	v : 10, oc.-th.-r : 10, oc.-th.-r
27	o : ssN,ssP,sp,g.-cur	sN,sp,g.-cur: o : o	10, oc.-shs : v, fr.-shs	v, t : v, r : o
28	o	w : m	10 : 10	10 : v : o, d
29	o	o	li.-cl : v	ci, ci.-cu, cu : ci,ci.-cu,cu,v : 10
30	o : wN	o : m	10, r : 10	ci, ci.-cu, ci.-s : o
31	w	o	v : 10	ci, ci.-cu, cu : li.-cl, v

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was 55°·2 on the 11th; and the lowest was 34°·0 on the 20th.

The mean ,, was 43°·7, being 1°·7 *lower* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was 0in·285, being 0in·017 *less* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 3grs·3, being 0gr·1 *less* than the average of the preceding 32 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 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 540 grains, being 1 grain *less* than the average of the preceding 32 years.

CLOUDS.

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

WIND.

The proportions were of N. 10, S. 5, W. 11, E. 5, and Calm 0. The greatest pressure in the month was 23lbs·1 on the square foot on the 23rd.

RAIN.

Fell on 12 days in the month, amounting to 1in·49, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·65 *less* than the average fall of the preceding 58 years.

ELECTRICITY.

The insulating lamp was not burning on May 1 and 2.

MONTH and DAY, 1873.	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 a 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.
June 1	..	29·752	56·1	46·4	50·9	47·0	87·7	43·2	58·4	55·5	3·9	5·8	3·6	− 6·1	NNW : NNE	ENE	4·8	0·2	1·1	496	0·19
2	Apogee	29·851	69·2	47·1	57·2	45·6	140·8	41·3	58·1	55·2	11·6	22·3	3·8	− 0·1	ENE	ENE : NE	8·7	0·0	0·6	410	0·00
3	First Qr.	29·677	69·9	49·7	58·0	52·0	119·5	46·0	58·4	55·3	6·0	16·6	4·2	+ 0·6	NE : ENE	SSE : Calm	1·2	0·0	0·1	204	0·26
4	..	29·671	74·6	50·5	60·9	55·8	132·2	42·7	58·1	56·0	5·1	17·9	0·0	+ 3·6	Calm : SE	NE : E : SE	1·0	0·0	0·0	104	0·20
5	In Equator	29·679	68·0	57·3	59·9	57·5	85·4	54·3	59·9	57·3	2·4	9·5	0·0	+ 2·7	N : NE	NW : NNE : E	0·7	0·0	0·0	117	0·03
6	..	29·893	57·1	43·5	49·8	48·3	69·3	40·0	60·4	58·2	1·5	4·9	0·4	− 7·2	NNE	NNE	3·3	0·0	0·6	371	0·00
7	..	30·077	64·5	42·0	51·4	42·7	126·3	33·0	60·0	58·0	8·7	18·5	2·4	− 5·6	N : NNE	NNE : NE	2·7	0·0	0·2	269	0·00
8	..	30·014	67·7	47·9	55·0	50·2	114·0	37·0	59·9	57·5	4·8	13·9	0·0	− 2·3	WSW : NNW	NNE : NNW : NW	0·3	0·0	0·0	127	0·00
9	..	29·832	70·5	52·9	59·3	52·1	113·3	37·1	60·0	58·0	7·2	14·4	2·7	+ 1·6	WSW	W : WSW	1·2	0·0	0·1	234	0·00
10	Full	29·595	64·1	49·3	55·8	50·2	109·8	40·6	60·2	58·0	5·6	11·0	2·1	− 2·2	SW : WSW	WSW : SW	3·2	0·0	0·3	340	0·00
11	..	29·529	65·3	51·2	56·3	49·1	126·1	50·5	59·9	58·0	7·2	11·7	2·4	− 2·0	SW : WSW	SW : SSW	1·1	0·0	0·1	209	0·04
12	Greatest Declination S.	29·376	70·0	45·1	56·4	48·5	132·7	36·0	60·1	58·0	7·9	20·2	0·0	− 2·2	S : SSE	SSE : ESE : ENE	1·1	0·0	0·1	184	0·00
13	..	29·483	72·9	49·7	58·9	51·5	150·7	46·5	60·3	58·0	7·4	21·8	0·6	+ 0·1	NE	WSW : NW	1·2	0·0	0·0	140	0·21
14	Perigee	29·574	67·1	46·8	56·0	49·6	140·0	38·6	60·9	58·8	6·4	16·7	0·0	− 3·0	WSW : SW	Variable	1·5	0·0	0·1	180	0·01
15	..	29·686	70·1	52·3	58·3	51·2	127·2	51·0	60·9	58·3	7·1	15·8	2·0	− 0·7	W	W : WSW	0·6	0·0	0·0	210	0·00
16	..	29·787	67·3	52·7	58·7	51·0	107·0	47·4	61·3	59·0	7·7	16·2	2·2	− 0·3	WSW : N	SE : S : SW	0·3	0·0	0·0	130	0·00
17	Last Qr.	29·819	76·1	46·7	61·1	49·9	147·3	37·9	61·4	59·0	11·2	23·0	0·0	+ 2·1	WSW : SE	SSE : SE	0·6	0·0	0·0	128	0·00
18	In Equator	29·872	72·0	53·5	58·9	57·6	119·8	45·8	62·6	60·0	1·3	11·7	0·0	− 0·2	ENE : NE	Variable	0·7	0·0	0·0	121	0·73
19	..	29·943	71·4	51·3	59·6	53·7	135·0	41·2	62·9	60·3	5·9	17·8	1·0	+ 0·4	SW	SW	3·3	0·0	0·4	312	0·03
20	..	30·048	73·1	57·0	61·9	54·1	132·1	56·1	63·4	60·8	7·8	15·0	2·3	+ 2·4	SW : WSW	WSW	1·1	0·0	0·1	234	0·00
21	..	30·074	78·1	52·7	64·4	61·4	145·8	45·3	64·0	61·2	3·0	15·6	0·0	+ 4·5	WSW : W	W : WSW	1·2	0·0	0·1	227	0·00
22	..	29·901	79·9	61·3	68·9	60·5	147·0	54·5	64·6	61·4	8·4	18·7	2·5	+ 8·6	WSW : SW	WSW : W	2·1	0·0	0·2	251	0·00
23	..	29·907	74·9	53·6	62·5	49·7	140·7	44·1	65·9	63·2	12·8	22·4	1·2	+ 1·8	W : WSW : WNW	WNW : NW	1·1	0·0	0·1	221	0·00
24	New	29·806	68·5	48·8	58·2	53·6	107·8	41·7	66·2	63·5	4·6	8·6	0·0	− 3·0	WSW : SW	WSW : W	4·6	0·0	0·4	381	0·00
25	Greatest Declination N.	29·819	68·1	51·6	57·8	46·1	126·9	47·4	65·9	63·0	11·7	16·9	6·3	− 3·8	W : WNW	NW : NNW	3·9	0·0	0·8	483	0·00
26	..	30·002	67·9	45·8	57·5	50·4	130·9	35·0	65·1	62·0	7·1	15·3	3·4	− 4·2	NNW : W	W : WSW	2·3	0·0	0·3	355	0·00
27	..	29·945	81·2	55·1	65·7	56·6	152·0	47·4	64·3	60·6	9·1	20·9	1·8	+ 4·1	WSW	WSW	3·2	0·0	0·3	355	0·00
28	..	29·872	76·7	57·5	63·6	54·4	148·7	51·2	64·8	62·0	9·2	20·6	5·7	+ 2·1	WSW	WSW : NW	1·8	0·0	0·2	322	0·00
29	..	29·716	81·0	51·8	65·5	56·7	167·1	42·5	64·9	62·6	8·8	20·7	0·0	+ 4·1	WSW : SE	ESE : SE	1·0	0·0	0·0	137	0·39
30	Apogee	29·632	61·3	57·4	58·0	55·9	68·0	56·2	65·4	63·5	2·1	3·6	0·0	− 3·1	WSW : W	NNW : NW	2·0	0·0	0·2	280	0·47
Means	..	29·794	70·2	51·0	58·9	52·1	125·0	44·4	61·9	59·4	6·8	15·6	1·7	− 0·2	...	...	..	..	..	Sum 7532	Sum 2·56

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first minimum in the month was 29in·698 on the 1st.

The first maximum in the month was 29in·901 on the 2nd ; the second minimum ,, was 29in·640 on the 4th.

The absolute maximum ,, was 30in·096 on the 7th ; the absolute minimum ,, was 29in·351 on the 12th.

The third maximum ,, was 30in·087 on the 21st ; the fourth minimum ,, was 29in·856 on the 22nd.

The fourth maximum ,, was 29in·944 on the 23rd ; the fifth minimum ,, was 29in·702 on the 24th.

The fifth maximum ,, was 30in·039 on the 26th ; the sixth minimum ,, was 29in·581 on the 30th.

The range in the month was 0in·745.

The mean for the month was 29in·794, being 0in·018 *lower* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 81°·2 on the 27th ; the lowest was 42°·0 on the 7th.

The range ,, was 39°·2.

The mean ,, of all the highest daily readings was 70°·2, being 0°·9 *lower* than the average of the preceding 32 years.

The mean ,, of all the lowest daily readings was 51°·0, being 1°·0 *higher* than the average of the preceding 32 years.

The mean daily range was 19°·2, being 1°·9 *less* than the average of the preceding 32 years.

The mean for the month was 58°·9, being 0°·1 *lower* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
June 1	o	o	10, oc.-r : 10, oc.-r : v, h.-r	10 : 10 : v
2	o	w	ci, ci.-cu, cu.-s : ci, cu, w	ci, cu : ci.-cu, cu
3	o	o : w	10, r : ci, ci.-cu, cu, cu.-s	v, r : 10
4	m	w : sN, sp	ci, ci.-cu, cu.-s, h	ci.-cu, ci.-s, cu.-s : v, t.-s : v, r
5	o	o : o : w	10 : 10	10, mt : v : ci.-cu, cu.-s
6	o	o : o : w	10 : 10, h	10, mt : v : o
7	w	o : o	ci, ci.-cu, ci.-s, cu, cu.-s	ci, ci.-cu, cu, cu.-s : v
8	o	o : w	10 : 10, mt, h	v : o, mt, h.-d
9	o	o : o : w	v : 10	10, li.-cl : v : ci, ci.-s
10	o	o : w	10 : ci, ci.-cu, cu, cu.-s	10 : 10 : 10, oc.-r
11	w	o : o	10, r : ci, ci.-cu, ci.-s, cu, sl.-r	10, th.-r : v, ci, ci.-cu, cu
12	o	o : w	ci.-cu	ci, ci.-cu, cu.-s : v, li.-cl
13	o	o	ci, ci.-s	ci, ci.-cu, ci.-s, v, r, t : 10
14	o	o	ci, ci.-cu, cu, v	ci, ci.-cu, cu : 10, r : 10
15	o	o	ci.-s, cu.-s, h	ci.-cu, ci.-s, cu.-s, h : ci.-s, cu.-s, h
16	o	o	cu, cu.-s	ci, ci.-cu, cu : 10 : ci.-s, cu.-s, h
17	o	o : o : m	v : ci, ci.-cu	ci.-cu, cu, cu.-s : ci.-cu, cu, s
18	o	o	10, mt, h.-r : 10, h.-r, mt	10, h, mt : v, sl.-r : o
19	o	o	ci, ci.-cu, cu, cu.-s	10, sl.-r : 10, r : 10
20	o	o : o : w	10 : 10	v, ci, ci.-cu, cu : v : o
21	o	o	ci, ci.-cu, cu	ci.-cu : vv
22			ci.-cu, cu, cu.-s	v : v, r : vv
23			ci, ci.-cu, cu, cu.-s, s	ci, ci.-cu : 10
24		o : o : wN	v : v : 10, sl.-r	10 : vv
25	o	o	ci, ci.-cu, cu, cu.-s	ci.-s, cu.-s, v : o
26	o	o	ci, ci.-cu, ci.-s, v	10, sl.-r : 10
27	o	o	v : ci, ci.-cu	ci, ci.-cu, cu : v
28	o	o	10 : v	ci, ci.-s : 10
29			ci.-cu, cu	v : 10, r, t : 10
30			10 : 10, th.-r, mt, glm	10 : 10, fr.-h.-r : 10, r

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was $64^{\circ}\cdot 4$ on the 22nd; and the lowest was $42^{\circ}\cdot 0$ on the 7th.

The mean ,, was $52^{\circ}\cdot 1$, being $1^{\circ}\cdot 4$ *higher* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot 389$, being $0^{in}\cdot 018$ *greater* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $4^{grs}\cdot 3$, being $0^{gr}\cdot 2$ *greater* than the average of the preceding 32 years.

Degree of Humidity.—The mean for the month was 78 (that of Saturation being represented by 100), being 4 *greater* than the average of the preceding 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 531 grains, being 1 grain *less* than the average of the preceding 32 years.

CLOUDS.

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

WIND.

The proportions were of N. 6, S. 7, W. 12, E. 4, and Calm 1. The greatest pressure in the month was $8^{lbs}\cdot 7$ on the square foot on the 2nd.

RAIN.

Fell on 11 days in the month, amounting to $2^{in}\cdot 56$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot 63$ *greater* than the average fall of the preceding 58 years.

ELECTRICITY.

The insulating lamp was not burning on June 22, 23, 29, and 30.

MONTH and DAY, 1873.	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.	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.
July 1	..	29·833	71·0	54·0	60·9	55·2	119·7	49·2	65·2	63·3	5·7	13·6	0·8	0·0	WNW : NNW	N : NNW	0·3	0·0	0·1	172	0·00
2	In Equator: First Quarter.	29·870	75·3	53·3	62·6	56·7	148·9	47·0	65·0	63·2	5·9	16·1	1·2	+ 1·5	WSW	SW	0·8	0·0	0·1	185	0·00
3	..	29·716	76·9	57·1	65·0	57·5	147·7	53·7	65·9	64·0	7·5	18·0	1·9	+ 3·7	SW : SSW	SW : S	3·0	0·0	0·3	269	0·00
4	..	29·601	73·4	58·2	61·5	51·9	149·9	57·8	66·3	64·3	9·6	18·7	4·4	0·0	SW : W	WSW	5·0	0·0	0·9	362	0·11
5	..	29·640	66·6	50·5	57·8	56·2	86·2	43·5	66·6	64·5	1·6	9·3	0·0	− 3·9	SSW : S	SW : SSW	2·7	0·0	0·4	267	0·01
6	..	29·778	74·7	55·5	59·9	51·8	127·0	52·9	66·0	64·2	8·1	19·9	1·0	− 1·9	SSW : WSW	WSW: WNW: SW	2·0	0·0	0·1	239	0·47
7	..	29·943	77·4	50·8	64·1	54·4	147·6	44·6	66·1	63·8	9·7	18·9	1·6	+ 2·3	Calm : SSW	SSW : SW	0·7	0·0	0·0	138	0·00
8	..	29·910	81·9	49·7	65·7	57·9	149·2	42·1	66·8	64·5	7·8	19·7	1·7	+ 3·8	SSW : SW	SW : WSW	1·2	0·0	0·1	178	0·00
9	Greatest Declination S.	29·948	77·5	53·8	62·7	50·8	142·5	44·0	67·4	65·4	11·9	22·9	3·8	+ 1·0	W : WNW	W : SW	1·6	0·0	0·2	278	0·00
10	Full	29·724	78·2	54·2	65·2	54·8	142·9	45·3	67·4	65·4	10·4	20·2	2·2	+ 3·4	SW : WSW	WSW : W	2·7	0·0	0·5	350	0·00
11	..	29·668	72·5	53·2	61·0	52·5	134·0	44·3	67·1	65·3	8·5	16·4	3·2	− 0·8	WSW	WSW : SW	1·2	0·0	0·1	221	0·00
12	Perigee	29·586	71·2	51·5	59·7	50·8	139·8	45·0	67·0	65·0	8·9	15·3	0·8	− 2·3	SW	SW	3·5	0·0	0·3	312	0·02
13	..	29·389	67·0	51·5	57·4	54·2	87·0	44·1	66·8	65·0	3·2	13·7	0·0	− 4·9	SSW	SSE: SSW: WSW	16·2	0·0	0·8	388	0·80
14	..	29·535	69·1	49·5	58·5	52·6	134·5	43·0	66·1	64·0	5·9	14·0	0·0	− 4·0	SW	SW	3·3	0·0	0·3	347	0·06
15	In Equator	29·623	70·3	51·0	57·1	51·8	143·0	47·2	65·4	63·0	5·3	15·1	2·2	− 5·4	WSW	WSW : S	4·5	0·0	0·5	380	0·30
16	Last Qr.	29·930	73·3	50·5	60·9	49·8	138·8	45·6	64·8	62·2	11·1	20·9	1·5	− 1·5	W : WNW	W : SW	1·7	0·0	0·2	310	0·00
17	..	29·911	75·6	54·5	63·5	60·4	112·0	50·0	64·6	63·0	3·1	11·1	0·0	+ 1·3	SSW : SW	WSW	2·5	0·0	0·3	300	0·00
18	..	29·768	74·1	52·5	59·7	52·9	147·4	50·0	64·8	63·8	6·8	15·0	3·8	− 2·2	SW : WSW	WSW : NNW	14·5	0·0	0·6	408	0·05
19	..	30·006	71·3	46·4	59·0	47·4	133·2	43·6	65·0	63·2	11·6	20·3	1·9	− 2·6	W	WNW : WSW	2·3	0·0	0·2	293	0·00
20	..	29·996	82·2	53·4	66·7	61·4	149·0	45·0	64·8	63·2	5·3	14·6	3·8	+ 5·3	WSW	WSW : SW	1·3	0·0	0·1	252	0·00
21	..	29·991	86·5	57·2	71·7	57·1	158·2	51·1	65·4	63·0	14·6	24·7	0·4	+10·2	SW : SSW	SSE : ESE	0·8	0·0	0·1	152	0·00
22	Greatest Declination N.	29·819	88·7	60·3	75·2	61·4	153·0	52·7	67·1	65·0	13·8	24·3	1·3	+13·7	E : SE	SSE : SW	1·3	0·0	0·1	168	0·00
23	..	29·767	87·2	63·0	72·3	63·2	148·2	59·6	68·8	66·5	9·1	18·4	0·8	+10·7	WSW	W : WNW	2·7	0·0	0·3	260	0·00
24	New	29·883	80·0	52·8	65·2	54·8	142·2	44·8	69·8	67·4	10·4	25·0	1·0	+ 3·5	WSW : W	WSW : SW	1·4	0·0	0·0	234	0·00
25	..	29·829	82·1	57·0	68·3	53·9	159·4	50·5	69·9	67·4	14·4	26·2	2·1	+ 6·5	SSW	SSW	1·3	0·0	0·1	204	0·00
26	..	29·799	74·0	58·2	62·4	57·2	115·1	49·4	70·4	68·3	5·2	15·8	2·1	+ 0·5	W: SSW: WSW	W : WSW	0·6	0·0	0·0	156	0·03
27	Apogee	29·818	77·1	52·8	62·0	52·8	152·8	43·1	70·0	67·2	9·2	22·6	1·2	0·0	WSW	WSW : SW	3·3	0·0	0·3	296	0·00
28	..	29·837	76·6	51·1	61·0	51·2	139·4	44·8	69·9	66·8	9·8	22·8	2·4	− 1·2	SW	SW	1·7	0·0	0·1	256	0·00
29	..	29·769	80·1	49·9	64·1	53·9	147·8	41·1	69·1	67·0	10·2	23·8	5·1	+ 1·8	SW : SSE	ESE	1·3	0·0	0·0	124	0·00
30	In Equator	29·847	83·6	57·8	69·1	56·0	156·8	50·5	69·2	67·3	13·1	26·0	5·8	+ 6·7	WSW	SW	4·8	0·0	0·3	317	0·00
31	..	29·854	80·0	59·3	66·5	58·8	125·2	49·9	69·6	67·8	7·7	17·9	2·1	+ 4·1	SSW	WSW	2·7	0·0	0·5	364	0·00
Means	..	29·793	76·6	53·9	63·4	54·9	138·0	47·6	67·0	65·0	8·6	18·7	1·9	+ 1·6	...	...	..	..	..	Sum 8180	Sum 1·85

