RESULTS

OF THE

MAGNETICAL AND METEOROLOGICAL

OBSERVATIONS

MADE AT

THE ROYAL OBSERVATORY, GREENWICH,

IN THE YEAR

1875:

UNDER THE DIRECTION OF

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ASTRONOMER ROYAL.

PUBLISHED BY ORDER OF THE BOARD OF ADMIRALTY,

IN OBEDIENCE TO HER MAJESTY'S COMMAND.

INDEX.

INDEX.

INDEX.

INDEX.

INDEX.

INDEX.

INDEX.

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GREENWICH MAGNETICAL AND METEOROLOGICAL OBSERVATIONS, 1875.

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, which is occupied by computers of the Magnetical and Meteorological Department. 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

a 2

in the south arm, near the south-east re-entering angle.   The fire-grate (constructed of copper, as far as possible,) is near the north end of the west side of the ante-room. Some of these fixtures may contain trifling quantities of iron; and, as the ante-room is used as a computing room, it is impossible to avoid the introduction of iron in small quantities; great care, however, is taken to avoid it as far as possible.

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

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

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

The bifilar-magnetometer is in the Basement, in a position vertically below its former position.   A massive brick pier, surmounted by a thick slab of stone (upon which the metal stand carrying the photograph lamp and narrow chink is fixed) supports 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 lower part of the theodolite-pier, within the Basement, 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, as it existed at that time; an addition, however, was made to the grounds in 1868, carrying the fence 100 feet further south.

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 $8 \cdot 3$ inches: it is divided to $5'$; and is read to $5''$, by three verniers, carried by the revolving frame of the theodolite. The fixed frame stands upon three foot-screws, which rest in brass channels let into the stone pier that stands upon the brick pier rising from the ground of the Magnetic Basement. The revolving frame carries the Y's (with vertical adjustment at one end) for a telescope with transit-axis: the length of the axis is $10\frac{1}{2}$ 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. 3¾ 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 10¾ 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, 1½ inch broad, and about ¼ inch thick: it is of hard steel throughout. The magnet-carrier was also made by Meyerstein, but it has since been altered by Simms. The magnet is inserted sideways and fixed by a screw in the double square hook which constitutes the lower part of the magnet-carrier. This lower part turns stiffly by a vertical axis with index in a graduated horizontal circle (usually called the torsion-circle) attached to the upper part. The upper part of the magnet-carrier is simply hooked into the skein.

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

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

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

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

On mounting the photographic magnetometer in the basement, the damper was

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

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

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

1871, January 17. The theodolite was clamped, so that the transit-axis was at right angles to the astronomical meridian. The illuminated end of the axis of the telescope was first placed to the East: the level was applied, and its scale was read; the level was then reversed, and its scale was again read; it was then again reversed, and again read, and so on successively six times. The illuminated end of the axis was then placed to the West, and the level was applied and read as before. This process was repeated four times, and the result was, that when the level indicates the axis to be horizontal, the pivot at the illuminated end is really too low by $0''\cdot7$. This value was used until 1875, August 25.

Between 1875, August 25 and August 28, the pivots of the telescope were reground by Mr. Simms.

1875, August 31 and September 21. Experiments made on these days for determination of the pivot inequality gave values $1''\cdot5$ and $1''\cdot3$ respectively, in the same direction as before. The value used from August 28 is $1''\cdot4$.

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

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-telescope was placed in different positions, and the vertical frame carrying the telescope was then turned till the micrometer wire bisected the cross. The result of ten comparisons of theodolite-readings with large values and with small values of the micrometer-reading was, that one revolution $= 1'.34''\cdot8$. Similar experiments made 1870, December 29, 1875, September 1, and December 28, gave respectively $1'.34''\cdot2$, $1'.34''\cdot1$, and $1'.34''\cdot2$, indicating a slight change in the value. That used, however, through the year 1875 is $1'.34''\cdot8$.

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

1874, December 26. The vertical axis of the theodolite had been adjusted to verticality, and the transit-axis was made horizontal. The declination-magnet was made to rest on blocks, and the cross-wires carried by it were used as a collimator for determining the line of collimation of the telescope of the theodolite. The telescope was reversed after each observation. The mean of 20 double observations was $100^r\cdot244$. This value is used to 1875, June 30.

On 1875, July 24, it was found that a change of collimation had occurred, a deter-

mination made on this day giving 100^r·633. Another determination made 1875, August 25, gave 100^r·710. Examination of the observations of polar stars and of the fixed mark, made with the theodolite, indicated that values of collimation might be used as follows :—from July 1 to July 23, 100^r·450, and from July 24 to August 25, 100^r·650.

From 1875, August 25 to 28, the telescope was in the hands of Mr. Simms, for repair of the telescope-micrometer which had become worn. After its return, observations for collimation made on August 31, gave 100^r·067, and again on December 28, 100^r·070. The value 100^r·067 was used from August 28 to the end of the year.

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 made in 1865, after removal of the horizontal and vertical force magnets to the basement, seemed to show that the correction was 36″·9, but no numerical correction has since been applied.

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

1874, December 26. 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 20″·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.

1874, December 26. 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 25′. 39″·9, and this value was used in the reductions for 1875.

8. Effect of the damper.

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

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

Mean of times with damper in usual position .... 23^s·888
Mean of times with damper reversed end for end...................... 24^s·508
Mean of times when damper was removed............................ 23^s·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.

$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad\quad$ ′ ″

Damper turned through 2° $\begin{cases}\text{N. end towards E., increase of western declination} .....-1.27 \\ \text{N. end towards W.,} \quad ,, \qquad ,, \qquad ,, \qquad ......+1.25\end{cases}$

Damper turned through 4° $\begin{cases}\text{N. end towards E.,} \quad ,, \qquad ,, \qquad ,, \qquad ......-2.16 \\ \text{N. end towards W.,} \quad ,, \qquad ,, \qquad ,, \qquad ......+3.11\end{cases}$

Damper turned through 6° $\begin{cases}\text{N. end towards E.,} \quad ,, \qquad ,, \qquad ,, \qquad ......-3.10 \\ \text{N. end towards W.,} \quad ,, \qquad ,, \qquad ,, \qquad ......+2.55\end{cases}$

Damper turned through 8° $\begin{cases}\text{N. end towards E.,} \quad ,, \qquad ,, \qquad ,, \qquad ......-1.22 \\ \text{N. end towards W.,} \quad ,, \qquad ,, \qquad ,, \qquad ......+1.45\end{cases}$

DAMPER REVERSED END FOR END.

Damper turned through 2° $\begin{cases}\text{N. end towards E., increase of western declination} .....+0.12 \\ \text{N. end towards W.,} \quad ,, \qquad ,, \qquad ,, \qquad ......+0.20\end{cases}$

Damper turned through 4° $\begin{cases}\text{N. end towards E.,} \quad ,, \qquad ,, \qquad ,, \qquad ...... 0.0 \\ \text{N. end towards W.,} \quad ,, \qquad ,, \qquad ,, \qquad ......+0.26\end{cases}$

Damper turned through 6° $\begin{cases}\text{N. end towards E.,} \quad ,, \qquad ,, \qquad ,, \qquad ......+0.5 \\ \text{N. end towards W.,} \quad ,, \qquad ,, \qquad ,, \qquad ......+0.5\end{cases}$

Damper turned through 8° $\begin{cases}\text{N. end towards E.,} \quad ,, \qquad ,, \qquad ,, \qquad ......-0.10 \\ \text{N. end towards W.,} \quad ,, \qquad ,, \qquad ,, \qquad ......+0.5\end{cases}$

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.

Period.	Jan. 1 to June 30.	July 1 to 23.	July 24 to Aug. 25.	Aug. 28 to Dec. 31.
Reading for line of collimation -	100^r·244	100^r·450	100^r·650	100^r·067
Micrometer equivalent - -	$-\overset{\circ}{2}.3\overset{\prime}{8}.2\overset{\prime\prime}{3}·1$	$-\overset{\circ}{2}.3\overset{\prime}{8}.4\overset{\prime\prime}{2}·6$	$-\overset{\circ}{2}.3\overset{\prime}{9}.\overset{\prime\prime}{1}·6$	$-\overset{\circ}{2}.3\overset{\prime}{8}.\overset{\prime\prime}{6}·3$
Correction for the plane glass in front of the box, in its usual position - - -	$+$ 20·7	$+$ 20·7	$+$ 20·7	$+$ 20·7
The collimator above the magnet. Correction for error of collimation - - -	$-$ 25. 39·9	$-$ 25. 39·9	$-$ 25. 39·9	$-$ 25. 39·9
Constant to be used in the reduction of the observations -	$-3.$ 3. 42·3	$-3.$ 4. 1·8	$-3.$ 4. 20·8	$-3.$ 3. 25·5

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

On 1873, August 7, it was found to be 31^s·40; on 1874, December 31, 31^s·33; and on 1875, December 31, 31^s·25.

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

By the same process which is described in the Magnetical Observations 1847, but for the silk skein at present in use, the proportion was found, on 1871, October 25, $\frac{1}{180}$; on 1871, December 28, $\frac{1}{170}$; on 1873, January 1, $\frac{1}{200}$; on 1874, January 8, $\frac{1}{182}$; on 1874, December 26, $\frac{1}{194}$; and on 1875, December 31, $\frac{1}{208}$.

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

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

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

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

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

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

Let $A_{,,}$ = seconds of arc in star's azimuth,

C_s = seconds of time in star's hour-angle,

$a_{,,}$ = seconds of arc in star's N.P.D. for the day of observation,

Then log. $A_{,,}$ = log. C_s + log. E + log. $(a_{,,} + F)$ + log. cos. ϕ.

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 1875 :—January 15, 20 ; February 15, 23 ; April 12, 26 ; May 15, 19 ; June 1, 2 ; July 12, 28, 29 ; August 14, 30 ; September 14 ; October 25 ; November 8, 14 ; December 17, 22. As a check on the continued steadiness of the theodolite, observations of a fixed mark (a small hole in a plate of metal above the Observatory Library) have been taken twenty times at intervals through the year. The concluded mean readings for the south astronomical meridian used were, from January 1 to August 25, 27°. 6'. 29"·4 ; from August 28 to December 31, 27°. 6'. 25"·0. From August 25 to 28, the telescope of the theodolite was in the hands of Mr. Simms, as already mentioned.

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

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

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

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

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

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

The adopted result is converted into arc, supposing 1^r = 1'. 34"·8, and the **quantity**

thus deduced is added to the mean of the vernier-readings, to which is applied the constant given in article 9 of the permanent adjustments ; the difference between this number and the adopted reading for the Astronomical South Meridian is taken ; and thus is deduced the magnetic declination, which is used in determining the zero for the photographic register.

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

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

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

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

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

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

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

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

The trace for each instrument is produced by a flame of coal gas usually charged with the vapour of coal naphtha. For the magnetometers the light shines through a small aperture about $0^{in}\cdot 3$ long, and nearly $0^{in}\cdot 1$ broad; for the earth-current-apparatus and for the barometer, the aperture is larger. The arrangements for throwing on the photographic paper of the revolving cylinder a spot of light which shall travel in the direction of the cylinder's axis with every motion of either magnetometer or galvanometer, or with the rise and fall of the mercury in the barometer, are as follows.

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

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

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

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

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

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

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, and the labour of the computers much diminished, by this arrangement.

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

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

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

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

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

One of the revolving cylinders is used for the photographic record of the Declination-Magnet and the Horizontal-Force-Magnet. In the preparation of the basement in 1864, as has been stated, the south-eastern re-entering angle was cut away, so that the

straight line from the suspending skein of the declination-magnet to the center of those of the bifilar magnet passes through a clear space, in which the registering apparatus is placed.

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

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

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

The horizontal-force-magnet, furnished by Meyerstein of Göttingen, is, like the declination-magnet, 2 feet long, 1½ inch broad, and about ¼ inch thick. For its support (as is mentioned above), a brick pier in the eastern arm of the Magnetic Observatory, built on the ground below the basement floor, rises through the floor of the upper room, and carries a slate slab, to the top of which a brass frame is attached,

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

through a hole in the top of the box. Above the magnet box is the concave mirror above mentioned. The height of the brass pulleys of the suspension-piece above the floor is $11^{ft.} 8^{in.}\cdot 5$; that of the pulleys of the magnet-carrier is $4^{ft.} 2^{in.}\cdot 5$; and that of the center of the plane mirror is about $3^{ft.} 1^{in.}$. The distance between the branches of the silk skein, where they pass over the upper pulleys, is $1^{in.}\cdot 14$; at the lower part the distance between them is $0^{in.}\cdot 80$.

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 to the scale from the center of the plane-mirror meets the scale at the division 51 nearly; the distance from the center of the plane-mirror to division 51 of the scale is $90\cdot 8$ inches.

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

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

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

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

Suppose that the magnet is suspended in its stirrup which is firmly connected with the small plane mirror, with its marked end in a magnetic westerly direction (not exactly W., but in any westerly direction between N. and S.), and suppose that, by means of the telescope directed towards that mirror, the scale is read, or (which is the same thing) the position of the plane mirror and of the stirrup, and therefore that of the axis of the magnet, are defined. Now let the magnet be taken out of the stirrup and replaced with its marked end easterly. The terrestrial magnetic power will now act as regards torsion, in the direction opposite to that in which it acted before, and

therefore the magnet will not take the same position as before. But by turning the torsion-circle, which changes the amount and direction of the torsion-power produced by the oblique tension of the suspending cords, the magnet may be made to take the same position as at first (which will be proved by the reading of the scale, as viewed in the plane mirror, being the same). The reading of the torsion-circle will be different from what it was. The effect of this operation then is, to give us the difference of torsion-circle-readings for the same position of the magnet-axis with the marked end opposite ways, but it gives no information as to whether the magnet-axis is accurately transverse to the meridian, inasmuch as the same operation can be performed whether the magnet-axis is transverse or not.

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

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

The following table exhibits the elements of the determination made on 1874, December 29:—

1874. 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
Dec. 29	140	15·40		21·76	223	17·54		20·00
	141	24·38	8·98	21·58	224	25·65	8·11	20·10
	142	32·85	8·47	21·38	225	33·01	7·36	20·20
	143	41·60	8·75	21·12	226	40·88	7·87	20·32
	144	50·20	8·60	21·00	227	48·06	7·18	20·42
	145	58·58	8·38	20·78	228	56·11	8·05	20·60
	146	66·91	8·33	20·64	229	64·10	7·99	20·72
	147	75·13	8·22	20·56	230	73·06	8·96	20·86
	148	83·14	8·01	20·44	231	81·32	8·26	21·00
	149	91·07	7·93	20·32	232	89·89	8·57	21·26

The times of vibration and scale readings were sensibly the same, when the torsion-circle read 145°. 30′, marked end West, and 228°. 50′, marked end East, differing 83°. 20′. Half this difference, or 41°. 40′, is the angle of torsion when the magnet is transverse to the meridian. The value deduced from the whole of the observations above was 41°. 33′·6.

The value adopted in the reduction of observations through the year 1875 was 41°. 34′·25.

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 90·838 inches, and that the length of $30^{div.}·85$ of the scale is exactly 12 inches; consequently the angle at the mirror subtended by one division of the scale is 14′. 43″·25, or, for change of one division of scale-reading, the magnet is turned through an arc of 7′. 21″·625.

The variation of horizontal force (in terms of the whole horizontal force) for a disturbance through one division of the scale, is computed by the formula, " Cotan. angle of torsion × value of one division in terms of radius." Using the numbers above given, the value is found to be 0·002414 through the year 1875.

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

The details of the experiments, made while the old vertical-force-magnet was in use, will be found in the volumes for 1841, 1842, 1843, 1844, 1845. The effect was to increase the readings by $0^{\text{div}}.487$. On mounting a new vertical-force-magnet in 1848, similar experiments were made, and the resulting number was $0^{\text{div}}.45$. 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 style="text-align:right">div.</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,
$$0·00007137\ (t-32) + 0·000000898\ (t-32)^2.$$

When the marked end of the magnet (to be tried) was East,
$$0·00009050\ (t-32) + 0·000000626\ (t-32)^2.$$

The mean, or
$$0·00008093\ (t-32) + 0·000000762\ (t-32)^2$$

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.

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* 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
13   ,,   ,,   W   } at mean temperature 36°.8 Fahrenheit gave 0·403711

21   ,,   marked end E
25   ,,   ,,   W   }   ,,   61·3   ,,   0·400836

17   ,,   marked end E
16   ,,   ,,   W   }   ,,   90·3   ,,   0·400579

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
7   ,,   ,,   W   } at mean temperature 34°.2 Fahrenheit gave 0·279985

9   ,,   marked end E
11   ,,   ,,   W   }   ,,   57·0   ,,   0·275111

7   ,,   marked end E
7   ,,   ,,   W   }   ,,   86·5   ,,   0·270778

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—

$$\left\{ 1 - 0.00015816 \times (t - 32) - 0.000001172 \times (t - 32)^2 \right\}$$

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 $t = 159°·0$. The discordance cannot be removed by a supposition similar to that made above.

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

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

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

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

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

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

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

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

d 2

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 page *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 1875 is very small.

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

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

Referring to the general description of photographic apparatus, the following remarks apply more particularly to that which is attached to the horizontal-force-magnet. A concave mirror of speculum-metal, 4 inches in diameter, is carried by the magnet-carrier. The light of a gas-lamp shines through a small aperture 0^{in}·3 high, and 0^{in}·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 1875 the adopted value of variation of horizontal force for one degree of angular motion of the magnet is sin. $1°$ $\times$ cotan. $41°.\ 34'·25 = 0·019679$; and the movement of the spot of light for $0·01$ part of the whole horizontal force is 2·385 inches. With this fundamental number, the graduations of the pasteboard scale for measure of horizontal force have been prepared.

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

The vertical-force-magnet in use to 1848 was made by Robinson; that in use from 1848 to 1864, January 20, was by Barrow. The magnet now in use is by Simms. Its length is $1^{ft.}\ 6^{in.}$; 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 $2^{\text{ft.}} 10^{\text{in.}} 6$. 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 1875, vibrations of the vertical-force-magnet were observed on 158 different days, and with readings of various divisions of the scale. The mean time of vibration adopted for the year was $15^s \cdot 205$.