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·881 on the 2nd; the first minimum in the month was 29in·555 on the 4th.
The second maximum ,, was 29in·984 on the 9th; the absolute minimum ,, was 29in·209 on the 13th.
The third maximum ,, was 29in·985 on the 16th; the third minimum ,, was 29in·732 on the 18th.
The absolute maximum ,, was 30in·027 on the 21st; the fourth minimum ,, was 29in·731 on the 23rd.
The fifth maximum ,, was 29in·902 on the 24th; the fifth minimum ,, was 29in·786 on the 26th.
The sixth maximum ,, was 29in·858 on the 28th; the sixth minimum ,, was 29in·732 on the 29th.
The range in the month was 0in·818.
The mean for the month was 29in·793, being 0in·009 *lower* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 88°·7 on the 22nd; the lowest was 46°·4 on the 19th.
The range ,, was 42°·3.
The mean ,, of all the highest daily readings was 76°·6, being 2°·4 *higher* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 53°·9, being 0°·8 *higher* than the average of the preceding 32 years.
The mean daily range was 22°·7, being 1°·6 *greater* than the average of the preceding 32 years.
The mean for the month was 63°·4, being 1°·3 *higher* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
July 1	0		10 : 10, ci, ci.-cu, ci.-s, cu, cu.-s, s	10 : ci, ci.-cu, cu, cu.-s : 0
2			v : ci, ci.-cu, cu, h	ci, ci.-cu, cu.-s : ci.-cu, cu, v : ci, cu.-s
3			ci, ci.-cu, cu, cu.-s	ci, ci.-cu, ci.-s, cu, cu.-s : 10 : 10, sl.-r
4	0	m : 0	10 : ci, ci.-cu, cu	ci, ci.-s, cu, cu.-s, r : 0
5	0	0 : 0 : m	v : 10, r, li.-shs	10, th.-r : v : 0
6	0	0 : w	v : 10, r : v	cu, cu.-s : ci, cu.-s
7	m	m	li.-cl	ci, ci.-cu, cu : 0 : 0
8	m	w : m	v : v : 10	ci, ci.-cu, cu, cu.-s : ci, ci.-cu, ci.-s, cu.-s
9	m	0 : 0 : 0	v : li.-cl, h	v : v
10	0	w : 0	ci.-s, cu.-s	ci, ci.-s, cu : 10
11	0	0 : 0 : m	ci, ci.-cu, ci.-s	10, th.-cl : 10, th.-cl : 10, h
12	wP, wN	s, sp, g.-cur : 0	10 : ci.-cu, cu, cu.-s, r	ci.-cu, cu, cu.-s : v
13	w	0	v : v : 10, h.-r	10, r, g : 10, r : v
14	s, sp, g.-cur	0 : m	v : ci, ci.-cu, cu, oc.-shs	ci, ci.-cu, cu, cu.-s : ci.-cu, ci.-s, cu.-s
15	ssP, ssN, sp, g.-cur	sN, sp, g.-cur : 0	ci, ci.-cu, cu : t, l, hl, fr.-shs	cu, cu.-s, t, l, fr.-shs : v
16	0	0	ci, ci.-cu, cu, cu.-s	ci, ci.-cu, cu : ci.-s, cu.-s
17	0	0	v : 10, th.-r	ci.-s, cu.-s : ci.-s, cu.-s
18	0	0	v : 10, r, ci.-cu, cu, cu.-s	v : vv : 0
19	0	w : w	0 : ci, ci.-cu, cu, cu.-s	ci, ci.-cu : ci, s
20	w	0 : m	0 : ci	ci : ci
21	w : 0	0 : m	0 : 0	0 : 0
22	0	w : m	0 : 0	0 : 0, l
23	0 : w	wN : m	v : ci, h, mt	ci, ci.-cu, cu : ci.-s, v : ci.-s, cu.-s
24	w	0 : w	ci.-s	0 : ci, s
25	w	0 : w	ci, ci.-cu	ci, ci.-cu, cu : ci, ci.-cu, ci.-s, cu.-s, s
26	0 : ssP, ssN, sp, g.-cur	w : w	v : 10, r	v : ci, ci.-s, cu.-s, s
27	0	w : w	ci.-cu, cu, cu.-s	ci.-cu, cu, cu.-s : ci.-cu, cu.-s
28	0 : w	0 : w	ci : ci, ci.-cu, ci.-s, cu	ci, cu, cu.-s : ci, ci.-cu, cu, cu.-s : 0
29	w	0 : w : m	ci : ci, ci.-cu, cu.-s	v : v, r : 10
30	0	0	10 : v : 0	ci, ci.-cu, cu : v
31	0	0	10 : 10, sl.-r	ci, ci.-s, cu.-s : 0

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was $68^{\circ}\cdot 8$ on the 23rd; and the lowest was $46^{\circ}\cdot 4$ on the 19th.

The mean ,, was $54^{\circ}\cdot 9$, being $1^{\circ}\cdot 0$ *higher* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot 431$, being $0^{in}\cdot 014$ *greater* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $4^{grs}\cdot 8$, being $0^{gr}\cdot 2$ *greater* than the average of the preceding 32 years.

Degree of Humidity.—The mean for the month was 74 (that of Saturation being represented by 100), being 1 *less* than the average of the preceding 32 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 32 years.

CLOUDS.

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

WIND.

The proportions were of N. 1, S. 11, W. 16, E. 2, and Calm 1. The greatest pressure in the month was $16^{lbs}\cdot 2$ on the square foot on the 13th.

RAIN.

Fell on 9 days in the month, amounting to $1^{in}\cdot 85$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot 70$ *less* than the average fall of the preceding 58 years.

ELECTRICITY.

The insulating lamp was not in action on July 1, 2, and 3.

MONTH and DAY, 1873.	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	First Qr.	29·935	73·0	54·4	60·8	52·9	132·1	45·2	69·3	67·0	7·9	13·8	0·0	− 1·6	WSW	W : NW : WSW	2·6	0·0	0·2	271	0·27
2	..	30·020	76·4	51·3	62·4	50·3	140·0	41·7	68·8	66·8	12·1	23·3	2·4	0·0	WSW	W : WSW	1·5	0·0	0·1	236	0·00
3	..	29·967	76·1	53·0	63·6	55·3	134·0	43·2	68·4	66·5	8·3	19·6	2·0	+ 1·2	WSW : SW	NW : WSW	1·3	0·0	0·1	262	0·00
4	..	29·851	77·7	54·5	62·6	54·1	135·8	47·3	67·9	66·0	8·5	21·6	2·0	+ 0·3	WSW	WSW	1·8	0·0	0·3	276	0·00
5	..	29·782	78·5	59·8	66·3	60·6	132·6	54·3	67·8	65·6	5·7	14·5	0·0	+ 4·1	WSW	SW	1·3	0·0	0·1	248	0·45
6	Greatest Declination S.	29·796	82·7	60·4	68·2	59·3	157·0	53·7	67·6	65·5	8·9	20·6	2·9	+ 6·1	SW	WSW : W	3·0	0·0	0·5	394	0·00
7	..	29·962	83·0	58·6	69·0	60·8	146·5	51·8	67·9	66·5	8·2	20·2	1·1	+ 7·0	WSW : W	WSW : SW	1·3	0·0	0·1	264	0·00
8	Full	29·758	87·3	57·2	71·5	56·2	146·5	48·0	68·3	66·8	15·3	25·5	0·8	+ 9·5	SW : SSW	W : NW	1·2	0·0	0·1	168	0·00
9	Perigee	29·777	71·7	53·5	60·8	45·4	146·6	50·0	68·8	66·4	15·4	23·9	6·8	− 1·3	WNW : N : NW	NW : NNW	3·8	0·0	0·7	390	0·00
10	..	29·880	70·4	48·0	57·6	45·8	119·6	37·3	68·3	66·0	11·8	19·3	3·8	− 4·5	WSW : W	W : WSW	2·9	0·0	0·4	358	0·10
11	..	29·799	65·8	53·0	58·0	56·7	86·8	51·7	67·1	64·7	1·3	7·6	0·0	− 4·1	S : E : NE	N : W by S	0·0	0·0	0·0	123	0·38
12	In Equator	29·898	77·9	53·1	64·1	57·8	122·0	44·6	66·4	64·0	6·3	19·2	0·0	+ 2·1	WSW	WSW : SW	2·9	0·0	0·3	329	0·00
13	..	29·792	75·1	60·8	65·9	52·7	134·4	60·5	66·3	64·8	13·2	20·7	1·0	+ 4·0	SW : WSW	WNW : WSW	5·8	0·0	1·0	496	0·04
14	..	29·935	77·7	55·7	65·1	54·2	144·7	53·0	66·4	64·8	10·9	22·3	3·0	+ 3·4	SW : W	W : WSW	2·2	0·0	0·2	278	0·00
15	Last Qr.	29·916	78·9	58·9	65·5	62·2	101·4	54·5	66·3	64·8	3·3	15·1	0·0	+ 4·0	SSW	SW	1·6	0·0	0·3	265	0·03
16	..	29·768	85·6	54·0	68·4	55·8	149·3	52·6	66·6	64·8	12·6	25·7	0·0	+ 7·1	SW	SW : W	9·0	0·0	0·5	337	0·00
17	..	29·989	74·7	49·1	59·5	46·6	131·5	49·0	67·6	65·2	12·9	25·8	2·9	− 1·6	WSW	SW : SSW	1·5	0·0	0·1	253	0·00
18	Greatest Declination N.	29·561	68·9	53·3	59·3	51·6	105·1	49·3	66·6	64·5	7·7	13·9	2·0	− 1·7	S by W : SSE	SSW	1·2	0·0	0·1	171	0·57
19	..	29·490	70·8	52·1	58·2	53·6	103·0	48·3	66·4	64·8	4·6	14·0	0·8	− 2·7	SSW : WSW	WSW	1·6	0·0	0·1	249	0·00
20	..	29·600	68·6	49·3	58·6	52·1	119·7	43·6	65·9	64·2	6·5	15·5	0·6	− 2·2	WSW : SW	SSW : SW	3·1	0·0	0·2	287	0·04
21	..	29·686	73·1	53·1	60·8	53·3	130·1	46·3	65·4	64·0	7·5	17·2	2·9	+ 0·1	SW	SW : SSW	1·7	0·0	0·2	309	0·00
22	..	29·728	74·6	54·3	62·3	55·1	123·7	49·8	65·0	63·4	7·2	17·0	0·6	+ 1·6	SSW : SW	SSW	2·2	0·0	0·2	256	0·00
23	New	29·712	73·5	51·5	61·6	54·5	118·5	45·8	65·0	63·4	7·1	19·6	0·8	+ 1·0	SSW : S	SSE : ESE	1·0	0·0	0·0	151	0·04
24	Apogee	29·687	74·5	55·7	64·1	60·9	133·7	51·0	64·9	62·0	3·2	13·3	0·0	+ 3·6	ESE : E	E	2·2	0·0	0·1	216	0·75
25	..	29·727	77·5	59·4	67·4	58·1	138·9	55·6	65·4	63·5	9·3	18·5	0·0	+ 6·9	E : WSW : SSE	ESE : SE	0·7	0·0	0·0	152	0·00
26	In Equator	29·722	74·1	57·1	64·3	53·9	137·7	52·6	65·9	63·4	10·4	17·5	2·1	+ 4·0	SSE : SSW	SSW : SW	11·4	0·0	0·4	324	0·04
27	..	29·709	73·5	55·5	63·2	54·3	136·8	50·0	66·1	64·5	8·9	16·5	1·0	+ 3·1	SSW	SW : SSW	3·7	0·0	0·3	320	0·00
28	..	29·396	67·8	54·8	60·0	52·5	119·2	51·5	66·0	64·2	7·5	12·2	1·7	− 0·1	SW	SW : WSW	19·6	0·0	0·9	510	0·37
29	..	29·534	63·3	47·9	54·3	48·0	109·8	38·5	64·6	64·0	6·3	13·1	3·0	− 5·4	W : WSW	W : WSW	4·6	0·0	0·6	458	0·04
30	..	29·639	71·0	50·4	59·7	52·8	114·6	42·1	65·6	63·0	6·9	14·9	1·4	+ 0·3	WSW	W : WSW	1·8	0·0	0·2	275	0·00
31	First Qr.	29·688	70·8	55·7	61·9	59·1	101·9	42·9	64·6	63·0	2·8	9·0	0·0	+ 2·7	SW : WSW	WSW	1·9	0·0	0·1	185	0·06
Means	..	29·765	74·7	54·4	62·7	54·4	127·5	48·6	66·7	64·8	8·3	17·8	1·5	+ 1·5	...	...	..	..	..	Sum 8811	Sum 3·18

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·028 on the 2nd; the first minimum in the month was 29in·775 on the 6th.
The second maximum ,, was 29in·976 on the 7th; the second minimum ,, was 29in·676 on the 8th.
The third maximum ,, was 29in·911 on the 10th; the third minimum ,, was 29in·763 on the 11th.
The fourth maximum ,, was 29in·924 on the 12th; the fourth minimum ,, was 29in·710 on the 13th.
The fifth maximum ,, was 29in·958 on the 14th; the fifth minimum ,, was 29in·689 on the 16th.
The absolute maximum ,, was 30in·042 on the 17th; the sixth minimum ,, was 29in·446 on the 19th.
The seventh maximum ,, was 29in·647 on the 20th; the seventh minimum ,, was 29in·536 on the 20th.
The eighth maximum ,, was 29in·750 on the 22nd; the eighth minimum ,, was 29in·677 on the 24th.
The ninth maximum ,, was 29in·775 on the 27th; the absolute minimum ,, was 29in·320 on the 28th.
The tenth maximum ,, was 29in·735 on the 30th.
The range in the month was 0in·722.
The mean for the month was 29in·765, being 0in·029 *lower* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 87°·3 on the 8th; the lowest was 47°·9 on the 29th.
The range ,, was 39°·4.
The mean ,, of all the highest daily readings was 74°·7, being 1°·8 *higher* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 54°·4, being 1°·3 *higher* than the average of the preceding 32 years.
The mean daily range was 20°·3, being 0°·5 *greater* than the average of the preceding 32 years.
The mean for the month was 62°·7, being 1°·3 *higher* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
August 1	o : ssN,ssP,sp,g.-cur	o	ci, ci.-cu, cu, cu.-s : ci, ci.-cu, cu, t, oc.-h.-r	v,t,l,oc.-h.-r,ci,ci.-cu,cu : o, mt
2	w	wN : w	ci, ci.-cu	ci, cu, cu.-s : ci.-cu,ci.-s,cu.-s : o
3	w	o	ci, ci.-cu : ci, ci.-cu, cu	10 : 10 : o
4	o	o	10	ci,ci.-cu,cu,cu.-s : v : 10, r
5	o	o	10 : 10	ci, ci.-s, cu.-s : v, h.-r : v
6	o	o	ci, ci.-cu	ci, ci.-cu : ci, ci.-cu : o
7	o	o	10 : ci, ci.-cu, cu.-s	ci, ci.-cu, ci.-s, cu, cu.-s: o
8	o	o	o : o	ci, ci.-cu, cu : ci, ci.-cu, cu, cu.-s, s, l
9	o	w : o : wN	ci, cu, cu.-s	ci, ci.-cu, cu, cu.-s : o, ms
10	o	o	ci.-s, cu.-s	10, ci.-cu, ci.-s, cu.-s : 10, sl.-r
11	o	o	10, h.-r : 10, th.-r, glm	10 : v : li.-cl
12	o	o	ci, ci.-cu, h	ci, ci.-cu, cu : v : 10
13	o	o	ci, ci.-cu, cu, w	ci,ci.-cu,cu,cu.-s: ci, ci.-cu, cu : 10
14	o	wN : w	v : ci, ci.-cu, ci.-s, cu.-s	ci, ci.-cu, ci.-s : ci, ci.-s
15	o	o : o : w	v : 10, oc.-r	v : o
16	o	o	v : v : o	o : v, sl.-r : o
17	o	o	ci	6, ci, ci.-cu : 10
18	o	o : o : sN,sp	10 : 10, th.-r	10, r : 10, oc.-h.-shs
19	o	sN,sP,sp,g.-cur : o	10 : 10	ci.-s,cu.-s,fr.-th.-r: v : o, h
20	o	o	9, ci, ci.-cu	9, ci,ci.-cu,cu.-s : 10 : 10, oc.-th.-r
21	o	w : o : o	10, ci, cu, cu.-s	ci, ci.-s, cu, cu.-s : ci
22	o	o : w : o	ci, ci.-cu, cu, cu.-s : v, sl.-r	ci.-cu, cu, cu.-s : o
23	o	o : o : wN	o : o : v, sl.-r	9, ci.-s, cu.-s : v, r
24	w	m	10, h, v	vv : vv, t.-s : v, l
25	o	o : o : w	o : ci, ci.-cu, mt	ci, ci.-cu, cu, cu.-s : li.-cl, l
26	o	o	ci, ci.-cu, cu	ci, cu, cu.-s : ci, ci.-cu, cu, r : o
27	o	o	ci, ci.-cu, cu	ci.-cu, cu, cu.-s : ci.-cu
28	o	o	10 : ci, ci.-cu, cu, cu.-s, sl.-r	ci, cu, cu.-s, fr.-h.-shs, st.-w : o, l
29	o	o	o : v, sl.-r	vv, fr.-h.-shs : vv, fr.-h.-shs
30	o	o	ci, ci.-cu, ci.-s	ci, cu, cu.-s : cu.-s
31	o	o	10, mt, th.-r	10 : 10 : v

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was 66°·2 on the 15th; and the lowest was 44°·4 on the 9th.

The mean „ was 54°·4, being 0°·7 *higher* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot 424$, being $0^{in}\cdot 008$ *greater* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $4^{grs}\cdot 7$, being $0^{gr}\cdot 1$ *greater* than the average of the preceding 32 years.

Degree of Humidity.—The mean for the month was 75 (that of Saturation being represented by 100), being 1 *less* than the average of the preceding 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 527 grains, being 2 grains *less* than the average of the preceding 32 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·3.

WIND.

The proportions were of N. 1, S. 10, W. 17, E. 2, and Calm 1. The greatest pressure in the month was $19^{lbs}\cdot 6$ on the square foot on the 28th.

RAIN.

Fell on 14 days in the month, amounting to $3^{in}\cdot 18$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot 80$ *greater* than the average fall of the preceding 58 years.

MONTH and DAY, 1873.	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	..	29·587	67·6	54·5	59·7	57·9	90·9	48·0	65·6	64·0	1·8	5·2	0·0	+ 0·7	WSW	SW : WSW	3·4	0·0	0·6	361	0·35
2	Greatest Declination S.	29·658	69·2	53·1	58·8	51·0	123·7	45·8	64·6	62·0	7·8	17·6	2·2	+ 0·1	SW : WSW : W	W : WNW	3·9	0·0	0·4	354	0·00
3	..	29·825	66·0	46·1	53·4	49·1	96·0	37·4	63·6	63·0	4·3	13·7	1·3	− 5·0	W : WNW	N : NW	2·7	0·0	0·0	188	0·09
4	..	29·895	66·0	46·1	54·7	50·2	96·5	37·3	62·6	60·0	4·5	14·4	1·2	− 3·5	WSW : W	NNW : NNE	2·4	0·0	0·1	197	0·01
5	..	29·894	60·0	44·5	52·3	47·0	93·0	34·8	62·6	61·0	5·3	11·6	2·0	− 5·7	N	N	1·0	0·0	0·1	219	0·00
6	Perigee : Full.	29·775	61·0	45·2	51·1	44·6	125·3	43·7	61·6	60·0	6·5	14·6	0·0	− 6·8	N	NW : SW	1·0	0·0	0·1	201	0·00
7	..	29·605	61·6	45·0	53·0	48·5	95·0	45·0	60·6	59·0	4·5	12·2	0·0	− 4·8	WSW	SSW : S : NNE	0·7	0·0	0·0	168	0·63
8	In Equator	29·655	62·3	46·5	53·0	45·6	116·8	38·6	58·6	56·0	7·4	17·3	0·0	− 4·8	NNW : N	WNW : WSW	1·1	0·0	0·1	222	0·00
9	..	29·547	63·9	47·5	54·7	52·5	100·7	38·9	61·6	59·0	2·2	7·6	0·0	− 3·0	SW : WSW	SW : WSW	9·5	0·0	0·7	385	0·19
10	..	29·560	67·2	52·1	57·7	52·0	110·0	45·8	57·6	55·0	5·7	15·7	3·4	0·0	SSW	W : WSW	5·7	0·1	1·4	500	0·00
11	..	29·644	66·5	49·8	56·7	49·3	114·5	45·0	60·2	56·8	7·4	17·6	2·0	− 0·9	SW : WNW	W : WSW	4·0	0·0	0·7	386	0·23
12	..	29·749	65·5	48·5	55·8	49·9	112·0	40·8	59·9	58·3	5·9	12·9	0·0	− 1·7	WSW	WSW : SW	1·3	0·0	0·1	246	0·00
13	Last Qr.	29·620	61·8	41·3	52·4	51·7	77·1	37·0	59·8	57·7	0·7	9·7	0·0	− 4·9	SW : ENE	ESE : SW	1·8	0·0	0·1	160	0·05
14	Greatest Declination N.	29·402	64·3	50·2	55·3	49·4	116·0	44·7	59·4	58·0	5·9	10·6	1·5	− 1·9	SSW : S	SW	7·0	0·0	0·3	291	0·17
15	..	29·144	60·8	43·8	50·1	47·5	122·0	39·0	59·3	57·4	2·6	12·0	1·9	− 7·0	SSW : SW	SW : WNW	5·6	0·0	0·4	336	0·79
16	..	29·553	62·5	45·0	52·4	44·4	117·2	38·2	59·0	57·2	8·0	16·2	2·9	− 4·5	W : WNW	WNW : W : WSW	4·9	0·0	0·7	415	0·00
17	..	29·524	67·9	47·0	57·4	56·1	78·8	38·7	58·0	56·2	1·3	8·3	0·6	+ 0·7	WSW : SSW	W	7·4	0·0	0·5	407	0·01
18	..	29·753	64·7	47·2	54·2	45·1	124·1	42·7	58·0	56·6	9·1	17·6	4·0	− 2·3	W by S	W	3·5	0·0	0·6	403	0·00
19	..	29·973	63·7	48·1	55·3	48·3	97·5	43·0	58·1	56·0	7·0	15·3	3·2	− 0·9	W	WSW : SW	1·2	0·0	0·2	292	0·00
20	Apogee	29·944	69·7	52·5	60·0	54·9	105·0	49·8	57·4	55·6	5·1	12·1	1·0	+ 4·0	WSW	WSW	2·7	0·0	0·4	377	0·00
21	New	30·148	65·0	46·8	55·9	48·3	102·9	37·0	58·1	56·7	7·6	14·4	2·6	+ 0·1	WSW : NNE	N : NE : ENE	1·1	0·0	0·1	237	0·00
22	In Equator	30·347	62·3	38·2	49·8	42·0	119·0	27·9	58·3	56·4	7·8	16·3	0·0	− 5·7	ENE	ESE : SE	0·4	0·0	0·0	138	0·00
23	..	30·227	65·0	39·8	51·9	43·7	109·7	33·8	58·0	55·7	8·2	19·6	1·8	− 3·3	Calm : WSW	NNE : ENE	0·1	0·0	0·0	94	0·00
24	..	30·149	63·2	38·8	52·3	47·3	100·0	31·2	58·0	55·6	5·0	11·0	0·0	− 2·7	Calm : ENE	E : SE	1·3	0·0	0·1	155	0·00
25	..	30·061	69·8	47·6	58·3	49·4	119·7	40·0	58·0	56·2	8·9	19·3	0·0	+ 3·5	SE	SSE : ESE	0·6	0·0	0·0	131	0·00
26	..	29·991	72·0	44·5	55·9	49·7	123·5	37·5	58·1	55·3	6·2	17·5	0·8	+ 1·3	Calm	SSW : Calm	0·1	0·0	0·0	79	0·00
27	..	29·784	72·5	40·5	56·9	49·1	120·5	31·4	58·3	56·0	7·8	18·4	0·9	+ 2·5	Calm	S	0·3	0·0	0·0	100	0·00
28	..	29·842	67·2	47·7	56·5	49·9	95·5	40·0	58·6	56·5	6·6	10·8	1·3	+ 2·3	SW : WSW : W	NNE	0·7	0·0	0·1	174	0·00
29	First Quarter: Greatest Dec. S.	30·006	61·1	41·8	50·7	44·9	101·0	32·8	58·4	57·0	5·8	13·9	2·6	− 3·4	NE	ESE	0·3	0·0	0·0	176	0·00
30	..	29·899	65·3	43·7	53·9	49·7	107·9	35·0	58·1	56·8	4·2	11·5	1·3	− 0·1	E : SE	SSW : Calm	0·2	0·0	0·0	102	0·00
Means	..	29·792	65·2	46·1	54·7	49·0	107·1	39·4	59·7	57·7	5·8	13·8	1·3	− 1·9	...	...	..	..	..	Sum 7494	Sum 2·52

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·936 on the 4th ; the first minimum in the month was 29in·559 on the 1st.
The second maximum ,, was 29in·718 on the 8th ; the second minimum ,, was 29in·570 on the 7th.
The third maximum ,, was 29in·774 on the 12th ; the third minimum ,, was 29in·429 on the 9th.
The fourth maximum ,, was 29in·646 on the 16th ; the absolute minimum ,, was 29in·082 on the 15th.
The absolute maximum ,, was 30in·364 on the 22nd ; the fifth minimum ,, was 29in·490 on the 17th.
The sixth maximum ,, was 30in·035 on the 29th ; the sixth minimum ,, was 29in·736 on the 27th.
The range in the month was 1in·282.
The mean for the month was 29in·792, being 0in·015 *lower* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 72°·5 on the 27th; the lowest was 38°·2 on the 22nd.
The range ,, was 34°·3.
The mean ,, of all the highest daily readings was 65°·2, being 2°·5 *lower* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 46°·1, being 3°·1 *lower* than the average of the preceding 32 years.
The mean daily range was 19°·1, being 0°·6 *greater* than the average of the preceding 32 years.
The mean for the month was 54°·7, being 2°·6 *lower* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Sept. 1	o	o	10 : 10, th.-r	ci.-cu, cu.-s, oc.-r : 0
2	o	o	ci, ci.-cu, cu.-s	ci, cu, cu.-s, sl.-r : 10
3	o	o	ci, cu, cu.-s	10, r : 10, oc.-shs
4	o	o	10, mt	ci, ci.-s, cu.-s, h, mt, sl.-r : ci
5	o	o	ci, ci.-s, cu, cu.-s	10 : 10, oc.-th.-r
6	o	o	v : v	10, oc.-th.-r : 10
7	o	o	10 : 10	10 : 10, r : 10, r
8	o	o	ci, h	ci, cu, cu.-s : ci.-cu
9	o	o	ci.-cu, ci.-s, s	10, r : 10, r : v, ci
10	o	o	ci, ci.-cu, cu, cu.-s, w	ci, ci.-cu, w : 10
11	o	o	ci, ci.-cu, cu	ci, cu.-s, cu, s : 0
12	o	o : o : w	v : 10	ci, ci.-cu, cu, cu.-s : 0
13		o	v : 10, mt	10 : 10, oc.-r : 10
14	o	o	10, fr.-h.-shs : vv, fr.-shs	v, fr.-shs : v, fr.-shs
15	o :sN,sp,g.-cur	sN,sP,sp,g.-cur: o	10, fr.-h.-shs : v, ci.-s, cu.-s, fr.-shs	10, v, fr.-shs, t, l: fr.-r : ci.-s, cu.-s
16	o	o	v : 0	ci.-cu, cu : 0, sl.-f
17	o	o	v : 10, oc.-r	ci, ci.-cu, cu : v : 0
18	o	o : o : w	0 : ci.-cu, ci.-s, cu.-s	ci.-cu, cu.-s : v : 0
19	w	o : o : m	ci, ci.-s, mt	ci.-s,cu.-s,oc.-r: ci.-s,cu.-s,oc.-r: 10, oc.-th.-r
20	o	o : o : w	10 : 10	ci.-cu, cu, cu.-s : 0, h.-d
21	o	o : w	10, mt	ci, ci.-cu, ci.-s : v : li.-cl
22	m	o : w : m	f : 0	ci, cu.-s : 0, f
23	o	o : m	f : f : ci, mt	0 : 0, f
24	o	w : o	10, li.-cl	ci, ci.-cu, ci.-s, h : 10
25	m	o : o : w	10 : v : 0	0 : 0, th.-f, h.-d
26	m	o : w : m	0, th.-f	0 0 : 0, h.-d
27	o	o : w	f : 0	0 : 0, h.-d
28	w	m : o	0, f : 0	v : 10
29	m	w : w	ci.-cu, ci, cu.-s	ci.-cu, ci, cu.-s : ci, ci.-s, cu.-s: 0
30	w	o : o : m	cu.-s, mt	10, ci, ci.-cu, ci.-s, cu.-s : ci, ci.-s

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was $61^{\circ}\cdot5$ on the 1st; and the lowest was $38^{\circ}\cdot2$ on the 22nd.

The mean ,, was $49^{\circ}\cdot0$, being $2^{\circ}\cdot1$ *lower* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot348$, being $0^{in}\cdot032$ *less* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $4^{grs}\cdot0$, being $0^{gr}\cdot2$ *less* than the average of the preceding 32 years.

Degree of Humidity.—The mean for the month was 81 (that of Saturation being represented by 100), being 1 *greater* than the average of the preceding 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 536 grains, being 3 grains *greater* than the average of the preceding 32 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 5·6.

WIND.

The proportions were of N. 5, S. 7, W. 12, E. 5, and Calm 1. The greatest pressure in the month was $9^{lbs}\cdot5$ on the square foot on the 9th.

RAIN.

Fell on 10 days in the month, amounting to $2^{in}\cdot52$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot06$ *greater* than the average fall of the preceding 58 years.

MONTH and DAY, 1873.	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$^{\text{h}}$ 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.
Oct. 1	..	29·777	70·4	50·0	59·4	56·5	102·9	43·2	58·0	56·7	2·9	9·7	1·5	+ 5·5	SE	WSW	0·3	0·0	0·0	131	0·00
2	..	29·835	73·6	51·3	61·1	55·4	113·7	45·9	58·1	57·0	5·7	14·1	1·2	+ 7·3	WSW	SW : SSE	0·3	0·0	0·0	158	0·00
3	..	29·721	75·1	54·5	63·0	58·6	113·2	48·1	58·6	57·2	4·4	10·7	1·3	+ 9·3	S : SW	SSW : WSW	1·6	0·0	0·1	167	0·00
4	..	29·816	60·8	53·0	55·5	52·5	67·2	47·0	59·0	57·6	3·0	4·4	1·8	+ 1·8	WSW : NW	NNE	1·7	0·0	0·1	253	0·00
5	Perigee: In Equator.	29·926	61·3	46·3	51·2	49·0	78·0	41·7	59·0	57·6	2·2	12·2	0·0	− 2·1	NNE	W : WSW	0·2	0·0	0·0	150	0·01
6	Full	29·792	65·1	41·2	53·8	48·0	108·2	34·2	58·6	57·0	5·8	11·9	0·0	+ 0·9	WSW : SW	SSW	2·6	0·0	0·2	236	0·00
7	..	29·471	61·1	42·8	52·1	51·9	87·0	37·0	58·3	56·5	0·2	2·1	0·0	− 0·4	WSW : SSW	SW : NNW : NW	1·7	0·0	0·2	271	0·47
8	..	29·604	50·1	38·0	42·3	41·6	64·1	29·8	57·9	56·0	0·7	4·4	0·0	− 9·8	WSW : SW	NNW : WSW	0·1	0·0	0·0	130	0·02
9	..	29·664	58·8	32·8	46·1	41·1	105·0	26·4	56·6	54·3	5·0	14·6	0·8	− 5·7	WSW	SW : SSW	3·2	0·0	0·2	287	0·01
10	..	29·608	66·1	53·7	59·4	55·2	89·9	50·0	56·4	54·0	4·2	7·2	1·0	+ 7·8	SSW : WSW	WSW	4·0	0·1	0·8	483	0·01
11	..	29·643	64·1	56·9	59·4	53·6	93·6	53·3	56·6	54·8	5·8	9·1	1·7	+ 8·0	WSW	SW	16·2	0·3	2·0	580	0·00
12	Greatest Declination N.	29·531	59·7	49·1	49·9	48·7	61·1	48·8	57·1	55·4	1·2	1·5	0·0	− 1·3	Variable	SSW	2·7	0·0	0·2	201	1·06
13	Last Qr.	29·440	52·8	41·5	46·6	45·5	73·1	35·1	57·0	55·5	1·1	6·0	0·0	− 4·3	NNE : N	W : WNW	0·3	0·0	0·0	124	0·23
14	..	29·743	54·9	38·3	45·3	38·9	107·5	30·1	56·4	54·8	6·4	15·2	1·8	− 5·3	WSW	W : WSW	0·3	0·0	0·0	206	0·00
15	..	29·806	59·7	34·1	47·2	39·4	118·3	28·1	55·8	54·0	7·8	13·7	2·2	− 3·1	WSW : SSW	SW : SSW	0·5	0·0	0·0	149	0·00
16	..	29·895	58·7	39·7	48·6	43·6	110·0	31·3	55·0	53·3	5·0	11·8	1·3	− 1·4	SSW : WSW	SW : SSW	0·1	0·0	0·0	149	0·00
17	Apogee	29·946	60·9	38·7	48·7	43·9	98·5	34·1	54·8	52·8	4·8	13·7	0·9	− 1·1	SSW	SW : SSW	0·2	0·0	0·0	137	0·00
18	..	29·866	61·7	44·8	52·5	48·7	96·1	38·0	54·8	52·4	3·8	10·3	0·0	+ 2·9	SSW : SW	W	1·0	0·0	0·1	216	0·00
19	In Equator	30·012	53·7	47·3	49·9	48·6	61·8	44·6	54·4	52·2	1·3	3·2	0·0	+ 0·6	NNE	NE : SW	0·2	0·0	0·0	97	0·05
20	..	29·689	54·6	37·6	44·6	37·8	85·1	34·5	54·4	52·0	6·8	13·4	1·0	− 4·5	SW : N	NNW : WNW	7·8	0·0	0·8	468	0·06
21	New	29·537	52·4	35·7	44·3	41·0	80·5	30·0	53·9	51·0	3·3	9·7	1·8	− 4·6	W : WSW	WSW	6·9	0·0	0·7	470	0·17
22	..	29·095	58·5	46·5	52·2	44·4	81·4	42·8	52·9	50·4	7·8	13·3	3·4	+ 3·5	WSW	W : WSW	13·5	0·1	1·7	662	0·06
23	..	28·836	51·3	38·3	42·9	41·4	61·0	35·0	52·6	50·2	1·5	4·0	0·0	− 5·6	WSW : SW	WSW	3·8	0·0	0·3	355	0·37
24	..	29·135	45·6	34·9	40·4	37·9	53·5	27·9	52·3	49·8	2·5	5·3	0·0	− 7·8	WSW : E	NE	0·7	0·0	0·0	114	0·01
25	..	29·398	48·2	31·2	39·5	38·8	66·7	26·8	51·1	48·2	0·7	7·1	0·0	− 8·4	NE	NNE : ENE	0·7	0·0	0·0	111	0·00
26	Greatest Declination S.	29·773	51·6	37·2	42·6	38·1	103·3	33·8	51·1	48·4	4·5	9·2	1·4	− 5·0	NNE	N by E	1·3	0·0	0·1	250	0·00
27	..	30·208	49·5	32·0	39·7	35·0	91·4	27·4	50·8	48·2	4·7	12·6	2·4	− 7·6	NNE	NNE	1·5	0·0	0·1	217	0·00
28	..	30·284	44·0	27·7	34·6	32·1	64·7	22·1	50·0	46·5	2·5	7·7	0·0	−12·4	WSW : NNE	S : SE	0·0	0·0	0·0	83	0·00
29	First Qr.	30·054	49·5	26·7	35·1	34·2	52·9	20·0	49·0	46·0	0·9	11·1	0·0	−11·7	SW	NE : SE	0·0	0·0	0·0	80	0·00
30	..	29·743	39·0	27·0	31·8	30·0	55·0	22·0	48·6	45·0	1·8	5·1	0·0	−14·8	NW : W	SW	0·0	0·0	0·0	94	0·00
31	..	29·392	54·6	28·9	43·5	38·2	105·2	22·9	47·6	44·0	5·3	11·2	0·0	− 3·0	SW	SSW	3·2	0·0	0·3	314	0·02
Means	..	29·685	57·0	40·6	47·8	44·2	85·5	35·2	54·7	52·5	3·7	9·2	0·8	− 2·3	...	...	..	..	..	Sum. 7343	Sum 2·55