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 1875.

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

The distance from the scale to the mirror is 186·07 inches, and each division of the scale $= \frac{12}{30\cdot85}$ inches. Hence the angle which one division subtends, as seen from the mirror, is $7' . 11'' \cdot 19$; 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 propor-
tion 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, $4'. 30''\cdot85$.

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

For the year 1875, T' was assumed $= 16^s\cdot158$, $T = 15^s\cdot205$, dip $= 67°. 42'. 18''$.
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 $= 0\cdot000608$.

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 ⎱						
18 „ „ W ⎰	at mean temperature $36\cdot6$ Fahrenheit, gave					$0\cdot172352$
33 „ marked end E ⎱						
29 „ „ W ⎰	„		$62\cdot2$		„	$0\cdot171657$
26 „ marked end E ⎱						
27 „ „ W ⎰	„		$93\cdot3$		„	$0\cdot171389$

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

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

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

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

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

In the beginning of 1868, observations were made in the method already described
for the horizontal-force-magnet, by heating the magnetic basement to different tempe-

ratures, and observing the scale-reading in the ordinary way. The results are as follows :—

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

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

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

these evils but by maintaining almost uniform temperature; a condition which has been almost perfectly preserved in the year 1875. In the observations which follow, no correction is applied for temperature.

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 1875 in which the magnet was found in a state of vibration is very small.

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

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

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

is made by watchwork to revolve once in twenty-four hours. The trace of the vertical-force-magnet is on the west side of the cylinder.

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

The scale for the ordinates of the photographic curve of the vertical force is thus computed. Remarking that the radius which determines the range of the motion of the spot of light is double the distance $100\cdot18$ inches, and is therefore $= 200\cdot36$ inches, the formula used in the last section, when applied to $\frac{\text{disturbing force}}{\text{whole vertical force}} = 0\cdot01$, gives value of division $= 200\cdot36 \times \tan. \text{ dip.} \times \left(\frac{T}{T'}\right) \times 0\cdot01$. The value of the ordinate of the photographic curve for $\frac{\text{disturbing force}}{\text{whole vertical force}} = 0\cdot01$, thus obtained, is, for the year $1875, = 4\cdot327$ 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 1875 have been observed, is that which, for distinction, is called Airy's instrument. The following description will probably suffice to convey an idea of its peculiarities :—

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

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

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

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

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

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

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

The needle, and the bodies of the microscopes, are inclosed in a square box. The base of the box, two vertical sides, and the top, are made of gun-metal (carefully selected to insure its freedom from iron); but the sides parallel to the plane of vibration of the needle are of glass. Of the two glass sides, that which is next the

observer is firmly fixed ; it is hereafter called " the graduated glass-plate." The other glass side can be withdrawn, to open the box, for inserting the needle, &c.

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

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

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

(1.) The eye-glass.

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

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

(4.) The object-glass.

(5.) The needle.

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

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

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

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

for carrying the microscope eye-glasses, has also two arms for carrying the lenses by which the verniers and glass-plate graduations are viewed. These four arms are the radii of a circle, which can be fixed in position by a clamp, attached to the gun-metal casing of the graduated glass-plate, and furnished with the usual slow-motion screw.

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

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

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

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

The needles adapted for use with this instrument are—

B_1, a plain needle... .....
B_2, a plain needle.. } each 9 inches long.
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..
C_2, a plain needle.. } each 6 inches long.
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..
D_2, a plain needle.. } each 3 inches long.
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 instrument carries two levels, one parallel to the plane of the vertical circle, the other at right angles to that plane, by means of which the instrument is from time to time adjusted in level. The readings of the first-mentioned level have for some years (since 1867) been recorded at each separate observation of dip, and since the beginning of the present year these observed readings have been regularly employed to correct the apparent value of dip for the small outstanding error of level. The correction usually amounts to a few seconds of arc only.

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

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

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

The deflected magnet (whose use is merely to ascertain the proportion which the power of the deflecting magnet at a given distance bears to the power of terrestrial magnetism) is 3 inches long, carrying a small plane mirror. The deflecting magnet is 4 inches long; it is a hollow cylinder, carrying in its internal tube a collimator, by means of which its time of vibration is observed in another apparatus. The frame which supports the suspension-piece of the deflected magnet carries also the telescope directed to the magnet-mirror; it rotates round the vertical axis of a horizontal graduated circle whose external diameter is 10 inches. The deflecting magnet is

always placed on the E. or W. side of the deflected magnet, with one end towards the deflected magnet. In the reduction of the observations, the precepts contained in the Skeleton Form prepared at the Kew Observatory have received the strictest attention.

The following is the explanation of the method of reduction.

The distance of the centers of the deflected and deflecting magnet being known, it is found (from observations made at Kew) 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

$$0\cdot00013126\,(t_0-35) + 0\cdot000000259\,(t_0-35)^2$$

A_1 is $\frac{1}{2}$(distance)^3 × 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 $\frac{A_2}{(1\cdot3)^2}$; 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 $= A_2 \times \left(1 - \frac{P}{1\cdot69}\right)$ for larger distance. The mean of these is 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 Professor 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 $= 9\cdot6637805$, and the factor for reducing the English values of X to Metric values will be $0\cdot46108$ or $\frac{1}{2\cdot1689}$. 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 Results of the Magnetical Observations.*

The results contained in this section (so far as relates to the three magnetometers) are founded upon or derived entirely from the measures of the ordinates of the Photographic Curves.

Telescope observations of the magnetometers have usually been made four times every day, except on Sunday, on which day three observations have usually been taken. These observations have been employed for forming values of the base lines on the photographic sheets. Finally a new base line, representing a convenient reading in round numbers of the element to which it applies, has been then drawn on each sheet for convenience of further treatment.

Before further discussing the records, 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 1875, one day only has been found exhibiting practically the same amount of irregularity which had been considered as defining the class of Days of Great Disturbance in the Memoirs to which I have alluded, viz.:—

February 26 (including a few hours of February 27).

This period being separated, the photographic sheets for the remaining tranquil 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 appreciable error can exist in the diurnal inequalities of horizontal force and vertical force (Tables VI. and X.) in consequence of the

omission of the temperature correction. It may be interesting to give the actual means for the year of the observations taken at different hours daily. These are as follows:—

	0^h.	1^h.	2^h.	3^h.	9^h.	21^h.	22^h.	23^h.
Temperature of H.F. magnet	$64°\cdot4$	$64°\cdot6$	$64°\cdot7$	$64°\cdot6$	$64°\cdot5$	$64°\cdot0$	$64°\cdot1$	$64°\cdot2$
„ V.F. magnet	$64\cdot5$	$64\cdot8$	$64\cdot8$	$64\cdot8$	$64\cdot7$	$64\cdot0$	$64\cdot0$	$64\cdot1$

It may be further stated that the inequalities in the monthly means of temperature are not sensibly greater than those here exhibited. It was, however, impossible to maintain similar uniformity of temperature through all the seasons. I have, therefore, exhibited, in Tables V. and IX., mean daily temperatures referring respectively to the daily values for horizontal and vertical force given in Tables IV. and VIII. Tables VII. and XI. similarly give mean monthly temperatures corresponding to the monthly values of the magnetic elements. It will therefore be understood that the numbers given in Tables IV., VII., VIII., and XI., are *not* corrected for temperature, but require correction corresponding to the printed temperatures.

In regard to the measurement of ordinates on disturbed days, it is only necessary to mention that the Assistant, who is charged with the translation of the curve-ordinates into numbers, remarking 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, applies to each of these 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. The temperatures referring to the measures of horizontal force and vertical force on days of disturbance are given on the right-hand page of the section. As before, it is to be understood 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 $\frac{\text{H. F. metrical}}{\text{Former H. F.}} = 1\text{·}795$; and this therefore is the factor to be employed for transformation.

Similarly,

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

The Former V. F. (in the same manner as Former H. F.) $= 1$; but the V. F. metrical $=$ H. F. metrical $\times$ tan. dip. The factor is therefore $1\text{·}795 \times \tan. 67°.42'.18'' = 4\text{·}3778$.

The values given in Tables VII. and XI. and at the bottom of the left-hand page in the section of disturbed days, for the adopted zeros (in metrical units) of the variable forces, are formed by multiplying $0\text{·}8600$ and $0\text{·}9600$ (the adopted zeros in the former expressions) by these factors respectively.

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

In preceding years, allusion has been made to the occasional dislocations of the curve of Vertical Force. No instance of such dislocation has presented itself in 1875. But there were two small dislocations of the Horizontal Force curve. The first change occurred between July 5 and 6, and the second, of nearly equal amount but in the opposite direction, between November 29 and 30. See Table IV.

On examining the monthly values of Vertical Force in each year since the mounting of the Vertical Force Magnet which has been used since 1865, it is remarked that the value for each December is less than that for the preceding January by about $\frac{1}{100}$ part of the whole: a quantity vastly greater than the change deduced from the combination of Dip and Absolute Horizontal Force. This is undoubtedly caused by gradual diminution of the power of the magnet; it is supported by the increase in the time of horizontal vibration.

In the Tables of Results of Observations of the Magnetic Dip, the result of each separate observation of Dip with each of the six needles in ordinary use is given, and also the concluded monthly and yearly values for each needle.

The table giving the results of the observations for Absolute Measure of Horizontal Force requires no particular explanation.

§ 12. *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 $15\frac{2}{3}$ 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 electro-meter 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 galva-nometer could be attached for eye-observation of the currents. From this point they were led to the "Battery Basement," and, with other wires, passed under the Park to the Greenwich Railway Station, and thence upon the telegraph poles of the South Eastern Railway. One wire branched off at the junction with the North Kent Railway to Dartford, the other at the junction with the main line of railway to Croydon. At both places their connexion with earth was made by soldering to water-pipes, as at the Royal Observatory.

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

The names and connexions of the Observatory ends of the four branches were identified in 1870; in 1871, June; again in 1872; on 1873, April 17; on 1874, April 15; and 1875, May 6.

The apparatus for receiving the effects of the galvanic currents consists essentially of two magnetic needles (one for each wire), each suspended by a hair so as to vibrate horizontally within a double galvanic coil, exactly as in an ordinary galvano-meter (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) throughout the year. A current of one kind, in either wire, causes the corresponding needle to turn itself through an angle nearly proportioned to the strength of the current, in one direction; a current of the opposite kind causes it to turn in the opposite direction. These turnings are registered by the following apparatus.

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

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

The photograph records were regularly made, with the wires in the first position, from 1865, March 15, to the end of 1867. Fifty-three days, on which the magnetic disturbances were active, were selected for special examination; and for these the equivalent galvanic currents in the north and west directions were computed, and their effects in producing apparent magnetic disturbances in the west and north directions were inferred. They correspond almost exactly with those indicated by the magneto-meters. 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 commu-nicated 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.

§ 13. *Standard Barometer.*

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

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

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

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

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

The barometer has usually been read at 21^h, 0^h, 3^h, 9^h (astronomical), and corrected by application of the index error given above. 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.

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

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

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

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

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

§ 15. *Thermometers for ordinary Observation of the Temperature of the Air and of 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; their bulbs are about 4 feet above the ground and projecting from 2 inches to 3 inches below the horizontal board. The maximum and minimum thermometers for air are placed 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. 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 since the year 1840 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. This thermometer continued to be the standard of reference until June of the present year 1875.

By the kindness of the Kew Committee of the Royal Society, a new Kew Standard Thermometer, No. 515, was, during this year, supplied to the Royal Observatory; and, commencing with the month of July, all thermometers have been compared with this standard, which will hereafter be referred to as the R. O. standard.

In order to determine whether any sensible difference exists between the indications of Mr. Glaisher's standard and those of the R. O. standard, the errors of all thermometers that had been recently referred to both standards were collected for comparison, the result of which is given in the following table. It will be understood that the errors set down for any particular thermometer refer sensibly to the same parts of its scale; they are indeed usually the means of comparisons ranging from or below the freezing point to temperatures of 80° or 90°.

Reference No.	Name of Thermometer.	Apparent Error as referred to.	
		Mr. Glaisher's Standard.	R. O. Standard.
1	Standard Dry Bulb by Newman	+ 0°8	+ 0°8
2	Standard Wet Bulb by Negretti and Zambra	+ 0·5	+ 0·4
3	Negretti and Zambra, No. 8527 ....:......	+ 1·0	+ 0·7
4	Negretti and Zambra, No. 1575	+ 0·3	+ 0·3
5	Negretti and Zambra, No. 4386	+ 0·5	+ 0·5
6	Negretti and Zambra, No. 3627	− 0·6	− 0·3
7	Standard Dry Bulb by Horne and Thornthwaite	+ 0·2	+ 0·5
8	Standard Wet Bulb by Horne and Thornthwaite....	+ 0·2	+ 0·4
	Means	+ 0·4	+ 0·4

The comparisons of the thermometers 1 to 6 were made by the same person (Mr. Nash), but the separate comparisons of the thermometers 7 and 8 were made by different persons, which may explain the tendency to excess in the errors of these thermometers as referred to the R. O. standard. The thermometers 1, 2, 7, and 8, are ordinary mercurial thermometers, 3 and 4 are self-registering maximum, and 5 and 6 self-registering minimum thermometers. The final result thus depending on comparisons of the two standards by means of intermediate thermometers of various construction, is eminently satisfactory, as showing the identity of the standards.

The Dry-Bulb Thermometer employed till June 30 was by Newman. The corrections required by its readings were as follows :—

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

The wet-bulb thermometer used until June 30 was by Negretti and Zambra, and was similar to the dry-bulb thermometer. The readings of this thermometer required a subtractive correction of $0°·5$.

On July 1 the upper part of the stem of the dry-bulb thermometer (Newman) was accidentally broken. Both it and the companion wet-bulb (Negretti and Zambra) were taken down, and the dry-bulb (Newman) was sent to Messrs. Horne and Thornthwaite for restoration. They reported that the thermometer could not be repaired, and were then instructed to make a new dry and wet-bulb pair. Meanwhile a pair of thermometers made by Watkins and Hill (the property of Mr. Ellis) was employed. One thermometer marked B, and used as dry-bulb, required a subtractive correction of $0°·3$; the other thermometer, marked A, and used as wet bulb, required a subtractive correction of $0°·4$. These thermometers were used from July 1 until November 17.

On November 17, the new pair of dry and wet bulb thermometers made by Horne and Thornthwaite was brought into use. The readings of the dry-bulb thermometer required a subtractive correction of $0°·5$; those of the wet-bulb thermometer required corrections as follows :—

$$
\begin{array}{llll}
\text{Below} & 54° & \ldots \ldots \ldots \text{subtract} & 0°·5 \\
\text{Between 54 and} & 58 & \ldots \ldots & 0°·4 \\
& 58 \text{ and } 66 & \ldots \ldots & 0°·3 \\
\text{Above} & 66 & \ldots \ldots & 0°·2 \\
\end{array}
$$

The self-registering thermometers for temperature of air and evaporation are by Negretti and Zambra. The construction of the thermometers for maximum temperature is as follows.

There is a small detached piece of glass in the tube, just above a bent part of the tube (near the bulb), through which the piece of glass cannot pass down. The column of mercury in rising lifts the glass up and passes freely; but in descending it is unable to pass the glass, and the lower mass of mercury descends, leaving a vacant space below the glass, and leaving a portion of the mercury above it. The piece of glass operates as an efficient valve. The thermometer used until February 27 for maximum temperature of the air was No. 6026; its corrections were :—

$$
\begin{array}{lll}
\text{Between } 32° \text{ and } 62° & \ldots \ldots \text{subtract} & 0°·5 \\
63 \text{ and } 80 & \ldots \ldots & 0°·4 \\
\text{Above} \quad 81 & \ldots \ldots & 0°·3 \\
\end{array}
$$

On February 27 the thermometer No. 6026 was accidentally broken. From February 28 the thermometer No. 8527 was employed. Until June 30 a subtractive correction of $1°·0$ was applied to all readings. From July 1 corrections were applied as follows :—

$$
\begin{array}{lll}
\text{Below} \quad 40° & \ldots \ldots \text{subtract} & 0°·7 \\
\text{Above} \quad 40 & \ldots \ldots & 0°·8 \\
\end{array}
$$

The maximum wet bulb thermometer was No. 1575. Until June 30, corrections were applied to its readings as follows:—

$$\begin{aligned}
&\text{Between } 32^{\circ} \text{ and } 80^{\circ} \ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{ subtract } 0^{\circ}\cdot3 \\
&\text{Above } \quad 81 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 0^{\circ}\cdot2
\end{aligned}$$

From July 1 the corrections used were:—

$$\begin{aligned}
&\text{Below } \quad 35^{\circ} \ldots\ldots\ldots^{\circ}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 0^{\circ}\cdot0 \\
&\text{Between } 35 \text{ and } 40 \ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{ subtract } 0\cdot1 \\
&\qquad\quad 40 \text{ and } 43 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 0\cdot2 \\
&\text{Above } \quad 43 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 0\cdot3
\end{aligned}$$

The minimum self-registering thermometers are alcohol thermometers (on Rutherford's principle). 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 for minimum temperature of the air, No. 4386, required a subtractive correction of $0^{\circ}\cdot5$. The minimum wet-bulb, No. 3627, until June 30 required an additive correction of $0^{\circ}\cdot6$; from July 1, an additive correction of $0^{\circ}\cdot3$ was used.

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 index errors already given. The dew-point at each of these times has then been inferred by multiplying the difference between the simultaneous readings of the dry-bulb and wet-bulb 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). 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 mean daily value of the dry-bulb thermometer given in the printed columns is found by combining two results derived from different sources. The first is the mean of the maximum and minimum readings of the self-registering thermometers, 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 for diurnal inequality thus investigated. The daily range being found by taking the difference between the maximum and minimum readings, this daily range is multiplied by the mean of the factors, corresponding to the hours of observation, taken from Table IV. of Mr. Glaisher's paper before mentioned ; the application of the correction thus found to the mean of the eye-observations gives the second result. The two results are then combined to form the adopted mean, weights being given proportional to the number of observations contributing to each result.