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29$^{\text{in}}$·871 on the 2nd; the first minimum in the month was 29$^{\text{in}}$·747 on the 1st.
The second maximum ,, was 29$^{\text{in}}$·954 on the 5th; the second minimum ,, was 29$^{\text{in}}$·690 on the 3rd.
The third maximum ,, was 29$^{\text{in}}$·735 on the 9th; the third minimum ,, was 29$^{\text{in}}$·398 on the 7th.
The fourth maximum ,, was 29$^{\text{in}}$·661 on the 11th; the fourth minimum ,, was 29$^{\text{in}}$·577 on the 10th.
The fifth maximum ,, was 29$^{\text{in}}$·980 on the 17th; the fifth minimum ,, was 29$^{\text{in}}$·419 on the 13th.
The sixth maximum ,, was 30$^{\text{in}}$·058 on the 19th; the sixth minimum ,, was 29$^{\text{in}}$·848 on the 18th.
The seventh maximum ,, was 29$^{\text{in}}$·787 on the 20th; the seventh minimum ,, was 29$^{\text{in}}$·651 on the 20th.
The absolute maximum ,, was 30$^{\text{in}}$·343 on the 28th; the absolute minimum ,, was 28$^{\text{in}}$·779 on the 23rd.
The range in the month was 1$^{\text{in}}$·564. The mean for the month was 29$^{\text{in}}$·685, being 0$^{\text{in}}$·014 *lower* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 75°·1 on the 3rd; the lowest was 26°·7 on the 29th. The range in the month was 48°·4.
The mean ,, of all the highest daily readings was 57°·0, being 1°·5 *lower* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 40°·6, being 3°·1 *lower* than the average of the preceding 32 years.
The mean daily range was 16°·4, being 1°·6 *greater* than the average of the preceding 32 years.
The mean for the month was 47°·8, being 2°·4 *lower* than the average of the preceding 32 years.

October 12. Mean daily value 49°·9 has been deduced from the eye observations taken at 9$^{\text{h}}$. a.m., noon, and 9$^{\text{h}}$. p.m., combined with the corrected mean of the maximum and minimum temperatures for the day. The day, however, was abnormal in character; during the early morning hours the temperature declined from 58°·7 to 49°·2 by 9$^{\text{h}}$. am.; increased to 51°·4 at noon, and to 59°·7 between the hours of 2 and 3, then declined to 49°·8 by 9$^{\text{h}}$. p.m. The mean of 24 hourly values deduced from the Photographic Register is 52°·9.

MONTH and DAY, 1873.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Oct. 1	w	o : o : m	v : 10, f	10, th.-cl, h, f : 10, mt, v : v, h, mt, f
2	s, sp, g.-cur	w : m	f : ci, ci.-cu, mt	9, ci, ci.-cu, ci.-s, h : 10
3	o : w	o : w	10 : 10, sl.-r	10 : v, ci, ci.-s
4	o	o	v : 10, f	10 : 10, oc.-th.-r : 10
5	o	o : w	10, r : 10, f, h	10 : v : ci, sl.-f
6	w : o	o : w	ci, ci.-cu, mt	ci, ci.-cu : v : ci.-s, cu.-s
7	o : sN, sP	mN : o	v : 10, h.-r	10, h.-r, gt.-glm : v
8	o	o	v : 10, oc.-th.-r	10, r : v : o, f, h.-d
9	o	o	h.-fr : ci, ci.-cu, cu.-s	ci, ci.-s, cu.-s : 10, oc.-th.-r : 10, r
10	o	w : o	10 : 10	10 : 10 : 10
11	o	o	10, w	10, w : v, sl.-r, w : 10, w
12	o	o	10, h.-r : 10, c.-r	10, c.-r : 10, r
13	o	o	10, th.-r, f	10, oc.-r, f
14	o	o	1, li.-cl, sl.-f	ci, ci.-cu, cu, sl.-f : o, f
15	w	o : m	o, h.-fr, f	ci.-cu, cu, th.-r : ci, ci.-cu, cu.-s
16	m	o : w	f : o, th.-f	2, ci : o, d
17	o	w : m	ci.-cu, ci.-s, th.-f	ci, ci.-cu, ci.-s : o
18	w	m : o	ci, ci.-cu, cu.-s, mt	10 : 10, f
19	o	o	10 : 10 : 10, f, th.-r	10, f : 10
20	o	o	10 : 10, r : v, r	ci.-cu, cu.-s : o
21	o	o	v : 10, sl.-r	10, r : 10, r : 10
22	o	o	10 : 10, st.-w, v	v, w : oc.-shs : 10
23	o	o	10 : 10, h.-r, glm	ci, ci.-cu, oc.-r : o, l
24	o	o	v : 10, f	10, oc.-r : 10 : o, f
25	o	o	f : ci, ci.-s, cu.-s, f	10 : 10, sl.-r : 10
26	o	o	v : ci, mt, d	ci, ci.-cu, v : o, d
27	o	o : o : s	o, fr : ci, ci.-cu, cu	ci, ci.-cu, cu, cu.-s : o, sl.-f
28	w	o : w	o, f, h.-fr	o, f : o, f : o, f, h.-fr
29	o	o	o, th.-f, h.-fr	ci, ci.-cu : ci, ci.-cu
30	o : w	o : s	ci.-cu, ci.-s, f : 10, f	9, f : v, f
31	o	o : o : w	ci, ci.-cu, cu.-s : th.-r	10 : 9, sl.-r : 10

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was $62^{\circ}\cdot7$ on the 3rd; and the lowest was $26^{\circ}\cdot7$ on the 29th.

The mean „ was $44^{\circ}\cdot2$, being $1^{\circ}\cdot9$ *lower* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{\text{in}}\cdot290$ being $0^{\text{in}}\cdot024$ *less* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $3^{\text{grs}}\cdot3$, being $0^{\text{gr}}\cdot3$ *less* than the average of the preceding 32 years.

Degree of Humidity.—The mean for the month was 88 (that of Saturation being represented by 100), being 1 *greater* than the average of the preceding 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 542 grains, being 3 grains *greater* than the average of the preceding 32 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 6·9.

WIND.

The proportions were of N. 5, S. 10, W. 12, E. 4, and Calm 0. The greatest pressure in the month was $16^{\text{lbs}}\cdot2$ on the square foot on the 11th.

RAIN.

Fell on 14 days in the month, amounting to $2^{\text{in}}\cdot55$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{\text{in}}\cdot24$ *less* than the average fall of the preceding 58 years.

MONTH and DAY, 1873.	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.
Nov. 1	..	29·047	53·9	39·9	45·0	40·4	82·1	35·0	47·6	43·8	4·6	9·0	1·7	− 1·4	SSW : WSW	WSW : SW	2·7	0·0	0·8	434	0·30
2	In Equator: Perigee.	29·152	52·1	37·1	45·1	41·1	92·6	30·9	47·8	44·0	4·0	9·0	0·0	− 1·2	SSW : S	S : S by E	2·8	0·0	0·2	239	0·72
3	..	29·314	55·2	34·1	44·2	40·0	102·0	31·1	47·6	43·8	4·2	10·8	0·0	− 1·9	S by E	SSW	1·0	0·0	0·0	193	0·17
4	Full	29·394	52·2	28·7	41·3	37·4	66·1	25·4	47·6	43·8	3·9	7·6	0·0	− 4·6	SSW : S by E	S : SE	1·3	0·0	0·0	109	0·01
5	..	29·258	52·5	42·0	47·4	45·6	60·7	36·5	47·0	42·7	1·8	5·2	0·0	+ 1·7	ESE : SSE	SSE	1·5	0·0	0·0	138	0·09
6	..	29·177	50·6	42·8	46·4	45·0	60·2	38·7	47·0	42·6	1·4	3·4	0·0	+ 0·9	SE : SW	SW	3·1	0·0	0·3	263	0·36
7	..	29·472	54·8	39·5	45·3	42·6	65·0	32·4	46·8	42·4	2·7	13·4	0·0	0·0	SSW	Variable	0·1	0·0	0·0	100	0·11
8	Greatest Declination N.	29·780	50·2	39·8	44·4	43·5	59·9	33·0	46·6	42·2	0·9	4·2	0·0	− 0·6	NE	NNE : ENE	0·4	0·0	0·0	177	0·00
9	..	29·850	47·4	39·9	44·2	40·0	53·0	37·6	46·6	42·0	4·2	6·5	1·8	− 0·5	E	E by N : E	14·5	0·1	2·3	592	0·19
10	..	30·008	47·9	40·9	44·4	43·1	51·0	38·0	46·6	42·0	1·3	2·3	0·0	0·0	E : ESE	E	2·8	0·0	0·2	296	0·01
11	..	30·063	48·3	37·0	41·6	37·4	92·2	31·7	46·3	43·5	4·2	8·0	1·4	− 2·5	E	ENE	1·4	0·0	0·1	250	0·00
12	Last Qr.	29·869	46·6	31·5	38·2	34·1	93·7	22·5	46·1	43·5	4·1	9·9	0·0	− 5·6	ENE : E	E : ENE	1·7	0·0	0·1	192	0·00
13	..	29·706	44·5	25·8	35·3	34·2	65·4	19·0	45·4	43·5	1·1	4·8	0·0	− 8·2	ENE	E : ENE	0·1	0·0	0·0	112	0·00
14	Apogee	29·836	47·7	34·4	41·2	38·9	66·9	27·0	45·1	43·0	2·3	6·1	0·0	− 2·0	ENE	ENE	1·8	0·0	0·2	282	0·00
15	..	30·173	46·5	37·5	41·0	34·0	82·5	32·9	44·9	43·6	7·0	10·5	3·2	− 1·9	E	E : ESE	4·2	0·0	0·4	328	0·00
16	In Equator	30·282	45·0	38·8	41·9	38·6	51·7	37·0	44·6	42·2	3·3	5·5	0·9	− 0·7	NNE	NNE	0·3	0·0	0·0	200	0·00
17	..	30·260	46·0	40·6	42·7	39·1	60·8	39·6	44·4	41·5	3·6	4·6	1·4	+ 0·4	NNE	NNE : NE	0·4	0·0	0·0	185	0·00
18	..	30·167	45·1	41·3	42·7	40·0	51·9	39·4	44·4	41·5	2·7	4·6	0·9	+ 0·7	NNE : ENE	NE : ENE	0·3	0·0	0·0	149	0·00
19	..	30·007	47·7	40·2	43·3	41·5	66·4	32·6	44·4	41·3	1·8	4·0	0·0	+ 1·5	ENE	E by N : SE	0·3	0·0	0·0	163	0·01
20	New	29·972	47·4	36·0	41·0	35·1	90·7	30·9	44·6	41·8	5·9	10·3	2·6	− 0·6	SE : ESE	ESE	0·3	0·0	0·0	111	0·00
21	..	29·689	47·0	35·7	41·2	35·8	69·0	28·5	44·4	41·0	5·4	9·9	2·6	− 0·2	ESE : SW	WSW	5·2	0·0	0·5	306	0·13
22	..	29·351	53·4	47·0	50·3	40·3	57·9	43·7	44·4	40·8	10·0	12·6	4·6	+ 9·1	WSW : W : NW	NW : W	9·9	0·1	1·9	619	0·04
23	Greatest Declination S.	29·530	57·0	43·5	50·7	41·6	74·0	36·2	44·8	42·6	9·1	12·6	6·7	+ 9·6	WSW : WNW	NW : WSW	10·3	0·0	0·8	523	0·00
24	..	29·761	53·1	42·3	47·2	44·1	70·0	36·7	45·2	43·2	3·1	6·8	0·0	+ 6·2	WSW	WSW : W	0·7	0·0	0·1	259	0·00
25	..	29·997	51·3	35·6	43·7	42·2	70·5	30·0	45·2	43·5	1·5	7·2	0·0	+ 2·8	WSW	SSW : WSW	0·0	0·0	0·0	96	0·00
26	..	29·537	54·8	48·2	51·0	49·3	56·1	44·9	45·4	43·5	1·7	2·8	0·0	+10·1	SSW	SSW : SW	20·2	0·0	0·9	426	0·22
27	First Qr.	29·372	50·5	43·4	46·7	38·8	79·1	38·1	45·9	44·0	7·9	10·7	4·8	+ 5·6	WSW	W : WNW	30·0	0·1	2·2	628	0·06
28	..	29·783	52·2	41·3	45·9	42·1	67·9	31·4	46·0	44·2	3·8	5·5	1·7	+ 4·6	NW : WNW : W	WSW : W	8·2	0·0	0·5	376	0·00
29	In Equator	29·534	55·0	45·6	50·5	45·4	61·7	40·1	46·2	44·3	5·1	7·4	2·7	+ 8·9	WSW	WSW : W	14·0	0·1	2·1	663	0·16
30	Perigee	29·905	47·0	33·4	41·3	36·3	65·5	29·3	46·6	44·8	5·0	9·0	2·3	− 0·6	W : WNW	NW : NNW	5·6	0·0	1·2	463	0·00
Means	..	29·708	50·1	38·8	44·2	40·3	69·6	33·7	45·8	42·9	3·9	7·5	1·3	+ 1·0	...	...	..	..	..	Sum 8872	Sum 2·58

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The absolute minimum in the month was 29in·004 on the 1st.

The first maximum in the month was 29in·416 on the 4th; the second minimum ,, was 29in·075 on the 6th.
The second maximum ,, was 30in·103 on the 11th; the third minimum ,, was 29in·683 on the 13th.
The absolute maximum ,, was 30in·299 on the 17th; the fourth minimum ,, was 29in·214 on the 22nd.
The fourth maximum ,, was 29in·531 on the 22nd; the fifth minimum ,, was 29in·434 on the 23rd.
The fifth maximum ,, was 30in·013 on the 25th; the sixth minimum ,, was 29in·289 on the 27th.
The sixth maximum ,, was 29in·818 on the 28th; the seventh minimum ,, was 29in·386 on the 29th.
The range in the month was 1in·295.
The mean for the month was 29in·708, being 0in·047 *lower* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 57°·0 on the 23rd; the lowest was 25°·8 on the 13th.
The range ,, was 31°·2.
The mean ,, of all the highest daily readings was 50°·1, being 1°·2 *higher* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 38°·8, being 1°·6 *higher* than the average of the preceding 32 years.
The mean daily range was 11°·3, being 0°·4 *less* than the average of the preceding 32 years.
The mean for the month was 44°·2, being 0°·6 *higher* than the average of the preceding 32 years.

ERRATUM.—On page (xlix), which was printed before this page, in foot-notes relating to WIND, greatest pressure in the month, *for* 20lbs·2 on the square foot on the 26th, *read* 30lbs·0 on the 27th.

MONTH and DAY, 1873.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Nov. 1	o	ssP,ssN,sp,g.-cur : w	10, h.-r : 10, r, ci, ci.-cu, cu, cu.-s	ci, ci.-cu, oc.-r : o
2	w	o : wN	v, sl.-r : ci, ci.-cu, ci.-s, cu.-s	10, h.-r : 10, c.-h.-r
3	w	m : m	v : o	ci, ci.-cu, cu, cu.-s : o
4	w	o	h.-fr, th.-f, v	10, ci.-cu, cu.-s : ci.-cu, cu.-s
5	o	o	10, ci, cu, cu.-s, sl.-r	10, r : v : ci,ci.-s,lu.-ha
6	o	o	10, r : 10, r : 10, r	10, oc.-r : v : ci, f
7	o	o	ci, ci.-cu, ci.-s : oc.-th.-r	10, oc.-th.-r : v, oc.-th.-r
8	o	o	li.-cl, h, f	v : ci, ci.-cu
9	o	o	ci, ci.-cu, cu, cu.-s, w	10, r, st.-w : 10
10	o	o	10 : 10, th.-r	10, th.-r : 10, th.-r
11	o	o : o : w	10 : 10 : v	ci, ci.-cu : o
12	o	w : w	ci.-cu, cu.-s	ci.-cu, ci.-s : o : o, h.-d
13	o	o	ci.-cu, ci.-s, th.-f	v, ci.-s : ci : o
14	o	o	v, mt, d : li.-cl : ci, ci.-cu, s	v : 10 : 10
15	o	o	ci, ci.-cu	ci, ci.-cu : v : 10
16	o	o	10, mt, oc.-th.-r	10 : 10
17	o	o	10, sl.-f	10, oc.-th.-r : 10
18	o	o	10 : 10	10 : 10
19	o	o	10, sl.-f	10, mt : v : ci, ci.-cu
20	o	o : o : w	ci, ci.-cu	v : v : ci.-cu, cu.-s
21	o	o	ci, f : v	10 : 10, r : 10
22	o	o	10 : 10	ci, ci.-cu, ci.-s, cu.-s : v
23	o	o	ci.-cu, cu, w	ci, ci.-cu : v : 10
24	o	o	10, li.-cl, mt	v : ci
25	o	o	v : th.-f	ci, ci.-s, cu.-s : 10 : 10
26	o	o	10, sl.-r, sc	10, sc : 10, r : 10, w
27	o	o	ci, ci.-cu, w	ci, ci.-cu, ci.-s : v
28	o	o	ci, ci.-cu, ci.-s	10 : v : o
29	•		10, th.-r, w : 10, w	10, oc.-th.-r, w : ci.-cu, cu, cu.-s
30			ci.-cu, sl.-f	v : o

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was 51°·3 on the 26th; and the lowest was 25°·8 on the 13th.

The mean „ was 40°·3, being 0°·8 *higher* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot250$, being $0^{in}\cdot003$ *greater* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot9$, being $0^{gr}\cdot1$ *greater* than the average of the preceding 32 years.

Degree of Humidity.—The mean for the month was 86 (that of Saturation being represented by 100), being 2 *less* than the average of the preceding 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 546 grains, being 2 grains *less* than the average of the preceding 32 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 7·4.

WIND.

The proportions were of N. 5, S. 7, W. 8, E. 10, and Calm 0. The greatest pressure in the month was $20^{lbs}\cdot2$ on the square foot on the 26th.

RAIN.

Fell on 15 days in the month, amounting to $2^{in}\cdot58$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot26$ *greater* than the average fall of the preceding 58 years.

ELECTRICITY.

On November 29 and 30 the insulating lamp was not in action.

MONTH and DAY, 1873.	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.
Dec. 1	..	30·324	50·4	32·2	43·2	39·5	71·5	24·1	46·4	44·0	3·7	6·9	3·0	+ 1·1	WSW : SSW	WSW	1·0	0·0	0·1	268	0·00
2	..	30·366	52·1	45·2	48·9	47·1	61·0	36·1	45·8	43·8	1·8	4·2	0·0	+ 6·7	WSW	WSW	0·3	0·0	0·0	193	0·00
3	..	30·426	50·4	43·5	46·9	42·7	58·0	40·2	46·0	44·0	4·2	5·9	1·7	+ 4·6	WSW	W	0·7	0·0	0·0	179	0·00
4	Full	30·417	43·5	39·4	40·2	37·8	46·3	37·9	46·2	44·2	2·4	2·8	1·1	− 2·0	N : WSW	SW	0·2	0·0	0·0	147	0·00
5	..	30·242	45·4	38·9	42·4	40·3	49·3	36·7	45·8	44·0	2·1	4·4	1·4	+ 0·2	WSW	WSW	0·7	0·0	0·1	255	0·00
6	Greatest Declination N.	30·304	45·4	34·5	40·1	36·5	48·0	24·5	45·6	44·0	3·6	6·4	0·8	− 2·0	WSW : N by E	NE	1·5	0·0	0·1	210	0·00
7	..	30·385	46·5	34·7	42·1	37·3	55·0	25·1	45·4	43·8	4·8	5·9	3·6	+ 0·1	SE : SW : S	SW	0·2	0·0	0·0	174	0·00
8	..	30·429	49·9	30·2	40·4	36·4	75·3	24·1	45·4	43·8	4·0	10·3	0·0	− 1·3	SW : SSW	SSW	0·1	0·0	0·0	184	0·00
9	..	30·395	36·0	24·8	29·7	26·7	51·7	15·3	45·0	43·2	3·0	9·5	0·0	−11·6	SSW	W : S	0·0	0·0	0·0	44	0·00
10	..	30·392	28·7	22·1	24·6	24·3	29·2	14·2	44·3	42·4	0·3	3·0	0·0	−16·4	WSW	Calm	0·0	0·0	0·0	72	0·00
11	Last Qr.	30·447	31·0	22·3	28·3	28·3	35·3	13·9	43·6	41·2	0·0	0·0	0·0	−12·4	Calm : WSW	SW : WSW	0·0	0·0	0·0	93	0·00
12	Apogee	30·462	38·7	30·4	34·6	31·8	43·2	27·9	43·1	41·0	2·8	5·0	0·0	− 6·0	WSW : SSW	NNE	0·0	0·0	0·0	66	0·00
13	In Equator	30·438	37·7	33·6	35·3	32·7	37·7	30·9	42·8	40·4	2·6	4·0	1·3	− 5·2	NNE : SSE	WSW	0·0	0·0	0·0	93	0·00
14	..	30·264	38·2	33·1	34·7	32·3	41·7	31·8	42·6	39·8	2·4	5·8	0·0	− 5·7	WSW : W	WSW	0·1	0·0	0·0	118	0·00
15	..	29·996	48·2	33·3	41·3	39·6	55·4	31·6	42·2	39·0	1·7	6·8	0·0	+ 1·1	SSW	SSW	3·0	0·0	0·3	350	0·03
16	..	29·757	56·3	42·5	50·8	46·2	56·3	34·9	42·2	39·0	4·6	7·7	1·9	+10·8	SW : WSW	WSW : WNW : W	12·2	0·1	1·9	605	0·00
17	..	30·005	56·0	42·3	49·8	48·0	83·9	32·8	43·6	40·0	1·8	5·9	0·0	+10·0	WSW : W	W by S	2·3	0·0	0·2	352	0·00
18	..	30·030	53·5	47·1	50·2	46·0	87·5	39·2	43·6	40·3	4·2	6·0	2·1	+10·6	W : WSW	WSW	2·7	0·0	0·3	326	0·00
19	New	29·810	50·0	45·2	47·5	44·6	55·0	43·8	43·9	40·6	2·9	4·8	0·0	+ 8·1	WSW : SW	SW	1·0	0·0	0·1	258	0·03
20	Greatest Declination S.	29·795	48·1	39·2	43·4	39·7	79·1	29·0	44·1	41·5	3·7	7·4	0·0	+ 4·3	WSW : N	WSW	2·1	0·0	0·2	297	0·00
21	..	29·947	51·7	42·5	47·4	42·4	71·5	35·7	44·1	42·0	5·0	7·4	2·7	+ 8·6	SW	WSW	6·0	0·0	0·8	427	0·00
22	..	29·903	50·7	36·0	44·0	40·1	55·0	28·9	44·0	42·0	3·9	7·4	3·0	+ 5·5	WSW	WSW : W	4·4	0·0	0·8	416	0·02
23	..	29·958	46·9	35·5	42·6	39·7	73·0	27·9	44·1	42·3	2·9	5·7	1·9	+ 4·5	W	WSW	4·4	0·0	0·5	411	0·00
24	Perigee	30·101	50·9	35·0	42·7	39·2	67·1	26·5	44·0	42·0	3·5	7·1	0·0	+ 4·9	W : N	NE : E : SE	4·0	0·0	0·5	294	0·00
25	..	30·140	45·5	36·4	41·6	39·2	50·8	27·2	44·1	42·4	2·4	4·8	0·0	+ 4·0	SSE : SSW	WSW : SW	0·2	0·0	0·0	132	0·00
26	First Quarter : In Equator.	29·885	46·7	43·0	44·3	38·9	47·9	39·2	44·0	42·2	5·4	7·0	1·8	+ 6·9	SW	SSW : SW	1·4	0·0	0·1	240	0·00
27	..	29·662	47·2	33·0	37·9	34·7	54·8	25·3	44·1	42·4	3·2	6·0	1·2	+ 0·6	WSW : N	NNW : NW	3·7	0·0	0·6	365	0·15
28	..	30·025	33·0	24·1	28·8	28·8	33·2	16·9	43·8	41·7	0·0	0·4	0·0	− 8·4	NNW : W	WSW : SSW	0·7	0·0	0·0	134	0·00
29	..	29·880	39·5	22·1	32·4	29·4	83·2	14·8	43·2	41·2	3·0	7·3	0·0	− 4·9	SE : S	SSE	1·1	0·0	0·1	178	0·00
30	..	29·640	45·5	31·0	37·9	34·3	72·9	23·1	42·4	40·2	3·6	6·1	1·3	+ 0·5	SSE	SSW	3·7	0·0	0·7	391	0·04
31	..	29·494	50·7	36·7	44·5	41·1	76·0	33·1	42·6	40·0	3·4	7·4	0·0	+ 7·0	SW	WSW	5·8	0·0	0·6	383	0·04
Means	..	30·107	45·6	35·2	40·6	37·6	58·3	28·8	44·1	41·9	3·0	5·8	0·9	+ 0·8	...	...	..	..	..	Sum 7655	Sum 0·31

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·463 on the 4th ; the first minimum in the month was 30in·188 on the 5th.
The absolute maximum ,, was 30in·477 on the 12th ; the second minimum ,, was 29in·687 on the 16th.
The third maximum ,, was 30in·043 on the 18th ; the third minimum ,, was 29in·717 on the 19th.
The fourth maximum ,, was 29in·984 on the 21st ; the fourth minimum ,, was 29in·877 on the 22nd.
The fifth maximum ,, was 30in·024 on the 23rd ; the fifth minimum ,, was 29in·877 on the 23rd.
The sixth maximum ,, was 30in·196 on the 24th ; the sixth minimum ,, was 29in·623 on the 27th.
The seventh maximum ,, was 30in·041 on the 28th ; the absolute minimum ,, was 29in·407 on the 31st.
The range in the month was 1in·070.
The mean for the month was 30in·107, being 0in·310 *higher* than the average of the preceding 32 years.

TEMPERATURE OF THE AIR.

The highest in the month was 56°·3 on the 16th ; the lowest was 22°·1 on the 10th and 29th.
The range ,, was 34°·2.
The mean ,, of all the highest daily readings was 45°·6, being 0°·6 *higher* than the average of the preceding 32 years.
The mean ,, of all the lowest daily readings was 35°·2, being 0°·4 *lower* than the average of the preceding 32 years.
The mean daily range was 10°·4, being 1°·0 *greater* than the average of the preceding 32 years.
The mean for the month was 40°·6, being 0°·3 *higher* than the average of the preceding 32 years.

MONTH and DAY, 1873.	ELECTRICITY. A.M.	ELECTRICITY. P.M.	CLOUDS AND WEATHER. A.M.	CLOUDS AND WEATHER. P.M.
Dec. 1			ci, ci.-cu	10 : 10 : v
2			v : 10, sl.-f, oc.-th.-r	ci.-s, cu.-s, h, f : 10
3	o	o	10 : 10	10 : 10 : 10
4	o	o	10 : 10	10 : 10 : 10
5	o	o	10 : 10, f	10, sl.-f : 10, mt
6	o	o	v	v : v : o, lu.-co, h, mt
7	o	o	ci, ci.-s, cu.-s	10, h : 10
8	o	o	10 : ci, ci.-cu, cu	v : o : o, sl.-f
9	w	o : m	o, f, h.-fr	th.-f : th.-f
10	o	w : o	th.-f : th.-f	th.-f : th.-f
11			ci.-cu, th.-f	th.-f : th.-f
12	o	o : w	10, f	li.-cl, h, f, ci.-s, cu.-s : 10
13	o	o	10, f	10, f : 10, f
14			10, sl.-f, h	10 : 10, sl.-r
15	o	o	10, th.-r	10 : 10, r
16			10, w	10, sc : v : o
17	o	o	ci, ci.-s	ci, ci.-s, cu.-s : 10
18	o	o	ci, ci.-cu	10 : 10
19	o	o	10 : 10	10 : 10 : 10, r
20	o	o	v : ci, ci.-s	ci : o
21	o	o	ci, ci.-s, cu.-s	v : v : 10
22	o	o	v, ci, ci.-s	10, oc.-r : o
23	o	o	10, sl.-f	ci, ci.-s, mt : 10, th.-r
24	o	o	10 : v	ci : ci.-s
25	o	o	li.-cl, h, f	10 : 10
26	o	o	10 : 10	10 : v, r, ci.-s, cu.-s
27	o	o	v : v, h.-r	ci, ci.-cu : o
28	o	o	v : 10, th.-f	10, f : th.-f
29	o	o	f : f : h.-fr,ci,ci.-s,cu,cu.-s	o : o
30	o	o : w	li.-cl, h.-fr	li.-cl : v : 10, r
31	w	o	v, r : o	ci, ci.-cu : o, d

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The highest in the month was 50°·9 on the 16th; and the lowest was 22°·1 on the 10th.

The mean ,, was 37°·6, being 0°·6 *higher* than the average of the preceding 32 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot225$, being $0^{in}\cdot003$ *greater* than the average of the preceding 32 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}\cdot6$, being *the same as* the average of the preceding 32 years.

Degree of Humidity.—The mean for the month was 90 (that of Saturation being represented by 100), being 2 *greater* than the average of the preceding 32 years.

Weight of a Cubic Foot of Air.—The mean for the month was 558 grains, being 6 grains *greater* than the average of the preceding 32 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. 9, W. 17, E. 2, and Calm 1. The greatest pressure in the month was $12^{lbs}\cdot2$ on the square foot on the 16th.

RAIN.

Fell on 6 days in the month, amounting to $0^{in}\cdot31$, as measured in the simple cylinder gauge partly sunk below the ground; being $1^{in}\cdot69$ *less* than the average fall of the preceding 58 years.

ELECTRICITY.

On December 1, 2, 11, 14, and 16, the insulating lamp was not burning.

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 great 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, 1873.		Reading.	Approximate Mean Solar Time, 1873.		Reading.	Approximate Mean Solar Time, 1873.		Reading.	Approximate Mean Solar Time, 1873.		Reading.
	d h m	in.		d h m	in.		d h m	in.		d h m	in.
January	1. 3. 30	29·660	January	2. 0. 45	29·279	March	29. 12. 0	29·862	March	31. 4. 30	29·531
	2. 14. 45	29·693		3. 2. 45	29·490	April	2. 9. 0	30·097	April	6. 4. 0	29·365
	3. 18. 0	29·754		4. 15. 20	29·476		9. 11. 0	30·158		17. 0. 0	29·346
	6. 22. 45	29·997		8. 19. 0	29·444		20. 10. 30	30·052		23. 4. 0	29·726
	13. 22. 30	30·055		15. 2. 40	29·847		25. 20. 0	30·108		27. 0. 0	29·774
	15. 21. 0	29·923		16. 17. 0	29·791		27. 19. 40	29·990		28. 16. 30	29·826
	17. 0. 0	29·860		19. 10. 30	28·282		29. 10. 30	30·056	May	3. 4. 0	29·457
	21. 9. 15	28·995		21. 23. 30	28·580	May	4. 1. 0:	29·583		5. 12. 15	29·182
	22. 22. 30	29·406		23. 16. 30	29·152		6. 11. 15	29·469		7. 9. 0	29·265
	24. 23. 30	29·855		25. 19. 0	29·750		13. 12. 0	30·061		17. 18. 0	29·417
	26. 23. 0	29·971		28. 4. 0	29·856		19. 21. 0	30·153		23. 1. 0	29·532
	28. 22. 30	29·940		30. 3. 0	29·795		24. 20. 30	30·120		27. 1. 0	29·638
	31. 8. 30	29·962	February	2. 10. 0	29·156		28. 19. 30	30·255	June	0. 18. 0	29·650
February	4. 16. 0	29·982		6. 3. 0	29·881	June	1. 20. 0	29·910		4. 17. 30	29·628
	10. 22. 45	30·238		11. 16. 15	29·815		7. 8. 45	30·100		12. 6. 0	29·351
	12. 20. 0	30·058		13. 3. 30	29·955		20. 19. 45	30·091		22. 7. 45	29·831
	17. 23. 0	30·623		22. 5. 0	29·670		23. 10. 10	29·951		24. 16. 0	29·696
	22. 20. 0	29·745		23. 9. 15	29·579		25. 19. 52	30·062		29. 12. 30	29·548
	23. 16. 45	29·680		24. 0. 20	29·578	July	1. 11. 30	29·888	July	3. 17. 0	29·513
	24. 12. 15	29·706		26. 2. 40	28·671		8. 21. 0	29·984		13. 8. 10	29·188
	28. 7. 15	29·658	March	1. 5. 0	28·955		16. 10. 45	29·998		17. 23. 50	29·720
March	2. 13. 0	29·830		3. 16. 30	29·560		20. 22. 0	30·027		22. 21. 0	29·731
	5. 21. 10	29·910		7. 0. 0	29·110		24. 9. 10	29·910		25. 15. 40	29·753
	8. 12. 15	29·570		11. 3. 0	29·021		27. 21. 0	29·858		29. 14. 45	29·731
	15. 0. 0	29·747		16. 9. 40	29·509	August	2. 8. 55	30·033	August	5. 19. 0	29·754
	17. 10. 45	29·795		18. 18. 30	29·680		6. 22. 0	29·990		8. 16. 0	29·665
	20. 11. 30	29·841		21. 4. 30	29·665		9. 12. 0	29·920		10. 20. 0	29·750
	25. 21. 30	30·035		28. 3. 30	29·712		11. 22. 10	29·941		12. 19. 30	29·695

MAXIMA.			MINIMA.			MAXIMA.			MINIMA.		
Approximate Mean Solar Time, 1873.		Reading.	Approximate Mean Solar Time, 1873.		Reading.	Approximate Mean Solar Time, 1873.		Reading.	Approximate Mean Solar Time, 1873.		Reading.
	d h m	in.		d h m	in.		d h m	in.		d h m	in.
August	14. 11. 15	29·960	August	16. 4. 0	29·683	October	16. 22. 10	29·992	October	18. 2. 0	29·836
	16. 19. 50	30·050		18. 17. 0	29·400		18. 22. 10	30·080		19. 21. 0	29·651
	19. 17. 30	29·655		20. 6. 0	29·535		20. 11. 50	29·826		23. 1. 5	28·755
	22. 10. 30	29·770		24. 5. 30	29·640		27. 12. 10	30·353	November	0. 19. 15	28·950
	26. 19. 30	29·778		28. 3. 45	29·310	November	3. 12. 45	29·425		5. 21. 0	29·075
	30. 10. 30	29·735	September	1. 7. 0	29·536		10. 22. 0	30·116		13. 3. 0	29·683
September	4. 9. 45	29·945		7. 12. 0:	29·521		16. 11. 45	30·305		21. 20. 40	29·180
	8. 12. 15	29·731		9. 7. 0:	29·410		22. 9. 50	29·540		22. 19. 30	29·385
	10. 8. 30	29·624		10. 17. 20	29·386		25. 0. 0	30·013		26. 15. 15	29·235
	12. 9. 0	29·774		15. 2. 0	29·050		27. 21. 30	29·845		29. 8. 15	29·370
	16. 13. 10	29·670		17. 3. 0	29·490	December	3. 21. 30	30·470	December	5. 15. 0	30·121
	21. 21. 40	30·370		27. 17. 20	29·700		12. 11. 15	30·478		15. 22. 0	29·680
	28. 22. 0	30·045	October	1. 3. 0	29·747		17. 22. 30	30·045		19. 13. 30:	29·702
October	1. 21. 10	29·878		3. 16. 15:	29·686		20. 22. 15	29·995		21. 19. 30	29·859
	5. 9. 30	29·970		7. 3. 30	29·390		22. 21. 0	30·024		23. 14. 0	29·844
	8. 20. 15	29·750		9. 17. 45	29·520		24. 12. 20	30·200		26. 20. 30	29·590
	10. 21. 5	29·670		12. 17. 10	29·390		27. 22. 30	30·052		30. 18. 30:	29·365

ABSOLUTE MAXIMA AND MINIMA READINGS OF THE BAROMETER for each Month in the YEAR 1873.
[Extracted from the preceding Table.]