For the mean daily value of the dew-point the usual process is to take the mean of the dew-points deduced from the several observations of the dry-bulb and wet-bulb thermometers as explained above, and to apply a correction which is the mean of the corrections for the corresponding hours in Mr. Glaisher's Table VIII. In some cases

the following method is used. The correction for diurnal inequality applicable to the mean of the eye-observations of the dry-bulb thermometer having been found (as described in the last paragraph), this correction is multiplied by a fraction whose numerator is the mean of the corrections to the wet-bulb thermometer for the hours of observation from Table VII., and whose denominator is the mean of the corresponding corrections to the dry-bulb thermometer from Table II.; thus a correction is found applicable to the mean of the eye-observations of the wet-bulb to form a wet-bulb reading for the day, comparable with the corresponding dry-bulb reading for the day. The difference between these being multiplied by the proper factor from the Table of Factors before given, the product is applied to the adopted value of the dry thermometer to obtain the dew point.

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

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

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

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

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

§ 17. *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 (No. 5964); its bulb is blackened, and enclosed in a glass sphere from which the air has been exhausted. Its graduations are correct, and the numbers inserted in the tables are those read 'from the instrument without alteration. The thermometer is read at 9^h a.m., noon, 3^h p.m., and 9^h p.m.; the highest of these readings is adopted as the maximum for the day.

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

The thermometer for radiation to the sky is placed near to the Solar Radiation thermometer, with its bulb resting on short grass, and fully exposed to the sky. It is a self-registering minimum spirit thermometer of Rutherford's construction, Horne and Thornthwaite, No. 3120. 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.

§ 18. *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 $2^{in\cdot}$, $1^{in\cdot}1$, $0^{in\cdot}9$, and $0^{in\cdot}55$; and the ranges of the scales, as first mounted, were, 43°·0 to 52°·7, 42°·0 to 56°·8, 39°·0 to 57°·5, and 34°·2 to 64°·5.

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

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

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

The readings at the early part of the series were at times defective at high tempera-

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

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

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

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

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

§ 19. *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 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. In the month of May 1874, the wooden trunk was shifted from the " Scorpion " to the " Royalist," moored in the same place. The first readings with the thermometers in the new position were taken 1874, May 5.

A strong wooden trunk is firmly fixed to the side of the " Royalist," about 5 feet in height, 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 thermometers used until February 25 were, for maximum temperature, one by Negretti and Zambra, requiring a subtractive correction of $1°·6$; and for minimum temperature, one by Horne and Thornthwaite, requiring no correction.

After February 25 two new thermometers were used : that for maximum temperature (a thermometer on Phillips's principle) is Horne and Thornthwaite, No. 22242; that for minimum temperature is Horne and Thornthwaite, No. 22243. Both thermometers required an additive correction of $0°·3$.

§ 20. *Osler's Anemometer.*

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

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

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

opposition to the wind, and it moves without sensible friction. A light wind drives it through a considerable space, until the ends of one pair of light springs touch their large hooks ; then for every additional pound of pressure the movement is smaller, till the ends of the other pair of light springs touch their large hooks ; after this the movement for every additional pound of pressure is still further diminished. This apparatus was arranged by Mr. Browning. The communication with the pencil below is similar to that in the first construction : the cord and pulley are omitted in the drawing to avoid confusion.

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

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

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

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

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

§ 21. *Robinson's Anemometer.*

In the latter part of the year 1866, a new instrument, on the principles described by Dr. Robinson in the Transactions of the Royal Irish Academy, vol. xxii., adapted to give a continuous record of the velocity of the wind, was mounted by Mr. Browning, of which the principal parts are represented in Figures 1 and 2 of the engraving in the Introduction 1866. The motion is given (as in the former instrument) by the pressure of the air on four hemispherical cups, the distance of the center of each from the axis of rotation being 15·00 inches. The foot of the axis is a hollow flat cone bearing upon a sharp cone which rises up from the base of a cup of oil. The horizontal arms are connected with a vertical spindle, upon which is an endless screw, working in a toothed wheel connected with a train of wheels, furnished with indices capable of registering one mile and decimal multiples of a mile up to 1,000 miles. A pinion C upon the axis of one of the wheels (which, in the figure, occupies a place too high) acts in a rack J, drawing it upwards by the ordinary motion of the revolving cups. The rack is pressed to the pinion by a spring, and, when it has been drawn up, it can be pressed by hand in opposition to the spring so as to release it from the pinion, and can then be pushed down, again to be raised by the action of the wheel-work. The rack is connected at the

bottom with a sliding rod D, which passes down into the chamber below, where it draws up the sliding pencil-carrier E. The pencil F, which it carries, traces its indications upon the sheet of paper wrapped round a barrel, whose axis is vertical, and which by spindle connexion with the clock H is made to revolve in 24 hours. The revolving cups and wheel-work are so adjusted that a motion of the pencil upwards of one inch represents a motion of the air through 100 miles. The curve traced upon the barrel exhibits, therefore, the aggregate of the air's movements, and also the air's velocity, at every instant of the day.

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

A post about 5 feet high with a vertical spindle in the top was erected, and on this spindle turned a horizontal arm, carrying at the extremity of its longer portion Robinson's anemometer, and on its shorter portion a counterpoise. The distance from the vertical spindle of the post to the vertical axis of the anemometer was $17^{ft.}\ 8^{in.}$·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 sufficiently confirming the accuracy of the theory.

§ 22. *Rain Gauges.*

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

The collected water passes through a tube into a vessel suspended in a frame by spiral springs, which lengthen as the water increases, until 0·25 of an inch is collected in the receiver; it then discharges itself by means of the following modification of the syphon. A copper tube, open at both ends, is fixed in the receiver, in a vertical position, with its end projecting below the bottom. Over the top of this tube a larger tube, closed at the top, is placed loosely. The smaller tube thus forms the longer

leg, and the larger tube the shorter leg, of a syphon. The water, having risen to the top of the smaller tube, gradually falls through it into the uppermost portion of a tumbling bucket, fixed in a globe under the receiver. When full, the bucket falls over, throwing the water into a small pipe at the lower part of the globe; the water completely fills the bore of the pipe; its descent causes an imperfect vacuum in the globe, sufficient to cause a draught in the longer leg of the syphon, and the whole contents run off. After leaving the globe, the water is carried away by a waste-pipe attached to the building. The springs then shorten and raise the receiver. The ascent and descent of the water-vessel move a radius-bar which carries a pencil; and this pencil makes a trace upon the paper carried by the sliding board of the self-registering anemometer. As the trace is rather long in proportion to the length of the radius-bar, the bar has now been furnished by Mr. Browning with a "parallel motion," which makes the trace sensibly straight.

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

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

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

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

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

A sixth gauge is a self-registering rain-gauge on Crosley's construction, made by Watkins and Hill. The surface exposed to the rain is 100 square inches. The collected water falls into a vibrating bucket, whose receiving concavity is entirely above the center of motion, and which is divided into two equal parts by a partition

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

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

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

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

§ 23. *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 1875 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 adjustable 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.

§ 24. *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 sixty years, is found by comparison with a table of results deduced by Mr. Glaisher from sixty years' observations, made at the Royal Observatory, ending 1873.

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-four Years Observations; those relating to Humidity have been calculated from Glaisher's Hygrometrical Tables.

The tables of Meteorological Abstracts, following the Tables of Daily Results of Meteorological Observations, require no special explanation.

§ 25. *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. These nights are, January 2 and 15 to 19; February 10 and 19; March 1 to 4 and 18; April 20 and 25 to 30; May 18; June 6 and 20; July 17, 20, and 29; August 3 and 7 to 13 (especially August 10); September 10; October 1 to 6 and 16 to 23; November 12 to 14, 19, 28, and 30; December 6 to 14 (especially December 11) and December 24.

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 others 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 1875 were Mr. Ellis, Mr. Nash, Mr. Cross, Mr. Todd, and Mr. Greengrass. Their observations are distinguished by the initials E., N., C., T., and G., respectively. Other observations, with the initials G. L. T., and M., were made by Captain Tupman, R.M.A., and Mr. Maunder respectively.

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

The papers used in 1875 were principally those furnished by Hollingsworth, Towgood, and Turner, all made 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 changes of water; 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.

§ 27. *Personal Establishment.*

The personal establishment during the year 1875 has consisted of William Ellis, Esq., Superintendent of the Magnetical and Meteorological Department, and William Carpenter Nash, Esq., Assistant.

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

Royal Observatory, Greenwich,   G. B. AIRY.
        1877, May 11.

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

MAGNETICAL OBSERVATIONS.

1875.

ROYAL OBSERVATORY, GREENWICH.

REDUCTION

OF THE

MAGNETIC OBSERVATIONS

(EXCLUDING A DAY OF MAGNETIC DISTURBANCE).

1875.

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.

1875.

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

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.

1875.

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

TABLE III.

1875.

Month.	Mean Western Declination of the Magnet in each Month.	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. 24·1	0·0439	5·8
February	19. 23·6	·0436	6·8
March	19. 23·7	·0437	11·4
April	19. 22·8	·0432	12·2
May	19. 21·6	·0426	11·2
June	19. 21·1	·0423	10·7
July	19. 20·6	·0421	10·2
August	19. 20·8	·0422	10·7
September	19. 20·4	·0420	10·3
October	19. 19·5	·0415	9·1
November	19. 18·8	·0411	6·8
December	19. 17·4	·0404	5·6
Mean	19. 21·2	0·0424	9·2

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

1875.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1	0·1492	0·1485	0·1476	0·1489	0·1495	0·1489	0·1495	0·1474	0·1476	0·1488	0·1472	0·1493
2	·1498	·1483	·1479	·1489	·1492	·1486	·1495	·1477	·1469	·1477	·1470	·1496
3	·1495	·1490	·1479	·1495	·1492	·1484	·1500	·1475	·1466	·1486	·1482	·1498
4	·1502	·1494	·1484	·1497	·1490	·1481	·1496	·1475	·1469	·1492	·1482	·1495
5	·1493	·1493	·1486	·1488	·1480	·1474	·1493	·1482	·1476	·1475	·1486	·1503
6	·1493	·1494	·1492	·1487	·1482	·1482	·1477	·1479	·1473	·1479	·1483	·1494
7	·1483	·1495	·1492	·1465	·1486	·1484	·1475	·1479	·1474	·1480	·1480	·1492
8	·1484	·1500	·1499	·1477	·1492	·1481	·1480	·1478	·1467	·1487	·1482	·1498
9	·1488	·1494	·1487	·1481	·1487	·1482	··	·1473	·1467	·1474	·1486	·1500
10	·1490	·1488	·1484	·1487	·1483	·1481	·1481	·1475	·1480	·1474	·1480	·1501
11	·1492	·1489	·1477	·1488	·1487	·1488	·1480	·1476	·1483	·1470	·1478	·1499
12	·1494	·1492	·1480	·1489	·1485	·1493	·1478	·1470	·1479	·1467	·1477	·1500
13	·1491	·1493	·1479	·1490	·1486	·1498	·1482	·1473	·1479	·1479	·1483	·1497
14	·1492	·1495	·1480	·1485	·1483	·1494	·1476	·1469	·1471	·1481	·1480	·1494
15	·1490	·1498	·1484	·1489	·1486	·1494	·1480	·1472	·1466	·1480	·1477	·1495
16	·1487	·1498	·1488	·1485	·1482	·1491	·1480	·1469	·1468	·1482	·1480	·1495
17	·1484	·1498	·1486	·1485	·1482	·1499	·1478	·1467	·1474	·1488	·1484	·1482
18	·1482	·1497	·1487	·1486	·1484	·1491	·1476	·1463	·1475	·1481	·1487	·1488
19	·1488	·1496	·1477	·1486	·1487	·1490	·1481	·1464	·1474	·1483	·1484	·1488
20	·1486	·1498	·1484	·1488	·1492	·1492	·1480	·1464	·1474	·1483	·1477	·1492
21	·1487	·1490	·1481	·1489	·1491	·1492	·1485	·1466	·1480	·1480	·1472	·1493
22	·1484	·1493	·1483	·1488	·1485	·1490	·1484	·1469	·1481	·1482	·1468	·1492
23	·1488	·1492	·1485	·1492	··	·1490	·1484	·1463	·1484	·1485	·1470	·1490
24	·1492	·1497	·1490	·1487	·1483	·1488	·1480	·1466	·1492	·1482	·1470	·1497
25	·1487	·1492	·1490	·1488	·1482	·1487	·1483	·1467	·1488	·1479	·1472	·1493
26	·1487	··	·1493	·1489	·1483	·1489	·1482	·1472	·1487	·1475	·1477	·1490
27	·1488	··	·1495	·1483	·1489	·1493	·1481	·1466	·1485	·1478	·1477	·1492
28	·1485	·1472	·1489	·1483	·1497	·1499	·1477	·1468	·1490	·1478	·1477	·1494
29	·1489		·1485	·1484	·1495	·1489	·1478	·1473	·1484	·1473	·1474	·1495
30	·1487		·1489	·1484	·1488	·1492	·1475	·1470	·1482	·1473	·1496	·1496
31	·1485		·1491		·1489		·1470	·1468		·1477		·1494

Small dislocations of the photographic trace occurred between July 5 and 6, and between November 29 and 30, without apparent cause.

TABLE V.—DAILY MEANS of READINGS (usually eight on each Day) of the THERMOMETER placed on the box inclosing the HORIZONTAL FORCE MAGNETOMETER, for each ASTRONOMICAL DAY.

1875.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1	61·1	62·5	62·4	63·1	63·1	65·4	66·8	65·5	67·9	66·1	62·4	61·5
2	61·7	62·5	62·8	62·7	62·9	66·1	66·6	65·9	69·5	66·0	62·8	61·4
3	63·3	62·3	62·4	62·7	64·0	67·5	66·4	66·1	68·2	65·3	63·1	61·2
4	62·7	62·1	62·2	62·0	64·6	68·5	65·7	65·5	67·4	66·7	63·9	61·6
5	62·9	61·8	61·8	62·0	65·0	68·2	66·7	66·1	66·3	66·3	63·6	60·6
6	62·6	62·0	62·3	62·2	64·7	67·8	67·6	67·8	67·4	64·5	63·4	61·1
7	62·9	62·1	62·3	62·5	63·4	68·1	67·1	69·2	68·4	64·8	61·6	61·9
8	62·7	62·4	62·1	63·0	64·4	68·1	66·5	70·1	69·0	64·8	61·2	62·0
9	62·6	62·5	61·9	62·8	63·8	67·8	65·3	70·4	67·9	64·0	61·8	61·5
10	63·2	62·3	62·7	62·6	63·7	66·7	65·0	70·7	66·8	63·1	62·4	61·5
11	63·4	62·7	62·2	62·2	63·9	65·1	64·0	70·8	67·6	63·3	62·1	61·6
12	63·5	62·7	61·8	62·3	65·2	64·0	63·7	70·3	68·7	63·2	62·5	61·7
13	63·7	61·9	62·1	62·3	66·3	64·6	64·3	70·4	69·6	63·7	62·6	61·4
14	63·7	62·3	61·5	62·5	67·2	64·9	64·8	70·8	69·7	62·9	61·7	61·9
15	63·6	62·4	62·0	62·3	67·6	64·1	65·6	71·6	68·8	63·1	62·5	62·5
16	63·8	62·5	62·4	62·8	65·5	64·2	66·2	73·3	68·8	62·8	63·1	62·5
17	63·6	62·9	62·3	62·9	65·5	64·3	66·5	74·0	69·6	62·3	63·7	62·8
18	63·5	62·6	62·7	63·2	64·5	64·6	67·6	72·4	70·5	63·7	63·6	62·9
19	63·3	62·3	62·3	63·5	63·4	65·5	66·9	71·0	70·1	64·0	62·5	61·7
20	63·2	62·3	62·1	62·4	63·6	64·7	65·7	71·9	70·1	64·7	61·8	62·1
21	62·5	62·5	61·7	63·4	64·9	63·8	65·1	71·2	69·6	65·1	61·4	62·8
22	61·8	62·3	62·3	62·2	64·7	64·7	65·3	69·5	68·8	64·4	62·4	62·8
23	62·5	62·3	62·7	62·3	64·6	65·7	65·4	69·7	66·1	64·1	62·8	62·7
24	62·4	62·0	62·6	62·1	64·9	66·6	65·7	69·8	66·1	62·5	62·3	62·5
25	62·5	62·3	62·8	62·6	64·8	67·0	65·2	70·8	67·3	62·7	61·7	61·4
26	62·6	61·9	62·2	62·7	64·2	67·0	65·5	70·5	66·1	62·1	61·7	62·4
27	62·6	61·8	62·9	63·2	63·7	66·1	65·7	69·3	65·8	62·3	61·7	62·3
28	63·1	62·4	62·7	63·6	64·1	66·3	66·6	68·5	65·5	62·6	61·1	62·1
29	63·0		63·0	63·6	64·0	66·8	66·9	67·5	65·5	62·7	60·9	62·2
30	62·2		63·1	64·0	63·4	66·8	67·1	67·6	65·4	62·9	61·3	62·2
31	61·7		62·9		64·3|		66·5	66·9		62·3		61·9

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

1875.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
0	0·1489	0·1491	0·1479	0·1478	0·1481	0·1481	0·1474	0·1466	0·1470	0·1476	0·1476	0·1493
1	·1492	·1492	·1481	·1482	·1485	·1485	·1477	·1470	·1474	·1479	·1479	·1494
2	·1491	·1494	·1485	·1486	·1488	·1489	·1482	·1470	·1476	·1480	·1480	·1496
3	·1491	·1493	·1486	·1489	·1490	·1491	·1485	·1471	·1477	·1481	·1479	·1496
4	·1490	·1492	·1487	·1491	·1493	·1492	·1485	·1471	·1476	·1481	·1479	·1495
5	·1489	·1491	·1487	·1491	·1495	·1494	·1487	·1473	·1476	·1482	·1480	·1495
6	·1489	·1491	·1487	·1492	·1496	·1496	·1488	·1475	·1478	·1482	·1479	·1495
7	·1488	·1492	·1488	·1492	·1495	·1497	·1490	·1475	·1480	·1482	·1479	·1494
8	·1487	·1492	·1488	·1491	·1493	·1496	·1489	·1475	·1481	·1480	·1479	·1493
9	·1488	·1491	·1487	·1491	·1491	·1494	·1488	·1475	·1481	·1480	·1479	·1493
10	·1488	·1491	·1488	·1490	·1490	·1493	·1487	·1474	·1481	·1480	·1479	·1493
11	·1486	·1491	·1488	·1491	·1489	·1492	·1486	·1474	·1482	·1480	·1480	·1493
12	·1487	·1491	·1488	·1490	·1490	·1491	·1486	·1474	·1482	·1481	·1480	·1493
13	·1487	·1491	·1487	·1490	·1489	·1491	·1485	·1474	·1482	·1481	·1479	·1493
14	·1488	·1491	·1487	·1488	·1489	·1491	·1484	·1475	·1481	·1481	·1479	·1494
15	·1489	·1491	·1486	·1488	·1488	·1490	·1484	·1475	·1481	·1481	·1479	·1494
16	·1490	·1492	·1487	·1487	·1488	·1491	·1483	·1475	·1481	·1482	·1481	·1495
17	·1491	·1493	·1488	·1488	·1487	·1490	·1482	·1474	·1481	·1482	·1482	·1496
18	·1492	·1494	·1489	·1489	·1485	·1488	·1480	·1473	·1479	·1482	·1481	·1497
19	·1492	·1494	·1489	·1486	·1481	·1485	·1479	·1469	·1477	·1481	·1481	·1497
20	·1491	·1494	·1486	·1482	·1478	·1482	·1476	·1465	·1473	·1478	·1478	·1497
21	·1489	·1492	·1481	·1477	·1477	·1479	·1473	·1462	·1469	·1473	·1475	·1494
22	·1488	·1489	·1478	·1472	·1477	·1477	·1470	·1460	·1467	·1471	·1473	·1492
23	·1487	·1488	·1477	·1473	·1478	·1478	·1471	·1461	·1467	·1472	·1473	·1491

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

TABLE VII.