1873, MONTH.	Readings of the Barometer.		Range of Reading in each Month.
	Maxima.	Minima.	
	in.	in.	in.
January	30·055	28·282	1·773
February	30·623	28·671	1·952
March	30·035	28·955	1·080
April	30·158	29·346	0·812
May	30·255	29·182	1·073
June	30·100	29·351	0·749
July	30·027	29·188	0·839
August	30·050	29·310	0·740
September	30·370	29·050	1·320
October	30·353	28·755	1·598
November	30·305	28·950	1·355
December	30·478	29·365	1·113

The highest reading in the year was 30in·623 on February 18. The lowest reading in the year was 28in·282 on January 19.
The range of reading in the year was 2in·341.

MONTHLY MEANS of RESULTS for METEOROLOGICAL ELEMENTS.

1873, 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 ..	29·576	53·8	26·0	27·8	46·8	38·0	8·8	42·1	38·2	0·231	2·7	0·4
February..	29·901	50·1	25·0	25·1	39·2	30·8	8·4	34·3	30·3	0·169	2·0	0·4
March	29·623	64·6	27·2	37·4	51·3	35·2	16·1	41·9	38·2	0·231	2·7	0·4
April	29·822	76·8	28·7	48·1	57·4	37·9	19·5	45·9	38·9	0·237	2·7	0·8
May	29·795	70·9	34·0	36·9	62·3	42·5	19·8	50·6	43·7	0·285	3·3	0·9
June	29·794	81·2	42·0	39·2	70·2	51·0	19·2	58·9	52·1	0·389	4·3	1·3
July......	29·793	88·7	46·4	42·3	76·6	53·9	22·7	63·4	54·9	0·431	4·8	1·7
August ...	29·765	87·3	47·9	39·4	74·7	54·4	20·3	62·7	54·4	0·424	4·7	1·6
September.	29·792	72·5	38·2	34·3	65·2	46·1	19·1	54·7	49·0	0·348	4·0	0·9
October ...	29·685	75·1	26·7	48·4	57·0	40·6	16·4	47·8	44·2	0·290	3·3	0·5
November .	29·708	57·0	25·8	31·2	50·1	38·8	11·3	44·2	40·3	0·250	2·9	0·5
December .	30·107	56·3	22·1	34·2	45·6	35·2	10·4	40·6	37·6	0·225	2·6	0·3
Means	29·780	69·5	32·5	37·0	58·0	42·0	16·0	48·9	43·5	0·293	3·3	0·8

1873, 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	546	6·9	15	2·45	2·48	10	21	63	45	103	359	86	20	37	0·78	413
February........	85	561	9·2	11	1·93	1·82	126	166	37	44	8	40	51	58	142	0·45	281
March	87	547	6·5	15	1·33	1·42	55	150	156	39	54	122	71	18	79	0·45	295
April...........	77	546	6·5	12	0·61	0·50	123	258	64	46	12	65	69	72	11	0·30	291
May.............	78	540	7·0	12	1·49	1·46	120	135	55	16	35	149	142	84	8	0·27	270
June............	78	531	7·2	11	2·56	2·58	72	100	35	42	42	190	180	42	17	0·21	251
July............	74	526	6·0	9	1·85	1·90	12	3	15	29	76	370	194	22	23	0·25	264
August	75	527	6·3	14	3·18	3·28	6	8	32	26	42	384	190	36	20	0·27	284
September.......	81	536	5·6	10	2·52	2·60	66	53	39	64	43	191	192	36	36	0·26	250
October.........	88	542	6·9	14	2·55	2·79	72	86	18	28	79	306	125	30	0	0·25	237
November........	86	546	7·4	15	2·58	2·70	25	108	175	56	79	132	101	44	0	0·49	296
December	90	558	7·2	6	0·31	0·33	26	20	12	29	79	292	244	20	22	0·26	247
Means	82	542	6·9	Sum 144	Sum 23·36	Sum 23·86	Sum 713	Sum 1108	Sum 701	Sum 464	Sum 652	Sum 2600	Sum 1645	Sum 482	Sum 395	0·35	282

(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, except Sundays, Good Friday, and Christmas Day.

Days of the Month, 1873.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	52·82	52·12	51·48	50·69	49·99	*S*	49·87	50·45	51·35	52·23	52·86	53·01
2	52·81	*S*	*S*	50·63	50·00	49·75	49·92	50·47	51·37	52·31	*S*	53·00
3	52·79	52·05	51·46	50·60	49·96	49·74	49·90	*S*	51·40	52·34	52·87	53·01
4	52·76	52·06	51·44	50·63	*S*	49·75	49·94	50·53	51·42	52·33	52·88	52·97
5	*S*	52·02	51·39	50·58	49·93	49·73	49·92	50·55	51·47	*S*	52·90	52·97
6	52·75	51·99	51·35	*S*	49·92	49·74	*S*	50·59	51·48	52·39	52·92	52·95
7	52·74	52·00	51·33	50·47	49·90	49·74	49·96	50·62	*S*	52·42	52·92	*S*
8	52·72	51·95	51·33	50·45	49·90	*S*	50·01	50·66	51·56	52·41	52·93	52·94
9	52·67	*S*	*S*	50·45	49·89	49·74	49·97	50·65	51·57	52·44	*S*	52·89
10	52·66	51·93	51·24	50·40	49·87	49·76	50·01	*S*	51·60	52·49	52·95	52·87
11	52·64	51·89	51·22	Good Friday.	*S*	49·74	50·02	50·72	51·66	52·51	52·96	52·87
12	*S*	51·88	51·18	50·35	49·87	49·75	50·04	50·75	51·69	*S*	52·98	52·87
13	52·60	51·85	51·15	*S*	49·87	49·75	*S*	50·77	51·70	52·55	52·95	52·86
14	52·57	51·84	51·14	50·33	49·83	49·75	50·04	50·80	*S*	52·51	52·99	*S*
15	52·56	51·82	51·10	50·32	49·86	*S*	50·06	50·82	51·76	52·53	52·99	52·87
16	52·54	*S*	*S*	50·28	49·84	49·75	50·09	50·88	51·77	52·58	*S*	52·89
17	52·45	51·76	51·10	50·28	49·80	49·77	50·12	*S*	51·86	52·55	53·00	52·87
18	52·45	51·74	51·02	50·23	*S*	49·77	50·15	50·91	51·89	52·62	52·99	52·85
19	*S*	51·73	50·99	50·21	49·78	49·78	50·14	50·93	51·90	*S*	53·05	52·83
20	52·37	51·68	50·95	*S*	49·79	49·78	*S*	50·96	51·96	52·66	53·01	52·82
21	52·36	51·70	50·92	50·18	49·79	49·82	50·23	51·00	*S*	52·66	53·01	*S*
22	52·35	51·65	50·90	50·16	49·78	*S*	50·23	51·03	51·99	52·72	53·03	52·79
23	52·34	*S*	*S*	50·12	49·77	49·81	50·25	51·06	52·03	52·69	*S*	52·75
24	52·30	51·59	50·86	50·10	49·76	49·81	50·26	*S*	52·05	52·72	53·04	52·76
25	52·26	51·59	50·85	50·07	*S*	49·84	50·29	51·12	52·09	52·74	53·01	Christmas Day
26	*S*	51·64	50·80	50·05	49·76	49·83	50·27	51·17	52·12	*S*	53·08	52·72
27	52·22	51·53	50·77	*S*	49·75	49·87	*S*	51·20	52·17	52·78	53·03	52·67
28	52·19	51·66	50·75	50·05	49·74	49·85	50·36	51·21	*S*	52·76	53·02	*S*
29	52·17		50·74	50·02	49·75	*S*	50·39	51·23	52·19	52·77	53·05	52·64
30	52·15		*S*	50·01	49·74	49·85	50·40	51·28	52·22	52·79	*S*	52·64
31	52·14		50·67		49·74		50·42	*S*		52·84		52·64
Means.	52·50	51·82	51·08	50·31	49·84	49·78	50·12	50·86	51·78	52·57	52·98	52·84

(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 the same times.

Days of the Month, 1873.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	51·10	49·94	47·87	46·90	47·90	*S*	51·58	54·42	56·55	56·65	55·60	52·96
2	51·06	*S*	*S*	46·97	47·98	49·41	51·76	54·56	56·60	56·65	*S*	52·90
3	51·00	49·78	47·74	46·95	47·98	49·44	51·84	*S*	56·60	56·61	55·40	52·86
4	50·94	49·77	47·65	46·97	*S*	49·54	51·94	54·75	56·62	56·47	55·35	52·73
5	*S*	49·70	47·60	47·01	48·05	49·56	51·97	54·82	56·68	*S*	55·25	52·71
6	50·85	49·61	47·50	*S*	48·04	49·63	*S*	54·95	56·67	56·49	55·16	52·61
7	50·81	49·58	47·48	47·05	48·10	49·70	52·19	55·05	*S*	56·46	55·05	*S*
8	50·75	49·44	47·45	47·08	48·15	*S*	52·37	55·15	56·76	56·37	54·84	52·50
9	50·70	*S*	*S*	47·10	48·20	49·84	52·37	55·19	56·81	56·30	*S*	52·45
10	50·65	49·34	47·33	47·09	48·23	49·96	52·51	*S*	56·82	56·44	54·72	52·31
11	50·60	49·22	47·28	Good Friday.	*S*	49·99	52·57	55·29	56·85	56·42	54·63	52·30
12	*S*	49·25	47·26	47·25	48·33	50·07	52·68	55·42	56·89	*S*	54·55	52·24

(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 the same times—*concluded.*

Days of the Month, 1873.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
13	50·55	49·00	47·23	*S*	48·38	50·15	*S*	55·50	56·85	56·31	54·39	52·26
14	50·53	48·95	47·22	47·26	48·36	50·21	52·80	55·55	*S*	56·33	54·37	*S*
15	50·44	48·89	47·18	47·25	48·41	*S*	52·94	55·62	56·81	56·29	54·26	52·12
16	50·45	*S*	*S*	47·34	48·50	50·35	53·05	55·78	56·86	56·24	*S*	52·11
17	50·36	48·72	47·16	47·37	48·50	50·46	53·14	*S*	56·90	56·28	54·08	52·05
18	50·35	48·62	47·13	47·36	*S*	50·53	53·26	55·82	56·89	56·26	53·98	51·93
19	*S*	48·60	47·16	47·44	48·56	50·60	53·30	55·85	56·83	*S*	53·95	51·86
20	50·25	48·50	47·11	*S*	48·66	50·66	*S*	55·95	56·90	56·19	53·84	51·78
21	50·23	48·45	47·10	47·46	48·76	50·81	53·58	56·05	*S*	56·15	53·76	*S*
22	50·24	48·34	47·07	47·50	48·80	*S*	53·65	56·09	56·81	56·10	53·67	51·62
23	50·21	*S*	*S*	47·60	48·84	50·95	53·73	56·15	56·77	56·00	*S*	51·53
24	50·20	48·21	47·06	47·53	48·90	50·96	53·78	*S*	56·73	55·94	53·55	51·44
25	50·15	48·17	47·07	47·56	*S*	51·03	53·88	56·27	56·77	55·91	53·40	Christmas Day
26	*S*	48·10	47·03	47·65	49·01	51·13	53·86	56·35	56·70	*S*	53·42	51·31
27	50·11	47·96	47·01	*S*	49·05	51·30	*S*	56·38	56·75	55·85	53·28	51·21
28	50·09	47·91	47·01	47·77	49·14	51·36	54·10	56·42	*S*	55·75	53·19	*S*
29	50·05		47·01	47·80	49·16	*S*	54·21	56·37	56·59	55·66	53·15	51·09
30	50·03		*S*	47·85	49·21	51·49	54·27	56·50	56·57	55·62	*S*	51·03
31	49·98		46·95		49·27		54·35	*S*		55·55		51·00
Means .	50·47	48·92	47·26	47·32	48·54	50·37	53·03	55·63	56·75	56·20	54·27	52·04

(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 the same times.

Days of the Month, 1873.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	49·00	47·31	44·45	46·10	48·90	*S*	56·70	60·51	61·23	58·55	54·56	51·07
2	49·00	*S*	*S*	46·31	48·96	52·30	56·96	60·62	61·18	58·54	*S*	51·05
3	48·90	46·91	44·46	46·45	48·97	52·40	57·08	*S*	61·11	58·48	53·62	51·02
4	48·88	46·79	44·47	46·63	*S*	52·58	57·17	60·81	61·03	58·35	53·43	50·89
5	*S*	46·60	44·50	46·84	49·18	52·69	57·19	60·82	61·00	*S*	53·32	50·90
6	48·72	46·39	44·54	*S*	49·29	52·83	*S*	60·92	61·29	58·48	53·20	50·82
7	48·76	46·24	44·70	47·09	49·40	53·05	57·55	61·00	*S*	58·43	52·90	*S*
8	48·80	46·06	44·86	47·20	49·50	*S*	57·77	61·07	60·66	58·33	52·79	50·73
9	48·80	*S*	*S*	47·32	49·58	53·38	57·78	61·00	60·51	58·30	*S*	50·60
10	48·80	45·83	45·03	47·33	49·62	53·51	57·95	*S*	60·32	58·28	52·60	50·51
11	48·70	45·68	45·14	Good Friday.	*S*	53·59	58·08	61·16	60·21	58·15	52·56	50·43
12	*S*	45·60	45·20	47·40	49·80	53·71	58·22	61·30	60·19	*S*	52·50	50·23
13	48·85	45·48	45·25	*S*	49·92	53·86	*S*	61·32	59·91	57·79	52·90	50·06
14	48·92	45·38	45·32	47·48	50·01	53·97	58·46	61·31	*S*	57·73	52·33	*S*
15	48·91	45·30	45·30	47·50	50·21	*S*	58·59	61·30	59·69	57·68	52·19	49·81
16	49·02	*S*	*S*	47·52	50·42	54·12	58·68	61·41	59·63	57·49	*S*	49·46
17	49·01	45·19	45·28	47·63	50·54	54·30	58·70	*S*	59·57	57·41	51·90	49·24
18	49·05	45·17	45·10	47·71	*S*	54·40	58·71	61·34	59·41	57·26	51·76	49·07
19	*S*	45·13	45·23	47·92	50·78	54·52	58·65	61·37	59·21	*S*	51·69	49·03
20	48·98	45·08	45·20	*S*	50·92	54·69	*S*	61·42	59·15	56·89	51·54	49·04
21	48·96	45·00	45·20	48·36	51·01	54·93	58·92	61·44	*S*	56·69	51·47	*S*
22	48·91	44·98	45·20	48·52	51·05	*S*	59·00	61·42	58·98	56·68	51·38	49·09
23	48·80	*S*	*S*	48·76	51·05	55·22	59·09	61·33	58·90	56·43	*S*	49·12
24	48·65	44·00	45·21	48·81	51·10	55·38	59·22	*S*	58·82	56·25	51·28	49·11
25	48·49	43·82	45·28	48·91	*S*	55·66	59·50	61·32	58·83	56·10	51·18	Christmas Day
26	*S*	44·00	45·27	49·00	51·28	55·90	59·58	61·34	58·74	*S*	51·19	49·11

(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 the same times—*concluded.*

Days of the Month, 1873.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
27	48·20	44·40	45·37	*S*	51·40	56·20	*S*	61·31	58·73	55·76	51·12	49·03
28	48·01	44·39	45·50	49·02	51·53	56·32	60·11	61·27	*S*	55·50	51·05	*S*
29	47·82		45·67	48·98	51·70	*S*	60·31	61·21	58·51	55·22	51·15	49·00
30	47·65		*S*	48·92	51·85	56·50	60·41	61·30	58·50	55·01	*S*	48·94
31	47·49		45·90		52·00		60·45	*S*		54·84		48·83
Means.	48·67	45·45	45·10	47·75	50·37	54·24	58·55	61·18	59·82	57·21	52·22	49·85

(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 the same times.

Days of the Month, 1873.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	46·30	42·12	40·95	46·09	48·11	*S*	61·05	65·15	62·98	58·50	49·50	48·52
2	46·29	*S*	*S*	46·42	48·74	54·61	60·88	65·06	63·00	58·70	*S*	48·00
3	46·14	41·43	41·11	46·62	49·22	54·63	60·90	*S*	62·78	58·80	49·17	48·04
4	45·98	41·27	41·30	46·67	*S*	55·20	61·22	64·61	62·33	58·85	49·27	48·04
5	*S*	41·09	41·91	46·89	49·79	55·72	61·41	64·61	61·90	*S*	49·21	48·12
6	46·06	41·00	42·47	*S*	49·66	56·04	*S*	64·81	61·39	58·81	49·22	47·90
7	46·20	40·96	42·68	46·90	49·65	56·02	61·45	64·98	*S*	58·44	49·20	*S*
8	46·37	40·80	42·90	46·71	49·69	*S*	61·82	65·27	60·55	58·12	49·18	47·53
9	46·32	*S*	*S*	46·60	49·71	55·89	62·11	65·35	60·28	57·59	*S*	47·30
10	46·51	40·78	43·02	46·41	49·88	56·14	62·57	*S*	59·98	57·39	49·12	46·62
11	46·68	40·63	43·07	Good Friday.	*S*	56·29	62·81	65·05	59·91	56·85	49·12	45·90
12	*S*	40·53	42·82	46·29	50·82	56·47	62·84	64·72	60·00	*S*	49·10	45·09
13	47·01	40·50	42·79	*S*	51·50	56·58	*S*	64·44	59·82	56·95	48·65	44·61
14	47·05	40·50	42·73	46·32	51·81	56·67	62·21	64·50	*S*	56·72	48·21	*S*
15	47·15	40·64	42·44	46·61	51·91	*S*	61·77	64·46	59·21	56·21	47·89	44·32
16	47·28	*S*	*S*	47·23	52·07	56·91	61·52	64·92	58·99	55·60	*S*	44·48
17	47·14	40·82	42·18	48·10	52·18	57·29	61·45	*S*	58·70	55·41	47·78	44·87
18	47·06	40·80	42·12	48·67	*S*	57·50	61·81	64·99	58·59	55·18	47·77	45·27
19	*S*	40·78	42·43	49·11	51·91	57·89	61·98	64·65	58·50	*S*	47·85	45·80
20	46·58	40·70	42·48	*S*	51·73	58·09	*S*	64·21	58·50	55·10	47·79	46·20
21	46·05	40·62	42·47	49·51	51·51	58·61	62·52	63·78	*S*	54·82	47·78	*S*
22	45·45	40·46	42·47	49·80	51·51	*S*	63·22	63·58	58·99	54·43	47·65	46·29
23	44·99	*S*	*S*	49·80	51·72	59·81	64·09	63·60	58·81	54·11	*S*	46·37
24	44·63	40·27	42·70	49·47	52·26	60·30	64·90	*S*	58·50	53·78	48·10	46·11
25	44·40	40·30	43·16	48·98	*S*	60·51	65·20	63·89	58·40	53·19	48·12	Christmas Day
26	*S*	39·99	43·58	48·50	52·98	60·35	65·21	64·01	58·41	*S*	48·20	46·03
27	43·58	40·43	44·01	*S*	53·40	60·20	*S*	64·07	58·63	52·37	48·53	45·93
28	43·20	40·93	44·50	47·91	53·62	60·29	65·09	63·93	*S*	51·83	48·41	*S*
29	42·80		44·88	47·78	53·74	*S*	64·97	63·67	58·48	51·12	48·57	45·29
30	42·50		*S*	47·98	53·80	61·02	64·81	63·32	58·41	50·41	*S*	44·63
31	42·27		45·60		54·10		64·88	*S*		49·92		44·20
Means.	45·63	40·76	42·80	47·65	51·37	57·56	62·77	64·45	59·85	55·53	48·54	46·21

(V.)—Reading of a Thermometer whose bulb is sunk to the depth of 1 inch below the surface of the soil, within the case which covers the tops of the deep-sunk Thermometers, at the same times.

Days of the Month, 1873.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	44·4	35·1	37·3	48·2	52·7	S	62·1	66·1	63·7	59·0	47·2	43·3
2	45·2	S	S	49·0	52·9	57·9	63·3	65·0	61·0	60·0	S	47·0
3	44·5	35·0	40·9	48·7	52·7	59·0	66·0	S	59·7	61·7	47·0	47·0
4	45·0	35·8	45·1	49·0	S	62·1	65·0	66·0	58·2	59·9	44·0	44·9
5	S	35·2	44·8	49·8	50·0	61·1	63·0	67·7	58·0	S	47·7	44·1
6	46·4	34·0	42·1	S	50·0	57·0	S	68·0	56·7	56·2	47·6	43·8
7	46·4	36·8	44·7	46·0	50·3	55·9	64·2	69·0	S	58·3	46·1	S
8	47·7	36·0	43·0	45·7	50·0	S	66·9	69·8	56·2	52·0	45·9	44·3
9	47·4	S	S	45·0	51·8	59·5	66·3	67·0	58·1	50·0	S	37·8
10	48·0	36·0	41·9	44·5	52·1	59·5	66·0	S	58·0	56·5	46·7	34·9
11	48·2	36·0	41·0	Good Friday.	S	60·0	66·3	63·5	58·6	57·8	46·1	35·2
12	S	36·1	40·0	45·0	56·4	59·1	64·7	64·4	58·2	S	43·2	36·9
13	47·1	37·0	39·8	S	54·9	60·5	S	66·0	57·1	53·5	39·0	37·7
14	49·0	37·1	38·3	49·0	51·5	58·9	60·3	66·0	S	51·0	41·9	S
15	46·5	38·7	40·1	53·0	52·2	S	61·0	66·8	55·1	50·8	44·2	39·6
16	47·3	S	S	55·3	53·1	60·1	61·9	68·8	54·7	51·0	S	47·0
17	45·1	36·1	41·1	54·5	53·9	61·7	65·0	S	57·0	50·9	44·1	46·4
18	43·9	36·0	41·5	52·5	S	61·0	65·7	64·3	56·9	53·3	44·8	47·6
19	S	36·4	40·2	50·9	49·8	62·1	62·0	62·0	56·2	S	45·0	46·0
20	39·9	35·7	41·0	S	51·0	62·1	S	63·0	59·9	51·9	49·8	45·0
21	38·8	34·1	39·0	52·5	51·2	65·0	69·0	62·4	S	48·3	43·5	S
22	40·8	36·0	41·0	49·0	55·0	S	72·2	64·0	56·2	52·5	47·5	46·6
23	39·0	S	S	48·0	55·5	66·0	74·0	64·0	55·0	50·0	S	42·8
24	41·0	34·0	44·0	45·0	54·2	64·0	69·9	S	55·8	46·1	47·1	46·5
25	36·2	35·8	45·2	44·3	S	63·0	69·6	66·8	59·1	45·8	44·5	Christmas Day
26	S	42·0	44·3	44·1	58·8	61·5	67·5	66·0	57·6	S	48·0	44·1
27	36·0	40·8	45·0	S	56·6	64·7	S	64·8	58·2	46·0	47·0	43·3
28	35·0	37·0	46·0	46·2	55·0	65·8	65·5	63·4	S	41·9	45·9	S
29	35·0		46·2	48·0	55·2	S	66·4	60·0	56·5	39·9	49·5	35·7
30	36·0		S	49·0	55·2	63·1	69·0	61·2	57·5	40·1	S	37·3
31	36·1		50·0		56·0		68·3	S		43·9		44·3
Means.	42·8	36·4	42·4	48·5	53·3	61·2	66·0	65·2	57·7	51·4	45·7	42·7

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

Days of the Month, 1873.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	47·6	32·6	37·3	55·1	59·5	S	66·9	67·7	64·8	67·9	51·2	46·8
2	45·8	S	S	56·3	63·7	68·0	70·8	71·6	63·8	70·6	S	50·8
3	47·0	33·2	43·4	53·5	57·0	65·2	72·6	S	61·9	71·2	53·1	49·6
4	49·2	36·2	52·5	56·9	S	71·3	69·8	72·4	59·8	59·5	49·1	41·5
5	S	35·6	47·9	53·9	51·0	66·0	63·9	72·8	59·7	S	51·9	43·3
6	51·0	32·9	44·5	S	55·8	56·9	S	76·0	58·3	63·3	48·8	45·0
7	50·2	39·6	48·3	47·1	55·1	60·9	73·1	78·2	S	60·0	48·0	S
8	51·8	36·0	49·8	49·2	53·8	S	78·7	80·7	59·8	49·2	48·1	45·7
9	51·0	S	S	47·6	56·9	65·6	71·9	68·1	61·9	55·6	S	33·2
10	50·9	36·8	42·9	48·1	61·5	62·8	72·0	S	60·8	63·0	46·5	27·1
11	51·5	36·0	44·3	Good Friday.	S	63·9	70·8	65·1	62·4	62·9	47·0	31·3
12	S	39·0	43·8	46·1	65·7	65·2	67·9	71·3	63·9	S	45·3	36·1
13	50·4	39·0	41·6	S	60·7	69·8	S	71·8	60·8	52·5	39·8	33·6
14	51·8	39·0	41·8	61·5	51·5	64·9	62·9	72·5	S	53·2	46·5	S
15	47·0	39·3	42·8	70·0	55·5	S	61·9	69·1	53·7	58·9	45·9	41·9

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

Days of the Month, 1873.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
16	51·0	*S*	*S*	70·6	57·0	63·3	68·0	80·0	57·3	55·1	*S*	55·0
17	44·3	35·2	46·2	65·8	58·5	72·9	70·8	*S*	62·9	52·5	45·2	53·3
18	45·0	34·0	44·9	54·3	*S*	64·9	70·6	66·9	61·7	58·7	44·8	53·4
19	*S*	35·0	40·0	58·9	49·9	69·1	66·9	64·1	61·5	*S*	46·8	49·2
20	37·0	31·3	42·3	*S*	57·1	67·4	*S*	66·9	65·9	49·9	46·5	47·2
21	38·0	31·9	40·1	60·0	52·8	75·0	81·1	67·3	*S*	48·2	45·4	*S*
22	42·5	40·0	47·5	48·0	64·5	*S*	85·3	68·8	61·7	55·7	50·8	50·2
23	41·8	*S*	*S*	49·8	63·1	71·3	85·5	70·2	60·6	46·9	*S*	43·8
24	41·0	31·3	55·1	45·8	60·2	63·8	74·0	*S*	61·1	44·9	51·2	48·7
25	34·1	38·3	54·2	47·5	*S*	65·7	76·5	73·3	68·1	44·8	44·8	Christmas Day
26	*S*	46·8	52·5	47·2	67·5	67·0	65·8	73·2	67·7	*S*	51·0	45·1
27	38·6	41·0	49·4	*S*	58·8	76·8	*S*	70·2	70·2	47·8	49·7	40·0
28	36·0	40·2	50·0	43·0	56·1	71·8	71·5	64·8	*S*	42·1	46·7	*S*
29	31·8		54·6	50·9	62·8	*S*	76·7	59·6	61·2	37·7	53·5	38·9
30	34·7		*S*	56·8	58·3	60·9	78·9	68·3	64·2	38·1	*S*	40·0
31	36·0		54·9		61·9		71·3	*S*		52·8		49·0
Means .	44·3	36·7	46·6	53·8	58·4	66·8	72·1	70·4	62·1	54·2	47·9	43·8

WEEKLY MEANS of READINGS of THERMOMETERS.

1873. 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	52·78	50·96	48·88	46·16	45·3	48·5
8 to 14	52·64	50·63	48·81	46·66	47·9	51·2
15 to 21	52·46	50·35	48·99	46·88	43·6	43·7
22 to 28	52·28	50·17	48·51	44·38	38·0	39·0
29 to February 4	52·12	49·93	47·33	42·07	35·5	34·1
February 5 to 11	51·96	49·48	46·13	40·88	35·7	36·2
12 to 18	51·82	48·90	45·35	40·63	36·8	37·6
19 to 25	51·66	48·38	44·67	40·52	35·3	34·6
26 to March 4	51·54	47·87	44·36	40·79	40·5	43·5
March 5 to 11	51·31	47·44	44·80	42·68	42·9	46·3
12 to 18	51·12	47·20	45·24	42·51	40·1	43·5
19 to 25	50·91	47·10	45·22	42·62	41·7	46·5
26 to April 1	50·74	46·99	45·63	44·78	46·6	52·8
April 2 to 8	50·56	47·01	46·75	46·70	48·0	52·8
9 to 15	50·37	47·19	47·41	46·45	47·3	54·7
16 to 22	50·22	47·41	47·94	48·74	52·5	59·6
23 to 29	50·07	47·65	48·91	48·74	45·9	47·4
30 to May 6	49·97	47·97	49·04	48·92	51·2	57·3
May 7 to 13	49·88	48·23	49·64	50·21	52·6	59·0
14 to 20	49·82	48·50	50·48	51·94	51·9	54·9
21 to 27	49·77	48·89	51·15	52·23	55·2	61·2
28 to June 3	49·74	49·27	51·96	54·08	56·4	62·0
June 4 to 10	49·74	49·71	53·01	55·84	59·2	63·9
11 to 17	49·75	50·21	53·93	56·70	60·1	66·7
18 to 24	49·79	50·75	54·86	58·70	63·4	68·6
25 to July 1	49·85	51·31	56·21	60·57	63·4	68·2
July 2 to 8	49·94	52·01	57·29	61·28	64·7	71·5
9 to 15	50·02	52·64	58·18	62·39	64·1	67·9
16 to 22	50·16	53·33	58·78	62·08	66·0	73·8
23 to 29	50·30	53·93	59·64	64·91	68·8	75·0
30 to August 5	50·47	54·53	60·60	64·85	67·0	72·5
August 6 to 12	50·66	55·17	61·08	65·03	66·9	73·2
13 to 19	50·85	55·69	61·34	64·66	65·6	70·7
20 to 26	51·06	56·14	61·38	63·85	64·4	69·9
27 to September 2	51·27	56·47	61·25	63·49	62·3	65·3
September 3 to 9	51·48	56·69	60·93	61·54	57·8	60·2
10 to 16	51·70	56·85	59·99	59·65	56·9	59·8
17 to 23	51·94	56·85	59·20	58·68	56·9	62·4
24 to 30	52·14	56·68	58·69	58·47	57·4	65·4
October 1 to October 7	52·34	56·56	58·47	58·68	59·2	65·4
8 to 14	52·48	56·36	58·10	57·27	53·5	56·1
15 to 21	52·60	56·24	57·24	55·39	51·0	53·9
22 to 28	52·74	55·93	56·12	53·29	47·1	47·0
29 to November 4	52·83	55·53	54·45	49·90	43·7	47·0
November 5 to 11	52·93	54·94	52·89	49·17	46·7	48·4
12 to 18	52·98	54·27	52·26	48·23	42·9	44·6
19 to 25	53·03	53·69	51·42	47·88	46·2	47·6
26 to December 2	53·03	53·15	51·10	48·37	46·8	49·8
December 3 to 9	52·96	52·64	50·83	47·82	43·6	43·1
10 to 16	52·87	52·22	50·08	45·17	38·6	37·5
17 to 23	52·82	51·79	49·10	45·80	45·7	49·5
24 to 31	52·68	51·18	49·00	45·37	41·9	43·6

ABSTRACT OF THE CHANGES OF THE DIRECTION OF THE WIND, AS DERIVED FROM OSLER'S ANEMOMETER.

By *direct* motion, in the following statements, is meant that the change of the direction of the wind was in the order N., E., S., W., N., &c.; by *retrograde* is meant in the order N., W., S., E., N., &c.

1872. Dec. $31^{d}. 12^{h}$. The direction of the wind was W.S.W.
1873. Jan. 31. 12. ,, ,, E., which implies a direct motion of $202\frac{1}{2}$°.
On Jan. 7. 21, $23^{d}. 22^{h}$, $30^{d}. 9^{h}$, the trace was shifted to the next set of lines upwards, implying retrograde motion of 1080°.
Therefore the whole excess of retrograde motion in the month of January was $877\frac{1}{2}$°.

1873. Jan. $31^{d}. 12^{h}$. The direction of the wind was E.
Feb. 28. 12. ,, ,, S.S.E., which implies a retrograde motion of $292\frac{1}{2}$°.
On Feb. 1. 2. 40^{m}, $16^{d}. 22^{h}$, $17^{d}. 20^{h}. 40^{m}$, $19^{d}. 9^{h}. 15^{m}$, $25^{d}. 9^{h}. 10^{m}$, $28^{d}. 8^{h}. 40^{m}$, the trace was shifted to the next set of lines downwards, and on Feb. $22^{d}. 22^{h}$, to the second set of lines downwards; on Feb. $2^{d}. 20^{h}. 30^{m}$, $5^{d}. 22^{h}$, $6^{d}. 22^{h}$, the trace was shifted to the next set of lines upwards, implying direct motion of 2880°, and retrograde motion of 1080°.
Therefore the whole excess of direct motion in the month of February was $1507\frac{1}{2}$°.

1873. Feb. $28^{d}. 12^{h}$. The direction of the wind was S.S.E.
March 31. 12. ,, ,, S.S.W., which implies a direct motion of 45°.
On March 5. 22, $13^{d}. 20^{h}. 30^{m}$, $16^{d}. 20^{h}. 30^{m}$, $28^{d}. 9^{h}$, the trace was shifted to the next set of lines downwards, implying direct motion of 1440°.
Therefore the whole excess of direct motion in the month of March was 1485°.

1873. March $31^{d}. 12^{h}$. The direction of the wind was S.S.W.
April 30. 12. ,, ,, W.N.W., which implies a direct motion of 90°.
On April 1. 8. 30^{m}, $15^{d}. 0^{h}$, $16^{d}. 21^{h}$, $29^{d}. 21^{h}$, the trace was shifted to the next set of lines downwards; on April $10^{d}. 22^{h}$, $13^{d}. 22^{h}$, $15^{d}. 21^{h}$, the trace was shifted to the next set of lines upwards, implying direct motion of 1440°, and retrograde motion of 1080°.
Therefore the whole excess of direct motion in the month of April was 450°.

1873. April $30^{d}. 12^{h}$. The direction of the wind was W.N.W.
May 31. 12. ,, ,, N.N.W., which implies a direct motion of 45°.
On May 20. 2. 45^{m}, $25^{d}. 8^{h}. 50^{m}$, the trace was shifted to the next set of lines downwards; on May $17^{d}. 8^{h}. 30^{m}$, the trace was shifted to the next set of lines upwards, implying direct motion of 720°, and retrograde motion of 360°.
Therefore the whole excess of direct motion in the month of May was 405°.

1873. May $31^{d}. 12^{h}$. The direction of the wind was N.N.W.
June 30. 12. ,, ,, W.N.W., which implies a retrograde motion of 45°.
On June 7. 21, $16^{d}. 2^{h}. 45^{m}$, $17^{d}. 2^{h}. 50^{m}$, $18^{d}. 8^{h}. 40^{m}$, $29^{d}. 21^{h}$, the trace was shifted to the next set of lines downwards; on June $12^{d}. 21^{h}$, $14^{d}. 22^{h}$, $17^{d}. 9^{h}$, $17^{d}. 22^{h}$, the trace was shifted to the next set of lines upwards, and on June $13^{d}. 3^{h}$, to the second set of lines upwards, implying direct motion of 1800°, and retrograde motion of 2160°.
Therefore the whole excess of retrograde motion in the month of June was 405°.