1875.

Month.	MEAN HORIZONTAL MAGNETIC FORCE in EACH MONTH, uncorrected for TEMPERATURE.		Mean Temperature.
	Expressed in terms of the MEAN HORIZONTAL FORCE for the Year, and diminished by a Constant (0·8600 nearly).	Expressed in terms of GAUSS's UNIT measured on the METRICAL SYSTEM, and diminished by a Constant (1·5437 nearly).	
January	0·1489	0·2673	62·8
February....................	·1492	·2679	62·3
March	·1486	·2668	62·4
April	·1486	·2668	62·8
May........................	·1487	·2670	64·5
June	·1489	·2673	66·0
July { 1 to 5	·1496	·2686	66·4
{ 6 to 31	·1479	·2655	65·8
August	·1471	·2641	69·6
September	·1477	·2652	68·0
October	·1480	·2657	63·9
November (omitting Nov. 30) .	·1478	·2653	62·3
December	·1494	·2682	62·0

Small dislocations of the photographic trace occurred between July 5 and 6, and between November 29 and 30, without apparent cause. See Table IV.
The value 0·8600 of Horizontal Force corresponds to 1·5437 of Gauss's Unit on the Metrical System.

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

1875.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1	0·0348	0·0348	0·0344	0·0339	0·0329	0·0334	0·0338	0·0314	0·0310	0·0287	0·0246	0·0226
2	·0350	·0349	·0344	·0336	·0326	·0346	·0335	·0314	·0330	·0282	·0251	·0228
3	·0365	·0350	·0341	·0331	·0338	·0361	·0332	·0315	·0314	·0273	·0256	·0224
4	·0362	·0346	·0337	·0334	·0343	·0366	·0323	·0309	·0300	·0289	·0267	·0230
5	·0361	·0345	·0335	·0333	·0350	·0354	·0333	·0316	·0296	·0287	·0267	·0219
6	·0356	·0346	·0343	·0337	·0348	·0352	·0345	·0341	·0306	·0264	·0256	·0223
7	·0360	·0344	·0345	·0339	·0332	·0354	·0341	·0356	·0319	·0276	·0245	·0235
8	·0355	·0344	·0338	·0344	·0340	·0354	·0330	·0359	·0330	·0276	·0229	·0232
9	·0352	·0344	·0335	·0339	·0334	·0354	·0317	·0354	·0305	·0262	·0241	·0227
10	·0358	·0345	·0344	·0336	·0334	·0339	·0309	·0357	·0297	·0263	·0245	·0228
11	·0361	·0349	·0340	·0335	·0334	·0320	·0310	·0354	·0306	·0265	·0245	·0225
12	·0361	·0349	·0335	·0330	·0350	·0308	·0297	·0352	·0319	·0265	·0250	·0228
13	·0362	·0341	·0338	·0328	·0357	·0313	·0300	·0352	·0328	·0267	·0248	·0226
14	·0363	·0347	·0338	·0335	·0362	·0321	·0314	·0355	·0324	·0260	·0232	·0234
15	·0362	·0344	·0338	·0332	·0359	·0308	·0327	·0360	·0309	·0259	·0245	·0233
16	·0362	·0346	·0341	·0339	·0344	·0308	·0330	·0366	·0317	·0253	·0256	·0233
17	·0363	·0342	·0337	·0340	·0333	·0315	·0335	·0363	·0329	·0251	·0259	·0235
18	·0361	·0341	·0339	·0344	·0327	·0316	·0350	·0351	·0333	·0268	·0257	·0237
19	·0357	·0340	·0342	·0344	·0311	·0328	·0340	··	·0333	·0269	·0240	·0230
20	·0353	·0341	·0343	·0345	·0313	·0332	·0325	·0347	·0328	·0270	·0234	·0228
21	·0347	·0343	·0339	·0341	·0330	·0307	·0312	·0334	·0320	·0277	·0237	·0234
22	·0339	·0340	·0337	·0330	·0328	·0318	·0310	·0326	·0315	·0270	·0239	·0232
23	·0352	·0333	·0336	·0328	·0326	·0332	·0312	·0323	·0287	·0264	·0242	·0237
24	·0345	·0332	·0339	·0324	·0333	·0344	·0312	·0326	·0282	·0253	·0240	·0232
25	·0350	·0338	·0345	·0331	·0333	·0347	·0312	·0338	·0293	·0252	·0238	·0222
26	·0350	··	·0339	·0332	·0323	·0333	·0314	·0332	·0291	·0245	·0233	·0236
27	·0351	··	·0340	·0342	·0318	·0329	·0314	·0317	·0278	·0247	·0233	·0234
28	·0357	·0347	·0345	·0343	·0326	·0332	·0328	·0311	·0280	·0255	·0229	·0229
29	·0357		·0342	·0344	·0316	·0339	·0330	·0303	·0278	·0253	·0220	·0229
30	·0344		·0341	·0347	·0318	·0336	·0333	·0301	·0275	·0251	·0226	··
31	·0343		·0340		·0320		·0318	·0295		·0248		··

TABLE IX.—DAILY MEANS of READINGS (usually eight on each Day) of the THERMOMETER placed on the box inclosing the VERTICAL FORCE MAGNETOMETER, for each ASTRONOMICAL DAY.

1875.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1	61·6	62·7	62·6	62·8	63·0	66·4	67·2	65·4	67·8	65·8	62·4	61·3
2	61·8	62·5	62·8	62·3	63·1	67·6	67·3	66·1	69·6	65·5	62·8	61·4
3	63·7	62·7	62·3	62·3	64·8	69·0	66·6	66·4	67·8	64·8	63·0	61·0
4	62·7	62·6	62·1	62·0	64·8	69·6	65·7	65·5	67·0	66·5	64·4	61·9
5	63·3	62·4	62·0	62·4	65·4	68·7	67·6	66·4	66·0	66·0	63·9	60·6
6	62·8	62·9	62·6	62·7	64·9	68·1	68·7	68·6	67·7	63·7	62·9	61·4
7	63·3	62·5	62·7	62·6	63·0	68·5	67·6	70·1	68·9	64·4	61·6	62·7
8	62·6	62·8	62·2	63·0	64·3	69·1	66·7	70·2	68·9	64·7	61·2	62·0
9	62·6	62·5	61·7	62·9	63·8	68·6	65·1	70·4	67·2	64·1	62·2	61·5
10	63·2	62·3	62·6	62·6	63·9	66·8	64·6	70·6	66·5	62·9	62·2	61·8
11	63·2	63·0	62·1	62·4	64·0	64·9	63·9	70·3	67·2	63·3	62·4	61·2
12	63·6	62·9	61·8	62·4	66·1	63·6	63·4	70·0	68·5	63·5	63·2	61·7
13	63·8	62·1	62·4	62·1	67·3	64·5	64·2	70·2	69·7	63·9	62·4	61·8
14	63·5	62·4	61·6	62·6	68·0	65·0	65·4	70·5	69·3	63·1	61·0	62·7
15	63·3	62·4	62·4	62·5	69·0	63·6	65·9	71·5	68·1	62·8	62·5	62·3
16	63·8	63·1	62·8	63·0	65·8	64·4	66·5	73·0	68·8	62·6	63·3	62·5
17	63·5	62·8	62·2	63·0	65·5	64·9	67·1	73·9	69·9	62·4	63·8	62·6
18	63·2	62·4	62·8	63·3	64·8	64·8	68·3	72·4	70·7	63·9	63·3	62·5
19	63·3	62·5	62·6	63·8	62·9	66·4	66·9	71·1	69·7	63·8	61·6	61·5
20	63·0	62·4	62·6	64·0	63·5	65·1	65·3	71·8	69·8	64·1	61·5	62·0
21	62·1	62·7	62·3	63·7	65·5	63·7	64·9	71·1	69·0	64·6	62·1	62·5
22	61·6	62·2	62·6	62·1	64·6	65·4	65·0	69·0	68·3	64·0	62·7	62·3
23	62·7	62·0	62·9	62·2	64·6	66·9	64·9	69·4	65·5	63·6	62·0	62·6
24	62·2	62·0	62·9	62·4	65·5	67·9	65·8	69·6	65·7	61·7	62·2	62·3
25	62·6	62·5	63·3	62·6	65·4	68·1	65·1	70·2	67·1	62·1	62·2	61·5
26	62·8	62·3	62·5	63·0	64·2	67·7	65·8	69·6	65·1	61·7	61·8	62·7
27	63·3	62·4	63·3	63·7	63·9	66·5	65·7	68·8	65·0	61·8	62·1	62·5
28	63·4	62·9	63·1	63·8	64·5	66·8	67·6	67·8	65·1	62·5	61·4	62·2
29	63·0		63·1	63·9	64·1	67·5	67·9	66·7	64·9	62·0	60·8	62·0
30	62·4		63·0	64·7	63·3	67·0	67·9	67·3	65·1	62·4	61·3	62·4
31	61·8		62·8		64·2		66·8	66·0		61·9		62·2

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

1875.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
0	0·0352	0·0341	0·0334	0·0329	0·0326	0·0328	0·0319	0·0330	0·0303	0·0261	0·0241	0·0227
1	·0353	·0342	·0336	·0331	·0329	·0331	·0322	·0334	·0307	·0264	·0242	·0228
2	·0354	·0343	·0338	·0334	·0333	·0334	·0324	·0338	·0311	·0266	·0243	·0229
3	·0354	·0344	·0340	·0335	·0335	·0337	·0326	·0341	·0314	·0267	·0244	·0229
4	·0354	·0344	·0341	·0337	·0338	·0339	·0328	·0343	·0316	·0268	·0244	·0229
5	·0356	·0343	·0341	·0338	·0340	·0341	·0330	·0344	·0317	·0268	·0245	·0230
6	·0358	·0344	·0342	·0339	·0342	·0342	·0331	·0344	·0317	·0269	·0246	·0231
7	·0359	·0345	·0343	·0340	·0342	·0343	·0332	·0345	·0317	·0269	·0246	·0232
8	·0359	·0345	·0344	·0341	·0342	·0343	·0332	·0345	·0317	·0268	·0246	·0232
9	·0359	·0345	·0344	·0340	·0342	·0343	·0331	·0344	·0316	·0268	·0245	·0232
10	·0358	·0345	·0343	·0340	·0341	·0341	·0330	·0343	·0314	·0267	·0245	·0232
11	·0357	·0346	·0343	·0340	·0339	·0337	·0327	·0340	·0312	·0267	·0245	·0232
12	·0357	·0346	·0343	·0340	·0337	·0335	·0325	·0337	·0310	·0267	·0245	·0232
13	·0357	·0346	·0343	·0340	·0336	·0333	·0324	·0335	·0308	·0266	·0245	·0232
14	·0356	·0345	·0342	·0339	·0334	·0331	·0322	·0332	·0306	·0265	·0245	·0231
15	·0355	·0345	·0341	·0339	·0332	·0330	·0321	·0330	·0304	·0265	·0244	·0230
16	·0355	·0344	·0341	·0338	·0330	·0329	·0320	·0328	·0302	·0264	·0244	·0230
17	·0354	·0344	·0340	·0337	·0329	·0327	·0319	·0326	·0301	·0263	·0243	·0229
18	·0354	·0343	·0339	·0336	·0328	·0326	·0317	·0325	·0300	·0262	·0243	·0229
19	·0354	·0343	·0339	·0336	·0327	·0326	·0317	·0325	·0299	·0261	·0242	·0228
20	·0354	·0343	·0338	·0335	·0326	·0326	·0317	·0325	·0298	·0260	·0242	·0229
21	·0353	·0342	·0336	·0333	·0325	·0326	·0317	·0325	·0298	·0260	·0241	·0228
22	·0353	·0341	·0335	·0332	·0324	·0326	·0317	·0325	·0299	·0259	·0241	·0228
23	·0352	·0340	·0333	·0329	·0324	·0326	·0317	·0327	·0300	·0258	·0240	·0227

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

TABLE XI.

1875.

Month.	MEAN VERTICAL MAGNETIC FORCE IN EACH MONTH, uncorrected for TEMPERATURE.		Mean Temperature.
	Expressed in terms of the MEAN VERTICAL FORCE for the YEAR, and diminished by a Constant (0·9600 nearly).	Expressed in terms of GAUSS'S UNIT measured on the METRICAL SYSTEM, and diminished by a Constant (4·2027 nearly).	
January......................	0·0355	0·1554	62·9
February.....................	·0344	·1507	62·5
March	·0340	·1489	62·5
April........................	·0337	·1476	62·9
May.........................	·0333	·1458	64·8
June	·0333	·1458	66·6
July.........................	·0323	·1414	66·2
August	·0335	·1467	69·4
September....................	·0308	·1348	67·7
October......................	·0265	·1160	63·6
November	·0244	·1069	62·4
December	·0230	·1007	62·0

The value 0·9600 of Vertical Force corresponds to 4·2027 of Gauss's Unit on the Metrical System.

TABLE XII.—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 1875.

January to December.

Hour, Greenwich Mean Solar Time.	Inequality of Declination.	Equivalent in terms of Gauss's Unit measured on the Metrical System.	Inequality of Horizontal Force.	Equivalent in terms of Gauss's Unit measured on the Metrical System.	Inequality of Vertical Force.	Equivalent in terms of Gauss's Unit measured on the Metrical System.
h	′					
0	+ 4·15	+ 0·00217	− 0·00048	− 0·00086	− 0·00047	− 0·00206
1	+ 4·76	+ 248	− 18	− 32	− 23	− 101
2	+ 4·17	+ 218	+ 4	+ 7	0	0
3	+ 3·07	+ 160	+ 14	+ 25	+ 16	+ 70
4	+ 1·93	+ 101	+ 17	+ 31	+ 28	+ 123
5	+ 1·03	+ 54	+ 23	+ 41	+ 38	+ 166
6	+ 0·25	+ 13	+ 30	+ 54	+ 47	+ 206
7	− 0·29	− 15	+ 33	+ 59	+ 55	+ 241
8	− 0·89	− 46	+ 27	+ 48	+ 57	+ 250
9	− 1·29	− 67	+ 22	+ 39	+ 52	+ 228
10	− 1·53	− 80	+ 18	+ 32	+ 43	+ 188
11	− 1·56	− 81	+ 17	+ 31	+ 32	+ 140
12	− 1·44	− 75	+ 17	+ 31	+ 23	+ 101
13	− 1·25	− 65	+ 14	+ 25	+ 15	+ 66
14	− 1·22	− 64	+ 13	+ 23	+ 1	+ 4
15	− 1·23	− 64	+ 12	+ 22	− 9	− 39
16	− 1·31	− 68	+ 17	+ 31	− 18	− 79
17	− 1·64	− 86	+ 18	+ 32	− 29	− 127
18	− 1·90	− 99	+ 14	+ 25	− 37	− 162
19	− 2·18	− 114	− 1	− 2	− 42	− 184
20	− 2·28	− 119	− 27	− 48	− 45	− 197
21	− 1·72	− 90	− 59	− 106	− 52	− 228
22	− 0·07	− 4	− 82	− 147	− 56	− 245
23	+ 2·23	+ 116	− 80	− 144	− 62	− 271

ROYAL OBSERVATORY, GREENWICH.

INDICATIONS

OF

MAGNETOMETERS

DURING A MAGNETIC DISTURBANCE.

1875.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°...	Greenwich Mean Solar Time.	Horizontal Force. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb.26 h m	° ′ ″		Feb.26 h m			Feb.26 h m			Feb.26 h m	° ′ ″		Feb.26 h m			Feb.26 h m		
0. 0	19.29. 0	·0465	0. 0	·1495	·2684	0. 0	·0337	·1476	10.50	19. 4.50	·0338	9.45	·1476	·2650	19.30	·0331	·1449
0. 7	28.30	·0462	0.10	·1490	·2675	0.55	·0340	·1489	11. 0	7. 5	·0350	9.47	·1469	·2637	20. 6	·0331	·1449
0.16	29.40	·0468	0.14	·1495	·2684	1.20	·0340	·1489	11.10	8. 0	·0355	10. 0	·1470	·2639	20.10	·0333	·1458
0.34	27.55	·0459	0.20	·1489	·2673	1.40	·0342	·1498	11.32	14.50	·0390	10.10	·1461	·2623	20.13	·0331	·1449
0.40	29.20	·0467	0.29	·1491	·2677	1.48	·0341	·1493	11.43	13.30	·0384	10.20	·1468	·2635	20.20	·0332	·1454
0.42	28.40	·0462	0.37	·1488	·2671	2.18	·0343	·1502	11.50	13. 0	·0381	10.35	·1472	·2643	20.24	·0330	·1445
0.49	30.10	·0471	0.41	·1493	·2680	2.30	·0342	·1498	12.10	6.30	·0348	10.47	·1456	·2614	20.27	·0332	·1454
0.55	28.50	·0463	0.44	·1490	·2675	2.35	·0344	·1507	12.28	1.15	·0319	10.52	·1461	·2623	20.32	·0329	·1440
1. 2	30.20	·0472	0.52	·1499	·2691	2.45	·0343	·1502	12.35	1.25	·0320	10.58	·1459	·2619	20.36	·0332	·1454
1.10	28.10	·0460	0.54	·1495	·2684	2.53	·0344	·1507	12.45	1.40	·0321	11. 5	·1470	·2639	20.42	·0329	·1440
1.18	30. 0	·0470	1. 1	·1499	·2691	3. 5	·0346	·1515	13. 3	11.45	·0375	11.30	·1455	·2612	21. 3	·0329	·1440
1.26	27.20	·0456	1. 7	·1484	·2664	3.40	·0344	·1507	13. 6	11. 0	·0371	11.37	·1462	·2625	21.17	·0330	·1445
1.32	30.55	·0475	1.12	·1498	·2689	5. 0	·0342	·1498	13.20	16.55	·0402	11.42	·1461	·2623	21.50	·0329	·1440
1.42	32.30	·0483	1.15	·1480	·2657	5.51	·0341	·1493	13.36	9.10	·0361	11.49	·1474	·2646	21.58	·0328	·1436
1.51	30.10	·0471	1.20	·1491	·2677	5.59	·0342	·1498	13.40	9.30	·0363	11.55	·1460	·2621	22.10	·0329	·1440
1.59	30. 5	·0470	1.24	·1489	·2673	6.50	·0341	·1493	13.52	4.40	·0337	12.13	·1445	·2594		(†)	
2. 3	31.10	·0476	1.38	·1501	·2695	8. 0	·0339	·1484	14.22	15. 0	·0392	12.22	·1452	·2607	22.40	·0324	·1419
2. 8	29.20	·0467	1.40	·1498	·2689	8.50	·0341	·1493	14.50	22.10	·0429	12.32	·1436	·2578	22.42	·0325	·1423
2.24	32.30	·0483	1.46	·1501	·2695	9.37	·0340	·1489	14.59	22.50	·0432	12.43	·1441	·2587	22.45	·0323	·1414
2.30	29.30	·0468	1.52	·1490	·2675	10. 0	·0341	·1493	15. 7	21.50	·0427	12.54	·1461	·2623	22.50	·0324	·1419
2.38	30. 5	·0470	2. 3	·1497	·2688	10.36	·0339	·1484	15.19	20.45	·0422	13.11	·1437	·2580	22.55	·0322	·1410
2.48	23.50	·0437	2.10	·1491	·2677	10.43	·0338	·1480	15.45	21.55	·0428	13.21	·1460	·2621	22.59	·0326	·1427
2.53	24.30	·0441	2.13	·1496	·2686	11. 2	·0340	·1489	15.52	20.10	·0419	13.23	·1451	·2605	23.12	·0321	·1405
3. 0	22.20	·0430	2.20	·1488	·2671	11.30	·0336	·1471	15.58	21.40	·0426	13.29	·1458	·2617	23.20	·0327	·1432
3.10	25. 0	·0444	2.24	·1494	·2682	11.50	·0332	·1454	16. 0	20.20	·0420	13.33	·1450	·2603	23.23	·0326	·1427
3.20	23.30	·0436	2.30	·1479	·2655	11.57	·0332	·1454	16.12	20.20	·0420	13.36	·1454	·2610	23.40	·0330	·1445
3.30	23.55	·0438	2.35	·1483	·2662	12.19	·0330	·1445	16.18	21.50	·0427	13.40	·1447	·2598		(†)	
3.38	25.10	·0445	2.42	·1472	·2643	12.22	·0327	·1432	16.21	20.45	·0422	13.50	·1456	·2614	23.55	·0341	·1493
3.48	24.20	·0440	2.59	·1480	·2657	12.40	·0328	·1436	16.30	21.55	·0428	13.56	·1451	·2605	23.59	·0336	·1471
3.53	25. 5	·0444	3. 5	·1484	·2664	12.43	·0327	·1432	16.55	23.50	·0437	14. 0	·1456	·2614			
4. 5	24.30	·0441	3.20	·1492	·2679	12.48	·0327	·1432	16.58	21.55	·0428	14. 4	·1449	·2601			
4.50	23.50	·0437	3.30	·1487	·2670	13.10	·0320	·1401	17. 3	21.50	·0427	14.22	·1466	·2632			
5.50	24. 0	·0438	3.40	·1493	·2680	13.19	·0318	·1392	17.10	24. 5	·0438	14.24	·1461	·2623			
5.53	22.15	·0429	3.50	·1489	·2673	13.22	·0317	·1388	17.14	20.10	·0419	14.40	·1471	·2641			
6. 8	24.35	·0441	4.30	·1492	·2679	13.38	·0314	·1375	17.22	23.30	·0436	14.51	·1464	·2628			
6.18	23.10	·0434	5.13	·1498	·2689	13.45	·0318	·1392	17.26	21. 5	·0423	14.59	·1466	·2632			
6.29	24.35	·0441	5.50	·1495	·2684	13.50	·0318	·1392	17.30	22.20	·0430	15.21	·1474	·2646			
6.46	23.10	·0434	5.58	·1506	·2704	14.20	·0325	·1423	17.36	19.10	·0413	15.35	·1472	·2643			
7.12	25. 5	·0444	6.28	·1494	·2682	15. 0	·0330	·1445	17.50	22. 5	·0428	15.44	·1475	·2648			
7.34	24.10	·0439	6.41	·1502	·2697	15.50	·0331	·1449	17.54	21.15	·0424	15.52	·1473	·2644			
7.50	24.30	·0441	6.58	·1498	·2689	15.56	·0332	·1454	18. 3	23.10	·0434	16. 0	·1478	·2653			
8.33	21.15	·0424	7.21	·1493	·2680	16.11	·0332	·1454	18. 4	22.10	·0429	16.15	·1477	·2652			
8.52	23. 0	·0433	7.35	·1497	·2688	16.50	·0333	·1458	18.10	23.50	·0437	16.33	·1476	·2650			
9. 0	22.30	·0431	7.50	·1499	·2691	17. 6	·0333	·1458	18.18	20.50	·0422	16.43	·1473	·2644			
9.10	23.20	·0435	8. 0	·1493	·2680	17.12	·0332	·1454	18.28	19.10	·0413	16.55	·1478	·2653			
9.26	20.25	·0420	8. 7	·1493	·2680	17.20	·0334	·1463	18.36	22.25	·0430	16.58	·1471	·2641			
9.39	20.15	·0419	8.21	·1487	·2670	17.42	·0332	·1454	18.38	21. 5	·0423	17. 8	·1481	·2659			
9.44	17.55	·0407	8.38	·1484	·2664	18.10	·0334	·1463	18.45	22. 0	·0428	17.13	·1471	·2641			
10. 0	19. 5	·0412	8.45	·1488	·2671	18.28	·0332	·1454	18.56	19. 0	·0412	17.18	·1482	·2661			
10.17	13.30	·0384	8.55	·1486	·2668	18.38	·0333	·1458	19.11	23.50	·0437	17.22	·1476	·2650			
10.20	13.20	·0383	9. 3	·1491	·2677	18.53	·0331	·1449	19.13	21. 0	·0423	17.29	·1481	·2659			
10.40	3.55	·0334	9.30	·1477	·2652	19. 6	·0332	·1454	19.17	22.50	·0432	17.32	·1475	·2648			

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

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

The constant by which the values of Horizontal Force are diminished is 0·8600 nearly, as expressed in parts of the whole Horizontal Force, equivalent to 1·5437 in terms of Gauss's Unit measured on the Metrical System. The corresponding constant for Vertical Force is 0·9600 nearly, equivalent to 4·2027 in terms of Gauss's Unit.

Left half

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
Feb.26			Feb.26					
h m	o ′ ″		h m			h m		
19.33	19.19.15	·0413	17.38	·1482	·2661			
19.39	21. 0	·0423	17.40	·1474	·2646			
19.40	19.15	·0413	17.45	·1478	·2653			
19.43	20.40	·0421	17.52	·1475	·2648			
19.45	18.55	·0412	17.58	·1484	·2664			
19.52	20.10	·0419	18. 0	·1476	·2650			
19.57	18.10	·0408	18. 8	·1491	·2677			
20. 0	20. 0	·0418	18.11	·1484	·2664			
20. 5	17.15	·0403	18.14	·1492	·2679			
20.10	23.50	·0437	18.20	·1487	·2670			
20.14	20.40	·0421	18.25	·1491	·2677			
20.16	24.45	·0442	18.27	·1482	·2661			
20.21	21.15	·0424	18.30	·1495	·2684			
20.28	27.30	·0457	18.35	·1485	·2666			
20.31	24.40	·0441	18.39	·1492	·2679			
20.36	27. 0	·0454	18.52	·1476	·2650			
20.43	20. 0	·0418	19. 0	·1477	·2652			
20.52	22.15	·0429	19.15	·1478	·2653			
21. 4	19.10	·0413	19.32	·1467	·2634			
21.11	22.30	·0431	19.40	·1473	·2644			
21.24	23.40	·0436	19.42	·1470	·2639			
21.30	21.50	·0427	19.48	·1468	·2635			
21.32	22.50	·0432	19.52	·1473	·2644			
21.41	21.40	·0426	19.58	·1467	·2634			
21.48	22.45	·0432	20. 0	·1477	·2652			
21.52	21.10	·0424	20. 3	·1462	·2625			
21.54	22. 0	·0428	20.10	·1484	·2664			
22. 1	20. 0	·0418	20.12	·1468	·2635			
22.10	22.40	·0431	20.18	·1474	·2646			
	(†)		20.22	·1458	·2617			
22.39	29. 0	·0465	20.30	·1466	·2632			
22.43	30.50	·0474	20.32	·1449	·2601			
22.45	27. 0	·0454	20.50	·1477	·2652			
22.52	31. 0	·0475	21. 3	·1462	·2625			
22.56	27.40	·0457	21.12	·1470	·2639			
22.59	33. 0	·0485	21.25	·1464	·2628			
23. 2	38.30	·0515	21.45	·1467	·2634			
23.11	28. 0	·0459	21.48	·1474	·2646			
23.20	32.55	·0485	21.56	·1479	·2655			
23.26	28.10	·0460	22. 0	·1466	·2632			
23.36	31. 0	·0475	22.10	·1485	·2666			
23.38	28.45	·0463	(†)					
23.41	32.45	·0484	22.40	·1463	·2626			
23.51	28. 0	·0459	22.42	·1477	·2652			
23.59	37.40	·0509	22.46	·1449	·2601			
			22.52	·1455	·2612			
			23. 0	·1444	·2592			
			23. 2	·1461	·2623			
			23.14	·1400	·2513			
			23.23	·1424	·2556			
			23.30	·1404	·2520			
			23.32	·1411	·2533			
			23.40	·1394	·2502			

Right half

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
h m	o ′ ″		Feb.26			h m		
			h m					
			23.55	(†) ·1394	·2502			
			23.59	·1409	·2529			
Feb.27			Feb.27			Feb.27		
0. 0	19.37.40	·0509	0. 0	·1409	·2529	0. 0	·0336	·1471
0. 7	33.20	·0487	0. 4	·1450	·2603	0. 4	·0334	·1463
0.11	43. 0	·0538	0. 6	·1417	·2544	0. 8	·0337	·1476
	(†)		0. 9	·1424	·2556	0.12	·0335	·1467
0.24	35. 0	·0496	0.11	·1403	·2518	0.28	·0346	·1515
0.36	43.40	·0541	0.16	·1431	·2569	0.34	·0342	·1498
0.38	41.10	·0528		(†)		0.50	·0351	·1536
0.50	46. 5	·0553	0.31	·1464	·2628	0.52	·0349	·1528
1. 0	45.40	·0551	0.42	·1435	·2576	1. 2	·0356	·1558
1. 6	51. 0	·0579	1.10	·1509	·2709	1. 6	·0350	·1532
1.10	50.50	·0578	1.20	·1424	·2556	1.12	·0359	·1571
1.14	52.20	·0587	1.31	·1518	·2724		(†)	
1.20	46. 0	·0553	1.33	·1507	·2706	1.30	·0377	·1651
1.30	53.10	·0591	1.34	·1511	·2712	1.50	·0366	·1602
	(†)		1.37	·1492	·2679	2.32	·0347	·1520
1.42	53.10	·0591	1.41	·1502	·2697	2.45	·0346	·1515
1.45	46. 0	·0553	1.43	·1481	·2659	2.52	·0344	·1507
1.55	35. 0	·0496	1.55	·1506	·2704	3.37	·0342	·1498
2. 0	37.50	·0510	2. 4	·1522	·2732	3.42	·0343	·1502
2. 4	41. 0	·0527	2. 6	·1498	·2689	3.52	·0339	·1484
2. 6	36.40	·0504	2.10	·1505	·2702	3.56	·0340	·1489
2.14	40.20	·0524	2.18	·1472	·2643	4.14	·0338	·1480
2.23	37.30	·0509	2.24	·1478	·2653	4.23	·0339	·1484
2.25	37.50	·0510	2.30	·1473	·2644	4.30	·0337	·1476
2.30	32. 0	·0480	2.35	·1476	·2650	4.35	·0339	·1484
2.38	32.50	·0484	2.40	·1470	·2639	5.30	·0339	·1484
2.46	31. 0	·0475	2.45	·1473	·2644	6. 0	·0340	·1489
3. 0	28.15	·0460	2.58	·1465	·2630			
3.10	29.40	·0468	3.10	·1476	·2650			
3.18	28. 5	·0459	3.15	·1470	·2639			
3.25	28. 0	·0459	3.19	·1474	·2646			
3.48	25.10	·0445	3.30	·1470	·2639			
3.50	25.40	·0447	3.39	·1465	·2630			
3.51	25. 0	·0444	3.54	·1468	·2635			
4. 2	28.40	·0462	4. 4	·1492	·2679			
4.12	25.50	·0448	4.11	·1464	·2628			
4.20	27. 0	·0454	4.18	·1468	·2635			
4.32	24.20	·0440	4.35	·1455	·2612			
4.44	24. 5	·0438	4.45	·1467	·2634			
4.51	23.10	·0434	4.52	·1457	·2616			
4.53	23.50	·0437	4.58	·1461	·2623			
5. 0	23.10	·0434	5. 0	·1455	·2612			
5.20	24.40	·0441	5. 6	·1460	·2621			
5.50	24.20	·0440	5.28	·1458	·2617			
5.58	25. 0	·0444	5.32	·1463	·2626			
			5.36	·1454	·2610			
			5.55	·1458	·2617			
			6. 0	·1454	·2610			

Thermometer readings

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.	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.
Feb. 26	o	o	Feb. 26	o	o	Feb. 26	o	o	Feb. 27	o	o	Feb. 27	o	o
h m			h m			h m			h m			h m		
0. 0	62·6	62·9	3. 0	62·3	62·9	22. 0	61·3	61·9	0. 0	61·9	62·4	3. 0	61·3	61·9
1. 0	62·4	62·8	9. 0	61·5	62·4	23. 0	61·3	61·2	1. 0	61·5	62·2	9. 0	62·2	63·2
2. 0	62·5	62·9	21. 0	61·0	61·6				2. 0	61·2	62·0			

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

OBSERVATIONS

OF THE

MAGNETIC DIP.

1875.