1873. June $30^{d}. 12^{h}$. The direction of the wind was W.N.W.
July 31. 12. ,, ,, W.S.W., which implies a retrograde motion of 45°.
On July 21. 9. 50^{m}, the trace was shifted to the next set of lines upwards, and on July $29^{d}. 2^{h}. 50^{m}$, to the second set of lines upwards; on July $22^{d}. 22^{h}$, $29^{d}. 20^{h}. 50^{m}$, the trace was shifted to the next set of lines downwards, implying retrograde motion of 1080°, and direct motion of 720°.
Therefore the whole excess of retrograde motion in the month of July was 405°.

1873. July $31^{d}. 12^{h}$. The direction of the wind was W.S.W.
Aug. 31. 12. ,, ,, W.S.W., which implies no change.

On Aug. 10. 22, $23^{d}. 22^{h}$, the trace was shifted to the next set of lines upwards; on Aug. $24^{d}. 20^{h}. 30^{m}$, the trace was shifted to the next set of lines downwards, implying retrograde motion of 720°, and direct motion of 360°.

Therefore the whole excess of retrograde motion in the month of August was 360°.

1873. Aug. $31^{d}. 12^{h}$. The direction of the wind was W.S.W.
Sept. 30. 12. ,, ,, S.E., which implies a retrograde motion of 112½°.

On Sept. 22. 22, $24^{d}. 22^{h}$, $29^{d}. 22^{h}$, the trace was shifted to the next set of lines downwards; on Sept. $7^{d}. 2^{h}. 50^{m}$, the trace was shifted to the next set of lines upwards, implying direct motion of 1080°, and retrograde motion of 360°.

Therefore the whole excess of direct motion in the month of September was 607½°.

1873. Sept. $30^{d}. 12^{h}$. The direction of the wind was S.E.
Oct. 31. 12. ,, ,, S.W., which implies a direct motion of 90°.

On Oct. 4. 22, $12^{d}. 11^{h}. 45^{m}$, $13^{d}. 2^{h}. 45^{m}$, $19^{d}. 9^{h}. 45^{m}$, the trace was shifted to the next set of lines downwards; on Oct. $24^{d}. 2^{h}. 45^{m}$, $28^{d}. 2^{h}. 50^{m}$, the trace was shifted to the next set of lines upwards, implying direct motion of 1440°, and retrograde motion of 720°.

Therefore the whole excess of direct motion in the month of October was 810°.

1873. Oct. $31^{d}. 12^{h}$. The direction of the wind was S.W.
Nov. 30. 12. ,, ,, W.S.W., which implies a direct motion of 22½°.

On Nov. 7. 10, the trace was shifted to the next set of lines upwards; on Nov. $21^{d}. 9^{h}$, the trace was shifted to the next set of lines downwards, implying retrograde motion of 360°, and direct motion of 360°.

Therefore the whole excess of direct motion in the month of November was 22½°.

1873. Nov. $30^{d}. 12^{h}$. The direction of the wind was W.S.W.
Dec. 31. 12. ,, ,, W., which implies a direct motion of 22½°.

On Dec. 6. 22, $12^{d}. 22^{h}$, $24^{d}. 9^{h}$, the trace was shifted to the next set of lines downwards; on Dec. $11^{d}. 0^{h}$, the trace was shifted to the next set of lines upwards, implying direct motion of 1080°, and retrograde motion of 360°.

Therefore the whole excess of direct motion in the month of December was 742½°.

The whole excess of direct motion to the end of the year was 3982½°.

The revolution-counter which is attached to the vertical spindle of the vane, whose readings increase with change of direction of the wind in the order N., E., S., W., &c., or in *direct* motion, and decrease with change of direction in the order N., W., S., E., &c., or in *retrograde* motion, gave the following readings:—

	revs.
On 1872, December $31^{d}. 12^{h}$	99·70
On 1873, December $31^{d}. 12^{h}$	110·75

Implying an excess of direct motion, during the year, of 11·05 revolutions, or 3978°.

AMOUNT OF RAIN COLLECTED IN EACH MONTH OF THE YEAR 1873.

1873, 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.	Cylinder partly sunk in the Ground read daily.	Cylinder partly sunk in the Ground read Monthly.
	in.	in.	in.	in.	in.	in.	in.
January............	1·21	1·29	1·72	1·35	2·35	2·45	2·48
February............	0·69	0·98	1·24	1·38	1·67	1·93	1·82
March	0·74	0·90	0·93	1·10	1·25	1·33	1·42
April............	0·18	0·22	0·38	0·55	0·53	0·61	0·50
May............	1·02	1·13	1·31	1·44	1·44	1·49	1·46
June............	2·00	2·16	2·28	2·74	2·54	2·56	2·58
July............	1·40	1·49	1·54	1·64	1·82	1·85	1·90
August	2·61	2·80	2·99	3·14	3·12	3·18	3·28
September............	1·82	1·96	2·18	2·44	2·56	2·52	2·60
October	1·81	1·87	2·30	2·63	2·65	2·55	2·79
November	1·71	1·83	2·14	2·20	2·55	2·58	2·70
December	0·11	0·18	0·27	0·27	0·32	0·31	0·33
Sums	15·30	16·81	19·28	20·88	22·80	23·36	23·86

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
The Two Cylinder Gauges partly sunk in the Ground	155	3	....	0	5

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

LUMINOUS METEORS.

1873.

Month and Day, 1873.		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						°	
March	26	8. 47. 45	S.	1	Bluish-white	0·7	Train	12	1
August	1	11. 58. 0	N.	1	Bluish-white	. . .	Train	..	2
August	7	10. 49. 53	S.	1	Bluish-white	0·6	None	5	3
	"	11. 29. 12	S., J.A.G.	1	Bluish-white	0·7	Train; 3 secs.	40	4
	"	11. 50. 36	S.	1	Bluish-white	0·3	None	9	5
	"	11. 51. 59	J.A.G.	1	Bluish-white	0·8	Fine	6	6
	"	11. 55. 24	S., J.A.G.	1	Bluish-white	0·2	Slight	12	7
	"	12. 14. 52	S.	Jupiter	White	1·0	Train	8	8
	"	12. 22. 25	S.	1	Bluish-white	1·2	Train	5	9
	"	12. 22. 52	J.A.G.	2	Bluish-white	0·4	None	4	10
	"	12. 36. 8	S.	1	Bluish-white	0·8	Train	10	11
August	9	9. 25. 0	N.	1	Bright bluish-white	0·6	Fine	12	12
	"	9. 46. 7	C.	2	Reddish	0·2	Train	7	13
	"	9. 54. 55	C.	2	Reddish	0·3	Train	10	14
	"	10. 15. 0	C.	3	Bluish-white	0·1	Slight	6	15
	"	10. 16. 27	N.	> 1	Bluish-white	0·4	. . .	6	16
	"	10. 21. 10	N.	> 1	Bluish-white	Instantaneous	. . .	2	17
	"	10. 29. 55	C.	1	Bluish-white	1·2	Fine train	12	18
	"	10. 30. 31	N.	> 1	Bluish-white	0·5	Train	8	19
	"	10. 55. 5	C.	3	Bluish-white	0·2	None	5	20
	"	11. 1. 5	C.	3	Bluish-white	0·3	Very slight	5	21
	"	11. 12. 5	C.	1	Bluish-white	0·8	Train (brilliant)	9	22
	"	11. 27. 5	C.	2	Bluish-white	1·3	Slight	15	23
August	11	9. 45. 34	N.	3	Bluish-white	0·4	Train	5	24
	"	9. 52. 12	C.	2	Bluish-white	0·3	Slight	6	25
	"	9. 56. 52	C.	2	Bluish-white	0·4	Slight	8	26
	"	9. 59. 47	N.	2	Bluish-white	0·5	Train	7	27
	"	10. 1. 24	N.	2	Bluish-white	0·4	Train	5	28
	"	10. 3. 44	C.	1	Bluish-white	0·3	. . .	5	29
	"	10. 7. 50	C.	1	Bluish-white	1·0	Train	15	30
	"	10. 15. 4	C., S.	1	Bluish-white	0·6	Train	12	31
	"	10. 18. 49	N.	> 1	Bluish-white	0·3	Train	5	32
	"	10. 33. 42	J.A.G.	1	Bluish-white	0·6	Train	6	33
	"	10. 38. 12	S.	2	Bluish-white	0·5	Train	7	34
	"	10. 40. 15	N.	4	Bluish-white	0·6	Train	7	35
	"	11. 5. 57	N.	> 1	Bluish-white	0·5	Train	8	36
October	26	9. 51. 0	N.	Probably very large	Bluish-white	. . .	Fine; 2 secs.	..	37
November	11	7. 19. 25	S.	Jupiter × 4	Bluish-white	1·5	Train; sparks	30	38
November	13	12. 3. 25	N.	1	White	> 1	Fine train	..	39
	"	12. 22. 40	C.	2	Bluish-white	0·7	Train	10	40
	"	12. 27. 25	C.	2	Bluish-white	0·6	Train	8	41
	"	12. 36. 23	N.	3	Bluish-white	0·4	None	..	42
	"	12. 43. 40	C.	1	Bluish-white	0·6	Slight	8	43
	"	12. 46. 23	W.	2	Bluish-white	0·5	None	15	44
	"	12. 46. 36	W.	3	Bluish-white	0·5	None	5	45
	"	12. 49. 55	C.	3	Bluish-white	0·6	Slight	9	46
	"	12. 56. 15	W.	3	Bluish-white	0·7	None	10	47
	"	13. 4. 23	C.	2	Bluish-white	0·5	. . .	7	48
	"	13. 6. 15	N.	3	Bluish-white	0·5	None	6	49
	"	13. 11. 58	S.	1	Bluish-white	0·7	Train	5	50
	"	13. 18. 28	N.	1	Bluish-white	0·6	Train	5	51
	"	13. 21. 24	J.A.G.	2	White	0·5	Slight	5	52
	"	13. 30. 15	J.A.G.	2	Bluish-white	0·7	Slight	8	53
	"	13. 47. 0	J.A.G.	2	Bluish-white	. . .	Train	..	54

No. for Reference.	Path of Meteor through the Stars.
1	From a little to left of γ Orionis fell towards the horizon parallel to a line joining α and β Orionis.
2	From ε Cygni towards γ Aquilæ.
3	Appeared about 2° above δ Cassiopeiæ and disappeared near κ Cassiopeiæ.
4	From about 3° west of Polaris disappeared near β Boötis.
5	Appeared near β Draconis; passed close above ε Aquilæ.
6	Appeared just below α Aquilæ and disappeared near ι Aquilæ.
7	Appeared about 2° east of κ Aquilæ, and fell vertically.
8	Passed below η Andromedæ at an angle of 40° to the horizon, east to west.
9	Appeared about 15° above the horizon, 20° south of the Pleiades, and fell at an angle of 50° to the horizon.
10	Appeared about 2° below β Persei, passed to left of ρ Persei.
11	Appeared near ο Ophiuchi and fell towards the horizon at an angle of 45°.
12	Passed a short distance below β and α Cassiopeiæ, parallel to line joining those stars, moving from direction of Cygnus.
13	From φ Cephei to ρ Cassiopeiæ.
14	From about 12° below Polaris towards ζ Ursæ Majoris.
15	From near γ Ursæ Majoris towards horizon at an angle of 70°.
16	Short path in N.E. at same altitude as Capella but about 15° to left, at inclination of 45°; moving from direction of Cassiopeia.
17	Very short path in N.E., at about altitude 15°, and 20° to left of Capella, moving downwards.
18	From near ε Boötis towards β Boötis.
19	From direction of a point midway between ε Cassiopeiæ and γ Persei, moved towards N. on a path at right angles to line joining [those stars. Point of appearance about 20° above and to left of Capella.
20	From c Draconis to A Ursæ Minoris.
21	Shot from near γ Ursæ Majoris at an angle of 45° to the horizon.
22	Appeared near γ Ursæ Majoris and shot towards horizon at an angle of 45°.
23	From a little to right of β Ursæ Minoris to η Ursæ Majoris.
24	From direction of 50 Cassiopeiæ passed about 10° below Polaris.
25	From direction of 50 Cassiopeiæ passed about 15° below Polaris.
26	Appeared a little below δ Bootis, pursued a path parallel to a line joining δ Bootis and α Coronæ.
27	Passed across η Pegasi from direction of α Cassiopeiæ.
28	Moving at an angle of 45° from left to right at same altitude as Mars but to left of that planet.
29	Shot perpendicularly towards horizon from near α Ophiuchi.
30	From near ε Coronæ towards α Serpentis.
31	Appeared a little south of σ Ophiuchi, shot towards ι Ophiuchi.
32	Appeared at α Arietis and moved downwards and to left, at angle of 45° to line joining α and β Arietis produced.
33	Appeared near Polaris and disappeared near η Ursæ Majoris.
34	Appeared 2° W. of γ Ursæ Majoris and fell towards the horizon at an angle of 45°.
35	From a point slightly to left of α Ophiuchi passed across β Ophiuchi.
36	From direction of α Arietis passed at an angle of 45° towards horizon to left.
37	A brilliant flash of bluish-white light, at first attributed to lightning, but on immediate reference to sky the trail of a meteor [was seen passing from η Cephei to a point a few degrees to left of β Draconis.
38	From about 20° above the Pleiades fell towards the horizon at an angle of 40° to the right.
39	From near ε Ursæ Minoris to a point between α and γ Cygni.
40	From near ψ Ursæ Majoris towards central point between δ and θ Ursæ Majoris.
41	From near β Ursæ Minoris to α Draconis.
42	From a point a little below δ Ursæ Minoris to Polaris.
43	From direction of b Camelopardali to a little to right of c Camelopardali.
44	Shot downwards from direction of Pollux towards π Leonis.
45	Passed downwards, parallel to line joining μ and ζ Leonis and about 5° from that line.
46	From near ο Ursæ Majoris towards β Ursæ Majoris.
47	Passed downwards towards δ Leonis from direction of ζ Leonis.
48	From near κ Orionis towards λ Leporis.
49	From ι Draconis fell towards horizon on line of continuation of Polaris and ι Draconis.
50	From about 2° to right of and above Sirius, fell to the right at an angle of 45° to line joining Sirius and β Canis Majoris.
51	From near λ Pegasi fell at right angles to line joining α and β Pegasi.
52	Passed midway between β and γ Ursæ Minoris, moving towards ε Ursæ Majoris.
53	Passed about 5° below γ Ursæ Minoris, moving towards η Ursæ Majoris.
54	From near α Cephei towards ζ Draconis.

Month and Day, 1873.		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						°	
November	13	14. 4. 55	C.	2	Bluish-white	0·4	None	5	1
„		14. 28. 55	C.	3	Bluish-white	0·4	None	6	2
„		14. 33. 50	N.	1	Bluish-white	0·8	Train	10	3
„		14. 44. 23	N.	1	White	0·5	Train	..	4
„		17. 26. 30	S.	2	Bluish-white	0·6	Train	10	5
„		17. 46. 10	S.	1	Bluish-white	0·8	Streak; 3 secs.	8	6
November	19	9. 11. 7	S.	1	Bluish-white	0·8	None	12	7
November	23	8. 16. 5	S.	1	Bluish-white	>3·0	Train	20	8
November	24	10. 19. 0	S.	1	Bluish-white	0·7	None	8	9
November	27	13. 13. 32	S.	2	Bluish-white	0·6	None	7	10
„		13. 17. 21	J.A.G.	1	..	0·4	None	10	11
„		13. 19. 1	J.A.G.	2	Bluish-white	0·7	Train	12	12
„		13. 20. 43	J.A.G.	1	Bluish-white	0·5	Slight	10	13
„		13. 21. 31	S.	2	Reddish	0·2	None	6	14
„		13. 31. 58	J.A.G.	2	Bluish-white	0·5	Train	..	15
„		13. 44. 19	S., J.A.G.	3	Bluish-white	0·3	None	6	16
„		15. 5. 36	S., T.	2	Bluish-white	0·6	None	5	17
„		15. 6. 38	S.	2	Bluish-white	0·4	None	8	18
„		15. 10. 36	J.A.G.	2	Bluish-white	0·4	Train	5	19
„		15. 10. 56	T.	2	Bluish-white	0·3	None	4	20
November	28	8. 26. 48	N.	1	White	0·7	Train	..	21
„		12. 5. 37	N.	3	Bluish-white	0·4	None	5	22
December	1	11. 0. 56	N.	1	White	..	Train	10	23

No. for Reference.	Path of Meteor through the Stars.
1	From a point a little above and to the right of β Orionis, disappeared a little below that star.
2	From near δ Orionis fell towards horizon at an angle of 60°.
3	From a point close to Capella to a point between β Tauri and ι Aurigæ.
4	Shot nearly perpendicularly down to left of Cassiopeia, between Cassiopeia and α Persei.
5	From direction of δ Corvi passed 2° above Spica.
6	From direction of η Boötis passed 5° above Arcturus.
7	Appeared about 2° north of Capella, shot close above δ Aurigæ.
8	From about 10° N. of Capella, shot northwards at an angle of 20° below a horizontal line.
9	From direction of κ Draconis, center of path 2° above α Ursæ Majoris.
10	From direction of δ Ursæ Majoris passed a little below χ Ursæ Majoris.
11	Passed about 20° below η Ursæ Majoris from right to left at an angle of 45° to the horizon.
12	Shot downwards 10° west of and parallel to line joining β and γ Ursæ Majoris.
13	Shot between Castor and Pollux towards κ Ursæ Majoris.
14	Shot towards the horizon past β Andromedæ at an angle of 35°.
15	From ι Ursæ Minoris towards γ Boötis.
16	From near *i* Draconis fell downwards parallel to line joining η and ζ Ursæ Majoris.
17	From direction of γ Ursæ Majoris passed close below χ Ursæ Majoris.
18	Passed just above η Ursæ Majoris at an angle of 15° to the horizon, N. to S.
19	Appeared about midway between ζ and γ Orionis, and disappeared a little below α Orionis.
20	Appeared about 1° above η Ursæ Majoris, and fell nearly vertically.
21	Passed nearly midway between Polaris and α Ursæ Majoris and across α Draconis.
22	Passed between θ and κ Ursæ Majoris, moving towards ψ Ursæ Majoris.
23	From direction of a point midway between Castor and β Aurigæ passed across γ Orionis.