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

Day and Approximate Hour, 1875.	Needle.	Length of Needle.	Magnetic Dip.	Observer.	Day and Approximate Hour, 1875.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
			o ′ ″					o ′ ″	
January 5. 1	C 1	6 inches	67.42. 5	N	May 20.22	C 2	6 inches	67.44.36	N
11. 0	B 1	9 „	67.40.58	N	21. 1	D 2	3 „	67.45.31	N
13. 0	C 2	6 „	67.42.25	N	24.23	B 1	9 „	67.42.31	N
13. 1	D 1	3 „	67.43.42	N	26.22	C 1	6 „	67.42.54	N
20. 0	B 2	9 „	67.40.41	N	27. 3	C 1	6 „	67.40.45	N
20. 1	C 2	6 „	67.42.28	N	31. 2	C 2	6 „	67.41.55	N
20.22	D 2	3 „	67.44.39	N					
21. 3	D 2	3 „	67.43.55	N	June 4. 2	D 1	3 „	67.45.58	N
27. 1	D 1	3 „	67.43.16	N	9. 2	C 1	6 „	67.42.57	N
28. 1	B 1	9 „	67.42.12	N	15. 2	D 2	3 „	67.45.16	N
					16.23	B 1	9 „	67.41. 0	N
February 4. 1	C 1	6 „	67.40.54	N	17. 1	B 2	9 „	67.39.45	N
8. 2	D 2	3 „	67.42. 9	N	17. 2	C 2	6 „	67.41.12	N
15. 1	C 2	6 „	67.43.42	N	22. 1	B 2	9 „	67.41.22	N
15. 2	B 2	9 „	67.40.54	N	22. 2	D 2	3 „	67.43.29	N
22. 0	B 2	9 „	67.43.16	E	29. 0	C 2	6 „	67.41.16	N
22. 1	B 1	9 „	67.39.20	N	29.22	B 1	9 „	67.41.48	N
22. 2	D 1	3 „	67.42. 7	N	29.23	D 1	3 „	67.44.52	N
22.21	C 1	6 „	67.41.15	N	30. 0	D 2	3 „	67.44.18	N
23. 0	C 2	6 „	67.41.53	N	30. 1	C 2	6 „	67.44.18	N
23. 2	C 1	6 „	67.44.29	N	30. 3	B 1	9 „	67.40.34	N
24. 1	D 1	3 „	67.44.20	N					
27. 0	B 1	9 „	(67.46.48)	N	July 7. 1	D 2	3 „	67.44.36	N
					9.22	C 2	6 „	67.40.55	N
March 8.22	D 1	3 „	67.40.51	N	19.23	C 1	6 „	67.42.54	N
8.23	D 2	3 „	67.43.50	N	20. 1	D 1	3 „	67.44.39	N
11. 2	C 1	6 „	67.41.13	N	23. 1	C 2	6 „	67.43.41	E
15. 2	C 2	6 „	67.44. 2	N	26. 3	D 2	3 „	67.44.19	N
18. 0	D 1	3 „	67.43.51	N	26.22	B 1	9 „	67.40.16	N
18. 2	D 2	3 „	67.43.41	N	28.22	B 2	9 „	67.42.37	N
26.23	B 1	9 „	67.41.43	N	29. 0	C 1	6 „	67.41.54	N
27. 2	C 2	6 „	67.41.40	N	29. 3	B 2	9 „	67.41. 9	N
29.22	B 2	9 „	67.41.50	N	30. 1	B 1	9 „	67.40.47	N
30. 0	C 1	6 „	67.42.57	N					
30. 3	B 2	9 „	67.43.13	N	August 4.23	D 1	3 „	67.43.35	N
31. 1	D 1	3 „	67.44. 8	N	9. 2	C 1	6 „	67.43. 7	N
					11. 0	C 2	6 „	67.40. 6	N
April 3. 0	D 2	3 „	67.44.23	N	12.23	B 1	9 „	67.40.28	N
13. 1	C 2	6 „	67.42.33	N	13. 1	C 1	6 „	67.40.34	N
15. 2	B 2	9 „	67.40.20	N	18. 0	D 2	3 „	67.43. 5	N
15.22	B 1	9 „	67.43.15	N	18. 2	D 1	3 „	67.42.37	N
16. 0	C 1	6 „	67.43.31	N	18.22	B 2	9 „	67.40. 5	N
16. 1	D 1	3 „	67.43. 6	N	19. 3	B 2	9 „	67.39.46	N
16. 3	B 1	9 „	67.40.47	N	24. 2	C 1	6 „	67.41.50	N
19.23	B 2	9 „	67.41.29	N	31.23	C 2	6 „	67.44.10	N
28. 2	D 2	3 „	67.44. 8	N					
29. 1	C 1	6 „	67.41.26	N	September 4. 2	D 1	3 „	67.45.30	N
29.22	D 1	3 „	67.45.25	N	7. 2	B 1	9 „	67.40.21	N
29.23	B 2	9 „	67.41.42	N	8.23	B 2	9 „	67.43.31	N
30. 1	C 2	6 „	67.44.29	N	13. 2	D 2	3 „	67.44.23	N
					18. 0	C 1	6 „	67.40.44	N
May 4. 1	D 2	3 „	67.43.10	N	21.22	B 1	9 „	67.43.36	N
10. 2	D 1	3 „	67.44.11	N	22. 1	C 2	6 „	67.44.17	N
11. 0	B 1	9 „	67.42.51	N	22. 3	B 1	9 „	67.41.30	N
11. 2	C 1	6 „	67.42. 1	N	27. 2	C 1	6 „	67.40.23	N
15. 2	C 2	6 „	67.45.47	N	28.23	C 1	6 „	67.41.25	N
19. 0	B 2	9 „	67.42.30	N	29. 2	C 2	6 „	67.43. 4	N

February 27ᵈ. 0ʰ. A magnetic disturbance in progress. The result obtained on this day has not been used in the formation of the monthly mean. The initials E and N are those of Mr. Ellis and Mr. Nash.

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

Day and Approximate Hour, 1875.	Needle.	Length of Needle.	Magnetic Dip.	Observer.	Day and Approximate Hour, 1875.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
			o ′ ″					o ′ ″	
			d h						
October 5. 2	D 1	3 inches	67.41.40	N	November 24. 23	B 1	9 inches	67.40.58	N
7. 1	D 2	3 „	67.40.43	N	29. 23	B 2	9 „	67.39.18	N
7. 22	D 1	3 „	67.42.57	N	30. 2	C 2	6 „	67.42.53	N
7. 23	D 2	3 „	67.42.50	N					
8. 3	D 1	3 „	67.41.10	N					
12. 1	C 1	6 „	67.39.47	N	December 7. 1	D 1	3 „	67.42.20	N
20. 23	B 1	9 „	67.41.39	N	13. 1	B 1	9 „	67.41.10	N
21. 0	C 2	6 „	67.42.5	N	13. 23	C 1	6 „	67.38.13	N
25. 2	B 2	9 „	67.39.20	N	14. 0	D 2	3 „	67.42.1	N
25. 22	B 2	9 „	67.39.45	N	17. 2	B 2	9 „	67.39.44	N
26. 0	C 1	6 „	67.39.23	N	17. 23	C 2	6 „	67.44.1	N
26. 3	B 2	9 „	67.39.35	N	20. 22	B 1	9 „	67.41.7	N
30. 0	C 2	6 „	67.41.53	N	20. 23	C 1	6 „	67.42.11	N
					21. 0	D 2	3 „	67.42.36	N
November 4. 2	D 1	3 „	67.43.30	N	21. 1	D 1	3 „	67.44.0	N
10. 1	D 2	3 „	67.42.38	N	21. 2	C 2	6 „	67.42.1	N
12. 0	C 1	6 „	67.41.44	N	21. 3	B 1	9 „	67.40.6	N
12. 1	D 2	3 „	67.43.51	N	28. 23	C 1	6 „	67.42.0	N
18. 1	B 1	9 „	67.39.47	N	29. 1	B 2	9 „	67.38.43	N
22. 23	B 2	9 „	67.40.36	N	29. 2	D 1	3 „	67.43.26	N
23. 1	C 2	6 „	67.44.11	N	31. 3	C 2	6 „	67.41.27	N

The initial N is that of Mr. Nash.

MONTHLY MEANS of MAGNETIC DIPS.

Month, 1875.	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. 41. 35	2	67. 40. 41	1	67. 42. 5	1
February	67. 39. 20	1	67. 42. 5	2	67. 42. 13	3
March	67. 41. 43	1	67. 42. 31	2	67. 42. 5	2
April	67. 42. 1	2	67. 41. 10	3	67. 42. 28	2
May	67. 42. 31	2	67. 42. 30	1	67. 41. 53	3
June	67. 41. 7	3	67. 40. 34	2	67. 42. 57	1
July	67. 40. 31	2	67. 41. 53	2	67. 42. 24	2
August	67. 40. 28	1	67. 39. 56	2	67. 41. 50	3
September	67. 41. 49	3	67. 43. 31	1	67. 40. 51	3
October	67. 41. 39	1	67. 39. 33	3	67. 39. 35	2
November	67. 40. 23	2	67. 39. 57	2	67. 41. 44	1
December	67. 40. 48	3	67. 39. 14	2	67. 40. 48	3
Means	67. 41. 15	Sum 23	67. 40. 55	Sum 23	67. 41. 38	Sum 26

Month, 1875.	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. 42. 26	2	67. 43. 29	2	67. 44. 17	2
February	67. 42. 48	2	67. 43. 13	2	67. 42. 9	1
March	67. 42. 51	2	67. 42. 57	3	67. 43. 45	2
April	67. 43. 31	2	67. 44. 16	2	67. 44. 15	2
May	67. 44. 6	3	67. 44. 11	1	67. 44. 20	2
June	67. 42. 15	3	67. 45. 25	2	67. 44. 21	3
July	67. 42. 18	2	67. 44. 39	1	67. 44. 28	2
August	67. 42. 8	2	67. 43. 6	2	67. 43. 5	1
September	67. 43. 40	2	67. 45. 30	1	67. 44. 23	1
October	67. 41. 59	2	67. 41. 56	3	67. 41. 47	2
November	67. 43. 32	2	67. 43. 30	1	67. 43. 15	2
December	67. 42. 30	3	67. 43. 15	3	67. 42. 18	2
Means	67. 42. 51	Sum 27	67. 43. 32	Sum 23	67. 43. 37	Sum 22

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

YEARLY MEANS of MAGNETIC DIPS for each of the NEEDLES, and GENERAL MEAN for the Year 1875.

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	23	67. 41. 15	67. 41. 5	
	B 2	23	67. 40. 55		
6-inch Needles .... {	C 1	26	67. 41. 38	67. 42. 15	67. 42. 18
	C 2	27	67. 42. 51		
3-inch Needles .... {	D 1	23	67. 43. 32	67. 43. 34	
	D 2	22	67. 43. 37		

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

Month and Day, 1875.	Needle.	Length of Needle.	Magnetic Dip.		Excess of the Magnetic Dip at 9ʰ. a.m. over the Magnetic Dip at 3ʰ. p.m.
			At 9ʰ. a.m. ±	At 3ʰ. p.m. ±	
			° ′ ″	° ′ ″	′ ″
January 21	D 2	3 inches	67. 44. 39	67. 43. 55	+ 0. 44
February 23	C 1	6 „	67. 41. 15	67. 44. 29	− 3. 14
March 30	B 2	9 „	67. 41. 50	67. 43. 13	− 1. 23
April 16	B 1	9 „	67. 43. 15	67. 40. 47	+ 2. 28
May 27	C 1	6 „	67. 42. 54	67. 40. 45	+ 2. 9
June 30	B 1	9 „	67. 41. 48	67. 40. 34	+ 1. 14
July 29	B 2	9 „	67. 42. 37	67. 41. 9	+ 1. 28
August 19	B 2	9 „	67. 40. 5	67. 39. 46	+ 0. 19
September 22	B 1	9 „	67. 43. 36	67. 41. 30	+ 2. 6
October 8	D 1	3 „	67. 42. 57	67. 41. 10	+ 1. 47
26	B 2	9 „	67. 39. 45	67. 39. 35	+ 0. 10
December 21	B 1	9 „	67. 41. 7	67. 40. 6	+ 1. 1
Means	....		67. 42. 9	67. 41. 25	+ 0. 44

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

DEFLEXION OF A MAGNET

FOR

ABSOLUTE MEASURE

OF

HORIZONTAL FORCE.

1875.

Abstract of the Observations of Deflexion of a Magnet for Absolute Measure of Horizontal Force.

Month and Day, 1875.		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	42 ·8	11. 21. 42	5 ·528	100	46 ·8	N
		1 ·3		5. 8. 54	5 ·530	100	46 ·2	
February	25	1 ·0	46 ·3	11. 21. 23	5 ·527	100	47 ·0	N
		1 ·3		5. 9. 1	5 ·530	100	48 ·1	
March	27	1 ·0	54 ·7	11. 19. 50	5 ·537	100	55 ·8	N
		1 ·3		5. 8. 3	5 ·531	100	57 ·5	
April	24	1 ·0	56 ·8	11. 18. 13	5 ·534	100	57 ·9	N
		1 ·3		5. 7. 28	5 ·534	100	60 ·2	
May	25	1 ·0	67 ·8	11. 16. 40	5 ·531	100	69 ·0	N
		1 ·3		5. 6. 48	5 ·541	100	69 ·6	
June	29	1 ·0	72 ·2	11. 16. 15	5 ·534	100	72 ·8	N
		1 ·3		5. 6. 40	5 ·538	100	73 ·7	
July	27	1 ·0	71 ·0	11. 16. 3	5 ·536	100	73 ·5	N
		1 ·3		5. 6. 32	5 ·538	100	73 ·5	
August	28	1 ·0	69 ·6	11. 16. 4	5 ·558	100	69 ·6	N
		1 ·3		5. 6. 29	5 ·551	100	70 ·2	
September	28	1 ·0	65 ·2	11. 15. 48	5 ·546	100	65 ·4	N
		1 ·3		5. 6. 24	5 ·550	100	66 ·3	
October	27	1 ·0	46 ·6	11. 17. 47	5 ·546	100	45 ·2	N
		1 ·3		5. 6. 56	5 ·543	100	46 ·8	
November	25	1 ·0	44 ·1	11. 16. 44	5 ·541	100	45 ·8	N
		1 ·3		5. 6. 48	5 ·540	100	44 ·9	
December	24	1 ·0	52 ·1	11. 14. 55	5 ·552	100	55 ·6	N
		1 ·3		5. 5. 57	5 ·546	100	52 ·1	

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. 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 1875.

Month and Day, 1875.	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. $\frac{m}{X}$	Adopted Time of Vibration of Deflecting Magnet.	Log. $m X$.	Value of X.	Value of m.	
January 22	+0·09861	0·09868	−0·00164		8·99492	5·5290	0·17481	3·890	0·3845	1·794
February 25	+0·09863	0·09878	−0·00368		8·99516	5·5285	0·17488	3·889	0·3846	1·793
March 27	+0·09855	0·09861	−0·00154		8·99461	5·5340	0·17466	3·891	0·3843	1·794
April 24	+0·09835	0·09846	−0·00272		8·99386	5·5340	0·17482	3·895	0·3840	1·796
May 25	+0·09832	0·09843	−0·00289		8·99372	5·5360	0·17510	3·897	0·3841	1·797
June 29	+0·09833	0·09847	−0·00334	−0·00242	8·99383	5·5360	0·17543	3·898	0·3843	1·797
July 27	+0·09829	0·09840	−0·00292		8·99359	5·5370	0·17531	3·898	0·3841	1·797
August 28	+0·09827	0·09837	−0·00250		8·99346	5·5545	0·17235	3·886	0·3827	1·792
September 28	+0·09815	0·09826	−0·00283		8·99296	5·5480	0·17300	3·891	0·3828	1·794
October 27	+0·09812	0·09812	+0·00005		8·99258	5·5445	0·17219	3·889	0·3823	1·793
November 25	+0·09793	0·09803	−0·00261		8·99197	5·5405	0·17278	3·894	0·3823	1·795
December 24	+0·09780	0·09789	−0·00238		8·99138	5·5490	0·17212	3·894	0·3817	1·795
Means	..	..	..	..	..	..	..	3·893	..	1·795

ROYAL OBSERVATORY, GREENWICH. .

RESULTS

OF

METEOROLOGICAL OBSERVATIONS.

1875.

MONTH and DAY, 1875.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	READINGS OF THERMOMETERS.				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.		Difference between the Dew Point Temperature and Air Temperature.			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.					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.
			Dry.			Dew Point.									OSLER'S.		Pressure in lbs. on the square foot.			ROBINSON'S.	
			Highest.	Lowest.	Mean Daily Value.	Mean Daily Value.			Highest.	Lowest.	Mean Daily Value.	Greatest.	Least.		General Direction. A.M.	P.M.	Greatest.	Least.	Mean of 24 Obs.		
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Jan. 1	Apogee	29·904	35·0	18·2	27·5	21·6	35·0	15·5	32·6	31·6	5·9	8·4	3·1	− 9·7	SE : S	S	3·0	0·0	0·5	257	0·24
2	..	29·803	44·5	35·0	40·6	37·4	78·6	32·0	32·4	32·0	3·2	7·0	1·1	+ 3·7	SSW : W	WSW : SW	6·7	0·0	0·4	337	0·29
3	..	29·820	50·7	42·1	46·6	41·1	68·1	34·4	33·4	31·8	5·5	7·4	0·0	+ 9·9	SW : W	W : SW	5·9	0·0	0·9	398	0·11
4	..	29·661	51·5	42·0	47·7	45·8	72·5	39·3	35·4	32·4	1·9	4·2	0·9	+11·1	SW	SW	2·3	0·0	0·4	353	0·01
5	..	29·828	48·7	41·3	44·4	41·6	74·6	36·6	37·2	34·0	2·8	5·0	0·0	+ 7·9	W	W : SW	0·9	0·0	0·1	257	0·00
6	Greatest Declination S.	29·868	50·0	39·1	43·4	40·1	90·1	37·4	39·4	35·0	3·3	7·1	0·9	+ 7·0	SW	SSW	1·2	0·0	0·1	217	0·00
7	New	29·925	42·0	38·3	39·6	37·0	45·3	38·3	40·6	37·0	2·6	3·7	0·9	+ 3·3	S : SE	SE : SSE	0·0	0·0	0·0	131	0·00
8	..	29·965	41·2	36·9	39·0	37·0	45·9	30·2	41·0	37·8	2·0	3·2	0·5	+ 2·7	SSE : S	SSE	0·0	0·0	0·0	122	0·00
9	..	29·774	44·5	37·8	40·8	36·9	54·6	33·2	41·2	37·8	3·9	5·5	1·8	+ 4·5	SSW : S : SSE	SSE : S	1·2	0·0	0·1	211	0·00
10	..	29·620	45·8	36·5	40·1	37·4	51·2	31·2	41·2	38·8	2·7	4·0	1·0	+ 3·8	S : SE	S	0·0	0·0	0·0	134	0·00
11	..	29·688	49·8	39·4	45·7	42·9	59·9	31·6	41·2	39·5	2·8	4·6	1·1	+ 9·4	SW	SSW	0·8	0·0	0·0	186	0·00
12	..	29·790	48·8	41·3	45·1	44·3	52·0	38·0	41·4	39·5	0·8	1·9	0·0	+ 8·8	S	SW	0·0	0·0	0·0	195	0·16
13	In Equator	29·917	49·5	44·6	47·0	43·6	81·9	41·0	42·6	40·2	3·4	5·3	0·0	+10·6	SSW	SSW	1·2	0·0	0·1	239	0·00
14	First Qr.	29·913	51·3	44·7	48·9	47·2	55·1	41·0	42·8	40·5	1·7	2·8	0·0	+12·5	SW	WSW : SW	2·7	0·0	0·4	336	0·06
15	..	29·686	51·5	44·7	48·0	43·9	69·9	42·7	43·6	41·5	4·1	8·0	0·4	+11·5	SSW	SW : WSW	13·0	0·0	1·2	426	0·03
16	..	29·475	51·0	43·5	46·9	42·2	70·2	40·6	44·6	42·2	4·7	7·1	0·4	+10·3	SW : W	W	15·5	0·0	0·6	376	0·07
17	Perigee	29·545	48·5	44·1	46·1	41·6	49·3	40·0	45·2	42·6	4·5	5·5	0·9	+ 9·4	WNW : W	W : WSW	6·5	0·0	0·8	352	0·05
18	..	29·583	53·1	44·5	49·3	46·6	57·7	41·6	45·6	42·8	2·7	4·8	1·5	+12·5	W	WSW : WNW	11·0	0·0	2·0	551	0·19
19	Greatest Declination N.	29·684	52·2	46·8	49·8	43·3	62·2	41·8	46·1	43·4	6·5	11·0	2·8	+12·8	WSW : W	WSW	18·5	1·5	6·7	847	0·00
20	..	29·482	53·7	43·0	46·9	39·5	64·6	37·8	46·1	44·4	7·4	9·7	4·2	+ 9·7	W	WSW	18·4	0·3	3·5	661	0·01
21	Full	29·210	46·1	34·5	40·4	36·3	67·0	30·5	46·4	44·8	4·1	7·3	2·3	+ 3·1	WSW : WNW : W	WSW : NE	6·5	0·0	1·0	445	0·41
22	..	29·770	41·3	29·9	35·2	29·4	63·7	23·8	46·2	43·7	5·8	10·3	1·3	− 2·2	NNE : NW : WNW	NW : WNW : WSW	3·1	0·0	0·5	382	0·00
23	..	29·441	53·1	33·0	45·1	41·5	60·3	28·0	45·0	42·0	3·6	8·2	1·9	+ 7·6	SW	W : WSW	3·8	0·0	0·7	395	0·11
24	..	29·008	51·5	38·0	43·5	37·0	82·4	35·0	44·1	41·3	6·5	10·9	0·4	+ 5·8	WSW : W	WSW	30·0	1·0	4·9	800	0·24
25	..	29·273	44·8	37·8	40·7	36·3	58·0	31·7	43·9	41·5	4·4	8·8	1·4	+ 2·8	W by S : WNW	WNW : W	30·+	0·0	3·1	579	0·65
26	In Equator	30·033	42·4	36·2	39·4	32·3	57·0	31·8	43·2	41·0	7·1	9·9	1·5	+ 1·4	WNW : NE	ENE : SSE	0·4	0·0	0·0	129	0·00
27	..	30·056	50·5	39·5	45·0	39·2	72·0	38·0	..	..	5·8	10·7	3·2	+ 6·8	S	S : SSE	3·7	0·0	0·6	270	0·00
28	..	30·071	51·9	40·5	47·2	42·9	88·2	34·9	43·2	41·0	4·3	8·8	2·1	+ 9·0	S : SSW	SW	2·3	0·0	0·2	265	0·00
29	Last Quarter: Apogee.	30·081	50·7	43·5	48·3	47·3	56·0	42·0	43·6	41·2	1·0	2·1	0·0	+10·0	WSW : SW	SW : WSW	6·2	0·0	0·3	240	0·35
30	..	30·433	43·5	34·4	38·4	31·3	82·2	24·3	43·9	41·8	7·1	10·6	3·1	0·0	NE : ENE	ENE : SE	1·6	0·0	0·2	226	0·01
31	..	30·361	43·7	32·0	37·2	32·0	89·1	25·4	44·8	42·4	5·2	8·4	0·7	− 1·3	S : SSW	SSW	0·7	0·0	0·0	202	0·00
Means	..	29·763	47·8	38·8	43·3	39·2	65·0	34·5	41·9	39·5	4·1	6·8	1·3	+ 6·3	...	...	..	..	..	Sum 10519	Sum 2·99

BAROMETER READINGS FROM EYE-OBSERVATIONS.
The first maximum in the month was 29in·845 on the 2nd ; the first minimum in the month was 29in·752 on the 2nd.
The second maximum ,, was 29in·898 on the 3rd; the second minimum ,, was 29in·770 on the 3rd.
The third maximum ,, was 29in·988 on the 8th ; the third minimum ,, was 29in·616 on the 4th.
The fourth maximum ,, was 29in·947 on the 14th ; the fourth minimum ,, was 29in·620 on the 10th.
The fifth maximum ,, was 29in·612 on the 18th ; the fifth minimum ,, was 29in·445 on the 16th.
The sixth maximum ,, was 29in·739 on the 19th ; the sixth minimum ,, was 29in·498 on the 18th.
The seventh maximum ,, was 29in·840 on the 22nd ; the seventh minimum ,, was 29in·075 on the 21st.
The eighth maximum ,, was 30in·103 on the 26th ; the absolute minimum ,, was 28in·961 on the 24th.
The ninth maximum ,, was 30in·138 on the 29th ; the ninth minimum ,, was 30in·021 on the 27th.
The absolute maximum ,, was 30in·488 on the 30th ; the tenth minimum ,, was 30in·019 on the 29th.
The range in the month was 1in·527.
The mean for the month was 29in·763, being 0in·028 higher than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.
The highest in the month was 53°·7 on the 20th ; the lowest was 18°·2 on the 1st.
The range ,, was 35°·5.
The mean ,, of all the highest daily readings was 47°·8, being 4°·5 higher than the average of the preceding 34 years.
The mean ,, of all the lowest daily readings was 38°·8, being 5°·1 higher than the average of the preceding 34 years.
The mean daily range was 9°·0, being 0°·6 less than the average of the preceding 34 years.
The mean for the month was 43°·3, being 4°·9 higher than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Jan. 1	o	o	ci, ci.-cu, ci.-s, h.-fr	10 : 10, sl, fr.-r : 10, r
2	o	w : o	10, r : v : ci	2, ci : 10, r
3	o	o	10, r : v : ci, ci.-s	ci, ci.-s, v : 10, r
4	o	o	10, sc, sl.-r	10 : 10, th.-r
5	w	m : o	v : ci	ci, ci.-cu : v : v
6	o	v : w	ci, ci.-cu, cu.-s	ci, ci.-s, s : 10 : 10
7	o	o	10	10 : 10, th.-r
8	o	w : o	10, glm, th.-r	10 : ci.-cu
9	o	o	ci, ci.-cu, ci.-s, cu.-s	ci, ci.-cu, cu.-s : li.-cl
10	o	o	10, f	v : v
11	o	o : w : w	10	10 : 10
12	o	o : w	10 : 10, r	10, th.-r : v : 10
13	o	w : w	10 : 10, v	10 : 10
14	o	o : m	10 : 10, r	10, th.-r : 10, th.-r
15	o	w : o	10 : ci.-cu, cu.-s	10, fr.-shs : v : o
16	o	o : w	v : 10, sc, r	ci, ci.-cu, cu, cu.-s, v, r: v
17	w	m : m	10, f	10, fr.-shs : 10
18	o	o	10, sc, oc.-th.-r	10, r : v : o
19	o	o	li.-cl, v	10 : 10, th.-r, st.-w
20	o	w : w	ci, ci.-s	10 : v, r, ci, lu.-ha
21	w	w : o	v, r	10, r : 10, r, v
22	o	wN : o : m	o	ci, ci.-cu : li.-cl, lu.-ha
23	o	o	10, sc, r : cu.-s, r	10 : 10, th.-r
24	o	o	10, r	ci.-cu, n : 10, r, l
25	o	o	10, sqs, h.-r	ci.-cu : li.-cl
26	w	o : m : w	ci, ci.-cu	10 : 10, sl.-r
27	o	o	10	ci, ci.-cu, cu.-s : o
28	m	o	v : ci.-cu, cu.-s	ci.-cu, cu.-s : v
29	o	o : w	10, sl.-f, r	10, r : 10, r
30	o	o	10 : v	ci, ci.-cu, cu.-s : v
31	w	o : w	ci, ci.-cu, h.-fr	ci, ci.-cu, cu : o

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $39°\cdot2$, being $4°\cdot5$ *higher* than the average of the preceding 34 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot239$, being $0^{in}\cdot034$ *greater* than the average of the preceding 34 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{gn}\cdot7$, being $0^{gr}\cdot3$ *greater* than the average of the preceding 34 years.

Degree of Humidity.—The mean for the month was 85 (that of Saturation being represented by 100), being 2 *less* than the average of the preceding 34 years.

Weight of a Cubic Foot of Air.—The mean for the month was 548 grains, being 5 grains *less* than the average of the preceding 34 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by o and a cloudy sky by 10, was $7\cdot4$.

WIND.

The proportions were of N. 1, S. 14, W. 14, E. 2, and Calm o. The greatest pressure in the month was more than 30 lbs. on the square foot on the 25th. The mean daily horizontal movement of the air for the month was 339 miles; the greatest, 847 miles on the 19th; and the least, 122 miles on the 8th.

RAIN.

Fell on 17 days in the month, amounting to $2^{in}\cdot99$, as measured in the simple cylinder gauge partly sunk below the ground; being $1^{in}\cdot09$ *greater* than the average fall of the preceding 60 years.

MONTH and DAY, 1875.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	READINGS OF THERMOMETERS.								Difference between the Dew Point Temperature and Air Temperature.			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.					ROBINSON'S.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
			Dry.			Dew Point.	Highest in the Sun, 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.						OSLER'S.			Pressure in lbs. on the square foot.			Horizontal Movement of the Air.	
			Highest.	Lowest.	Mean Daily Value.	Mean Daily Value.			Highest.	Lowest.	Mean Daily Value.	Greatest.	Least.		General Direction.					Amount of Horizontal Movement on each Day.	
															A.M.	P.M.	Greatest.	Least.	Mean of 24 Obs.		
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Feb. 1	..	30·164	48·2	31·6	39·1	33·4	95·7	22·8	43·2	41·8	5·7	11·6	2·4	+ 0·5	SSW : SW	SW	0·6	0·0	0·0	228	0·00
2	Greatest Declination S.	30·020	45·2	30·6	37·7	35·5	61·3	22·2	43·4	40·6	2·2	6·2	0·0	— 1·0	WSW	WSW	0·0	0·0	0·0	163	0·00
3	..	29·741	41·7	33·5	37·4	32·8	43·3	25·1	42·4	39·0	4·6	7·8	0·0	— 1·4	WSW : NW	WNW	0·6	0·0	0·0	189	0·00
4	..	29·894	41·5	29·3	35·0	29·3	75·4	22·1	41·8	38·4	5·7	7·9	3·5	— 3·9	N	N	0·3	0·0	0·0	131	0·00
5	..	30·170	37·0	27·3	32·3	30·2	55·5	22·6	40·6	37·6	2·1	4·7	0·0	— 6·7	NNE: NNW: WSW	WSW	0·0	0·0	0·0	140	0·00
6	New	30·106	40·2	26·0	33·5	32·2	63·7	25·8	39·9	37·4	1·3	6·2	0·0	— 5·6	SW	WSW : SSE	0·0	0·0	0·0	98	0·04
7	..	29·961	38·8	30·0	34·4	29·8	46·5	29·0	39·4	37·0	4·6	8·3	0·3	— 4·7	E	E	2·2	0·0	0·2	236	0·08
8	..	30·066	34·7	27·8	30·4	20·5	63·8	27·0	39·2	37·0	9·9	12·6	3·9	— 8·7	ESE	E : ENE	0·3	0·0	0·0	130	0·00
9	In Equator	29·927	33·2	28·0	30·5	25·2	40·0	26·8	38·8	36·8	5·3	6·6	3·1	— 8·6	NNE: N	ENE: NE	0·0	0·0	0·0	114	0·00
10	..	30·011	33·6	30·9	31·9	23·8	37·8	30·9	38·2	36·5	8·1	9·0	4·1	— 7·1	NE	NNE: E : WSW	0·1	0·0	0·0	148	0·00
11	Perigee	29·940	37·1	29·7	33·2	25·9	56·3	29·7	38·0	35·6	7·3	10·8	2·8	— 5·8	WSW : SSW	SSW : S	2·4	0·0	0·1	223	0·11
12	..	29·716	45·4	33·7	40·5	40·1	49·2	32·2	37·4	35·4	0·4	3·5	0·0	+ 1·6	SW	WSW: NW: NE	10·8	0·0	0·8	327	0·11
13	First Qr.	29·904	45·0	36·9	40·5	37·9	59·3	35·2	37·9	36·4	2·6	5·1	1·5	+ 1·6	E : SE : SSE	S	0·0	0·0	0·0	119	0·03
14	..	29·857	50·7	43·1	47·4	45·3	58·9	41·0	38·8	37·0	2·1	3·4	0·7	+ 8·6	SSW	SSW : SW : N	1·7	0·0	0·2	299	0·03
15	..	30·133	51·3	35·8	42·3	37·4	98·2	27·8	40·0	37·6	4·9	9·5	0·2	+ 3·6	NNW	N	0·0	0·0	0·0	128	0·00
16	Greatest Declination N.	30·246	46·1	29·4	37·3	33·5	72·3	24·2	41·2	38·2	3·8	10·1	0·0	— 1·4	N : SW	NW: WNW: N	7·8	0·0	0·4	248	0·00
17	..	30·050	44·1	36·3	39·3	34·4	55·4	30·3	41·9	38·8	4·9	9·2	2·4	+ 0·6	N	NNE	5·3	0·0	1·0	348	0·02
18	..	30·028	41·1	29·7	34·3	29·9	79·7	27·5	42·2	39·0	4·4	8·5	1·5	— 4·5	NNE	NE: ENE	2·7	0·0	0·3	352	0·02
19	..	29·936	34·4	29·2	31·4	25·3	42·7	26·0	41·6	39·4	6·1	8·4	4·6	— 7·4	NE	NNE: NE	2·8	0·0	0·4	368	0·02
20	Full	29·862	34·1	28·7	30·6	27·2	41·8	28·7	41·2	39·0	3·4	5·9	1·3	— 8·3	NE	ENE: NE	1·9	0·0	0·3	305	0·16
21	..	29·952	38·7	30·8	33·7	27·7	89·0	29·0	40·2	37·8	6·0	9·2	2·3	— 5·3	NE : ENE	ENE	14·3	0·0	1·0	391	0·00
22	In Equator	29·940	39·5	27·7	33·5	24·8	106·8	23·0	39·4	37·0	8·7	12·0	2·1	— 5·6	NE	ENE	4·7	0·0	0·6	383	0·00
23	..	29·575	38·3	23·5	29·9	22·2	109·8	16·0	39·1	36·7	7·7	14·4	0·0	— 9·3	ENE	E	1·7	0·0	0·2	230	0·00
24	..	29·151	36·5	23·3	30·8	28·3	41·4	13·5	38·6	36·2	2·5	6·9	0·0	— 8·5	ENE	ESE	0·7	0·0	0·0	175	0·17
25	..	29·319	42·0	30·0	35·4	31·4	77·0	30·0	38·2	35·5	4·0	8·5	0·0	— 4·1	E : SW	SE	1·4	0·0	0·1	225	0·03
26	Apogee	29·352	45·8	33·5	38·8	33·3	88·6	30·2	38·5	36·3	5·5	8·4	0·6	— 0·9	ESE	E	15·5	0·0	1·8	453	0·00
27	..	29·480	35·3	31·0	32·4	27·1	43·2	31·0	38·3	37·3	5·3	7·3	3·2	— 7·5	E : ENE	ENE : NE	8·5	0·0	0·9	381	0·00
28	Last Qr.	29·589	32·4	29·9	30·9	24·6	37·8	29·9	38·3	37·3	6·3	6·8	4·2	— 9·2	ENE	NE	1·8	0·0	0·4	352	0·00
Means	..	29·860	40·4	30·6	35·2	30·3	63·9	27·1	39·9	37·6	4·8	8·2	1·6	— 3·9	...	...	..	..	..	Sum 6884	Sum 0·82

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30ⁱⁿ·195 on the 5th ; the second maximum ,, was 30ⁱⁿ·078 on the 8th ; the third maximum ,, was 30ⁱⁿ·040 on the 10th ; the fourth maximum ,, was 29ⁱⁿ·918 on the 13th ; the absolute maximum ,, was 30ⁱⁿ·321 on the 16th ; the sixth maximum ,, was 29ⁱⁿ·982 on the 22nd ;

The first minimum in the month was 29ⁱⁿ·739 on the 3rd. the second minimum ,, was 29ⁱⁿ·951 on the 7th. the third minimum ,, was 29ⁱⁿ·902 on the 9th. the fourth minimum ,, was 29ⁱⁿ·697 on the 12th. the fifth minimum ,, was 29ⁱⁿ·856 on the 14th. the sixth minimum ,, was 29ⁱⁿ·846 on the 20th. the absolute minimum ,, was 29ⁱⁿ·130 on the 24th.

The range in the month was 1ⁱⁿ·191.
The mean for the month was 29ⁱⁿ·860, being 0ⁱⁿ·063 *higher* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.

The highest in the month was 51°·3 on the 15th ; the lowest was 23°·3 on the 24th.
The range   ,,   was 28°·0.
The mean   ,,   of all the highest daily readings was 40°·4, being 5°·1 *lower* than the average of the preceding 34 years.
The mean   ,,   of all the lowest daily readings was 30°·6, being 3°·5 *lower* than the average of the preceding 34 years.
The mean daily range was 9°·8, being 1°·5 *less* than the average of the preceding 34 years.
The mean for the month was 35°·2, being 4°·1 *lower* than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Feb. 1	m	o : o	o : ci, ci.-s	1, ci : o, h.-fr
2	m	m	o, h.-fr, f	10, li.-cl : v : o, d, h.-fr
3	o	o	v • 10, f	10, f : v : v, f
4	o	o : w	v, ci.-cu, sl.-f	ci, ci.-cu, cu, cu.-s : v, li.-cl, sl.-f
5	w	v	li.-cl, f, h.-fr	v, sl.-f, h : th.-f
6	o	v : o	f, h.-fr	10, sl.-f : 10, th.-r
7	o	o	10, r : 10, r	10, sl.-r : 10
8	o	o	ci, cu.-s, cu	10 : 10
9	o	m : o	10 : 10, sl.-sn	10, sl.-sn : 10
10	o	v : m	10 : 10	10, sl.-sn : 10
11	o	w : w	10 : 10	v : 10, r, s
12	o	o	10, r	10, r : 10
13	o	w : m	10 : 10	10, th.-r : 10, r
14	w	w : w	v : v : 10, th.-r	10, th.-r : fr.-shs
15	w • s	w : o	v : o, f	ci, ci.-cu, cu-s : li.-cl, v
16	o	o	th.-f, fr	10, h : v : v
17	o	o	v : 10, th.-r	10 : 10, fr.-shs : 10, sc
18	o	v : o	10 : 10, sl.-sn	10, sl.-sn : v, sl.-sn : 10
19	w	o	10 : 10	10, s : 10 : 10
20			10, s	10, s : 10 : 10
21			10 : ci, ci.-cu, cu, cu.-s	ci, ci.-cu, cu : o
22			o, h.-fr	o : v : 10
23			ci, ci.-cu	ci, ci.-cu, v : vv
24			v : 10, s	10, sl.-sn : 10
25			10 : 10, sl.-sn, ci, ci.-cu, cu	ci, ci.-s, v, th.-r : o
26			v : 10, li.-cl, h	li.-cl : 10 : 10, st.-w
27	o	o	10 : 10	10 : 10
28	o	o	10 : 10, sl.-sn	10 : 10

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 30°·3, being 4°·6 *lower* than the average of the preceding 34 years.

Elastic Force of Vapour.—The mean for the month was 0^{in}·169, being 0^{in}·038 *less* than the average of the preceding 34 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2^{grs}·0, being 0^{gr}·4 *less* than the average of the preceding 34 years.

Degree of Humidity.—The mean for the month was 82 (that of Saturation being represented by 100), being 3 *less* than the average of the preceding 34 years.

Weight of a Cubic Foot of Air.—The mean for the month was 559 grains, being 6 grains *greater* than the average of the preceding 34 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 7·8.

WIND.

The proportions were of N. 8, S. 5, W. 5, E. 10, and Calm 0. The greatest pressure in the month was 15^{lbs}·5 on the square foot on the 26th. The mean daily horizontal movement of the air for the month was 246 miles; the greatest, 453 miles on the 26th, and the least, 98 miles on the 6th.

RAIN.

Fell on 12 days in the month, amounting to 0^{in}·82, as measured in the simple cylinder gauge partly sunk below the ground; being 0^{in}·71 *less* than the average fall of the preceding 60 years.

ELECTRICITY.

From February 20 to 26. The electrical apparatus was under examination.

MONTH and DAY, 1875.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	READINGS OF THERMOMETERS.								Difference between the Dew Point Temperature and Air Temperature.			Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	WIND AS DEDUCED FROM ANEMOMETERS.					ROBINSON'S.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
			Dry.			Dew Point.	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.						OSLER'S.			Pressure in lbs. on the square foot.			Amount of Horizontal Movement of the Air on each Day.	
			Highest.	Lowest.	Mean Daily Value.	Mean Daily Value.			Highest.	Lowest.	Mean Daily Value.	Greatest.	Least.		General Direction. A.M.	P.M.	Greatest.	Least.	Mean of 24 Obs.		
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Mar. 1	..	29·579	32·6	29·7	30·9	26·0	39·0	29·7	37·8	37·1	4·9	6·2	3·0	− 9·4	NE : NNE	NNE	2·2	0·0	0·4	348	0·00
2	Greatest Declination S.	29·639	33·2	29·6	31·0	27·4	35·0	29·6	37·9	37·3	3·6	4·8	1·3	− 9·4	NE	NE	2·7	0·0	0·7	397	0·05
3	..	29·696	36·0	31·7	33·5	28·6	45·2	31·7	..	37·5	4·9	5·9	3·9	− 7·0	NE : ENE	ENE	5·3	0·0	0·8	367	0·00
4	..	29·821	40·7	29·0	33·9	29·4	65·0	24·0	..	38·3	4·5	7·4	1·5	− 6·6	E	ENE	1·3	0·0	0·2	230	0·00
5	..	29·774	46·3	25·5	35·8	30·4	106·0	17·1	..	37·5	5·4	11·4	0·0	− 4·7	ENE : E	E : SE	1·3	0·0	0·1	192	0·00
6	..	29·548	48·7	34·0	41·3	40·4	64·8	29·3	..	38·3	0·9	3·4	0·0	+ 0·8	SE : SSE	SSE : SSW	3·3	0·0	1·0	368	0·16
7	New	29·701	56·8	45·1	51·5	47·1	92·8	40·7	39·3	38·5	4·4	8·6	0·4	+11·0	SW	SW	9·0	0·1	1·4	464	0·19
8	In Equator	29·880	57·4	50·3	52·8	49·0	78·2	46·3	40·8	38·8	3·8	5·5	0·4	+12·3	SW	SW	6·7	0·0	1·8	519	0·00
9	..	29·882	55·3	39·3	47·5	38·5	111·4	30·0	..	38·6	9·0	16·0	5·0	+ 7·0	SW : WSW : W	WNW : NW	18·0	0·0	2·7	593	0·00
10	Perigee	30·239	50·9	30·3	40·6	33·0	118·9	21·9	..	40·7	7·6	16·4	0·0	0·0	Calm : E	ESE : E	2·3	0·0	0·2	180	0·00
11	..	30·029	45·8	30·8	38·9	30·9	118·9	27·6	..	42·1	8·0	14·5	0·4	− 1·8	ENE : E	E	16·5	0·0	2·1	466	0·00
12	..	29·775	38·0	33·6	35·4	31·2	52·8	32·5	46·5	43·3	4·2	6·5	2·6	− 5·4	E	ENE	8·8	0·0	1·0	412	0·04
13	..	29·781	41·0	36·4	38·0	33·2	48·0	35·2	45·5	43·3	4·8	5·5	3·1	− 3·0	ENE	ENE	2·4	0·0	0·5	347	0·00
14	First Qr.	29·910	46·7	32·3	38·6	34·7	100·2	25·2	44·8	42·8	3·9	8·0	1·3	− 2·6	ENE	E : NE : NNE	2·3	0·0	0·3	298	0·00
15	Greatest Declination N.	29·990	50·0	29·9	37·9	34·1	93·4	25·2	44·3	41·8	3·8	10·5	0·0	− 3·5	N	N : ESE : Calm	0·0	0·0	0·0	127	0·00
16	..	30·021	41·1	31·5	36·4	33·1	56·1	23·0	43·3	41·8	3·3	6·2	1·4	− 5·1	N	Calm : E	0·2	0·0	0·0	126	0·00
17	..	30·172	42·0	34·6	36·9	30·4	60·9	30·1	43·5	41·3	6·5	8·8	3·2	− 4·7	E : NE	- NE	7·5	0·0	0·8	425	0·00
18	..	30·340	42·2	28·1	34·2	24·5	118·5	22·5	42·8	40·8	9·7	15·4	0·0	− 7·5	NE : E	E : Calm : SW	4·0	0·0	0·2	303	0·00
19	..	29·945	46·5	30·0	38·2	34·6	64·4	23·3	42·1	39·7	3·6	9·2	0·0	− 3·5	WSW : NNE	NNE : NE	0·6	0·0	0·0	226	0·10
20	..	29·946	42·0	32·1	36·9	28·2	62·4	25·0	42·3	40·3	8·7	11·9	7·6	− 4·8	N	N	2·0	0·0	0·0	239	0·00
21	Full	29·993	41·9	34·2	38·2	30·0	81·0	28·1	41·8	39·8	8·2	11·2	6·0	− 3·6	N : NNE	N : Calm : SW	1·0	0·0	0·1	184	0·00
22	In Equator	29·907	49·0	31·5	40·0	35·3	61·7	23·0	41·5	40·1	4·7	8·6	0·0	− 1·9	SW : N	N : NNE	4·1	0·0	0·4	278	0·01
23	..	30·175	46·2	29·1	37·0	28·8	115·2	22·0	41·3	40·3	8·2	13·0	1·8	− 5·0	NE	E : ESE : Calm	0·7	0·0	0·1	201	0·00
24	..	30·189	51·3	30·5	41·7	34·4	67·2	21·8	41·7	40·3	7·3	13·9	5·1	− 0·4	SW	WSW : NW : W	0·5	0·0	0·0	209	0·00
25	..	30·169	56·5	39·2	47·1	38·4	104·4	33·8	42·3	40·9	8·7	17·6	3·2	+ 4·8	WSW	SW	2·2	0·0	0·3	334	0·00
26	Apogee	30·024	55·3	44·0	49·0	39·6	117·0	40·8	43·1	41·5	9·4	13·6	5·3	+ 6·5	SW : WSW	WSW	3·3	0·0	0·6	418	0·00
27	..	29·875	55·3	38·9	45·6	34·4	110·6	29·8	44·5	42·5	11·2	16·8	2·5	+ 2·9	W	WNW	7·0	0·0	0·8	467	0·01
28	..	30·073	47·5	36·2	41·4	29·1	99·0	30·3	45·3	42·8	12·3	16·1	5·7	− 1·6	NNW	N : NW	8·5	0·0	1·1	356	0·00
29	Greatest Declination S.	30·267	53·2	38·3	44·5	35·0	102·3	28·6	45·8	42·8	9·5	15·5	5·3	+ 1·2	N : NW	NW : NNW	1·3	0·0	0·1	249	0·00
30	Last Qr.	30·313	55·0	41·6	47·9	38·9	78·3	37·8	46·3	43·9	9·0	13·8	3·5	+ 4·2	W : NW : N	N	0·1	0·0	0·0	132	0·00
31	..	30·362	56·2	43·5	48·4	39·4	84·9	40·8	46·5	44·7	9·0	14·3	2·2	+ 4·4	Variable	NE : SE	0·2	0·0	0·0	112	0·00
Means	..	29·968	47·1	34·5	40·4	33·8	82·4	29·2	(24 days) 43·0	40·6	6·5	10·9	2·4	− 1·2	...	...	..	..	..	Sum 9567	Sum 0·56

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in·840 on the 4th; the absolute minimum in the month was 29in·515 on the 6th.
The second maximum ,,   was 29in·904 on the 8th; the second minimum ,,   was 29in·707 on the 9th.
The third maximum ,,   was 30in·271 on the 10th; the third minimum ,,   was 29in·757 on the 12th.
The absolute maximum ,,   was 30in·415 on the 18th; the fourth minimum ,,   was 29in·932 on the 19th.
The fifth maximum ,,   was 30in·012 on the 21st; the fifth minimum ,,   was 29in·889 on the 22nd.
The sixth maximum ,,   was 30in·217 on the 23rd; the sixth minimum ,,   was 29in·852 on the 27th.
The seventh maximum ,,   was 30in·400 on the 31st.
The range in the month was 0in·900.
The mean for the month was 29in·968, being 0in·217 *higher* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.

The highest in the month was 57°·4 on the 8th; the lowest was 25°·5 on the 5th.
The range ,,   was 31°·9.
The mean ,,   of all the highest daily readings was 47°·1, being 2°·9 *lower* than the average of the preceding 34 years.
The mean ,,   of all the lowest daily readings was 34°·5, being 0°·8 *lower* than the average of the preceding 34 years.
The mean daily range was 12°·6, being 2°·1 *less* than the average of the preceding 34 years.
The mean for the month was 40°·4, being 1°·3 *lower* than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
March 1	o	o	10 : 10, sl.-sn	10, sl.-sn : 10, sl.-sn
2	o	o	10, sn	10, sl : 10
3	o	o	10 : 10	10 : 10 : v
4	o	w : o	v : 10	ci, ci.-cu : o, h.-fr
5	w	o : w	o, h.-fr	ci, ci.-cu, cu : o : o
6	o	o	v : 10, r, sc	10, th.-r : 10, oc.-r : v
7	o	o	v : 10	10 : 10,fr.-h.-shs,w : 10, sl.-r
8	o	o	10 : 10	10 : v : 10
9	o	o	10, g : ci, ci.-cu, cu.-s, st.-w	ci,ci.-cu,ci.-s,cu: v : o
10	o	o : w	o, sl.-f, h.-fr : o, sl.-f, h.-fr	o : li.-cl
11	o	o	ci, ci.-cu, cu.-s, st.-w	ci, ci.-cu : v : v
12	o	o	10, sl, sn	10 : 10
13	o	o	10	10 : 10, th.-r
14	o	o	10	ci, ci.-cu, cu.-s, cu : o
15	w	o	10, f	10, th.-cl, h, so.-ha : v
16	o	o	v : 10	10 : 10
17	o	o	10	10 : 10
18	o	o	ci, ci.-cu, cu	o : v : o, h, lu.-ha
19	o	o	10, r : 10, sl.-f, sl.-r	10 : 10
20	o	o	10	10 : 10
21	o	o	10	10 : 10
22	o	wN : o	10, sl.-f, sl.-r	10, sl.-r : 10 : v
23	o	w : o : w	ci, ci.-cu, cu	ci, ci.-cu, cu, h : 10
24	m	v : w	10 : 10, sl.-f	10 : 10, mt
25	w	wP, mN: w	ci, ci.-s, cu.-s, h, mt	ci, ci.-s, h : 10 : v
26	w	v	ci, ci.-cu, ci.-s	10 : 10
27	o	w : o	v : ci, ci.-cu, cu	ci, ci.-cu, cu, cu,-s: v, sl.-r : v
28	o	o	v : v : cu.-s	ci, ci.-cu, cu, cu.-s, ci.-s : 10
29	w	o : w	10 : v, mt	10, glm : 10
30	o	o	10, sl.-f	10 : 10
31	o	o	10, sl.-f	10 : v : 10

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The mean for the month was 33°·8, being 2°·5 *lower* than the average of the preceding 34 years.

Elastic Force of Vapour.—The mean for the month was 0^{in}·194, being 0^{in}·024 *less* than the average of the preceding 34 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2^{grs}·3, being 0^{gr}·2 *less* than the average of the preceding 34 years.

Degree of Humidity.—The mean for the month was 78 (that of Saturation being represented by 100), being 4 *less* than the average of the preceding 34 years.

Weight of a Cubic Foot of Air.—The mean for the month was 555 grains, being 6 grains *greater* than the average of the preceding 34 years.

CLOUDS.
The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 7·8.

WIND.
The proportions were of N. 10, S. 4, W. 6, E. 11, and Calm 0. The greatest pressure in the month was 18^{lbs}·0 on the square foot on the 9th. The mean daily horizontal movement of the air for the month was 309 miles; the greatest, 593 miles on the 9th; and the least, 112 miles on the 31st.

RAIN.
Fell on 7 days in the month, amounting to 0^{in}·56, as measured in the simple cylinder gauge partly sunk below the ground; being 1^{in}·01 *less* than the average fall of the preceding 60 years.

MONTH and DAY, 1875.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	READINGS OF THERMOMETERS.									Difference between the Dew Point Temperature and Air Temperature.			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.					ROBINSON'S.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
			Dry.			Dew Point.	Highest in the Sun 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.						OSLER'S.					Amount of Horizontal Movement of the Air on each Day.	
			Highest.	Lowest.	Mean Daily Value.	Mean Daily Value.			Highest.	Lowest.	Mean Daily Value.	Greatest.	Least.		General Direction.		Pressure in lbs. on the square foot.				
															A.M.	P.M.	Greatest.	Least.	Mean of 24 Obs.		
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
April 1	..	30·358	54·3	42·2	46·7	36·7	100·2	39·7	47·3	45·3	10·0	16·6	4·2	+ 2·5	Variable	ENE: SSW: W	0·0	0·0	0·0	93	0·00
2	..	30·198	54·4	42·3	46·4	34·7	113·7	37·5	47·1	45·3	11·7	17·6	3·7	+ 1·9	NW	NW : SW	0·4	0·0	0·0	193	0·00
3	...	29·761	53·2	38·6	45·4	40·0	72·9	34·3	46·7	45·1	5·4	10·6	3·2	+ 0·6	WSW	WSW	6·1	0·0	1·3	453	0·00
4	..	29·482	59·5	43·1	48·8	41·5	125·3	42·7	47·7	45·5	7·3	18·2	0·7	+ 3·8	WSW : WNW	SW : SSW	3·5	0·0	0·8	434	0·08
5	In Equator	29·143	55·9	41·4	46·7	38·7	109·8	35·8	48·3	46·1	8·0	15·4	2·0	+ 1·5	SSW	SSW	8·8	0·0	2·1	530	0·00
6	New	29·298	56·6	39·6	45·4	38·9	122·0	33·7	48·3	46·1	6·5	13·8	2·1	+ 0·1	SSW : SW	SW : S	3·7	0·0	0·4	394	0·02
7	Perigee	29·230	51·8	37·1	43·3	35·9	105·3	34·9	48·5	46·1	7·4	15·0	1·2	− 2·1	SSE: WSW	W : NE : E	2·8	0·0	0·1	211	0·08
8	..	29·500	58·3	36·0	44·9	39·1	127·2	30·0	48·7	46·1	5·8	18·2	0·0	− 0·6	WSW : SSW : NE	NNE	1·7	0·0	0·1	183	0·48
9	..	29·792	43·8	39·2	40·6	38·3	53·5	39·0	49·1	46·5	2·3	4·4	0·4	− 5·0	NE	NE	3·0	0·0	0·2	352	0·42
10	..	29·943	47·2	40·3	42·1	40·1	59·4	40·0	49·3	46·5	2·0	4·2	0·2	− 3·6	NE	ENE	3·8	0·0	0·3	364	0·15
11	Greatest Declination N.	29·965	52·1	41·3	45·0	41·4	82·0	41·2	48·9	46·5	3·6	7·4	1·5	− 0·8	ENE	E	2·6	0·0	0·2	305	0·00
12	First Qr.	30·018	45·4	35·7	39·5	37·5	57·8	29·7	48·9	46·8	2·0	5·7	0·2	− 6·4	NE : NNE	NNE	2·7	0·0	0·2	323	0·00
13	..	30·096	52·3	34·4	41·7	33·4	125·0	26·0	48·5	46·5	8·3	15·2	1·7	− 4·3	NE	ENE : ESE	2·5	0·0	0·3	317	0·00
14	..	30·148	55·0	30·8	42·3	31·8	124·4	23·5	47·5	45·3	10·5	19·6	0·0	− 3·9	NE : E : SE	NE : N : SW	0·0	0·0	0·0	84	0·00
15	..	30·224	52·0	35·4	40·8	37·7	94·8	26·3	47·5	45·3	3·1	11·0	1·4	− 5·6	WSW : NNE : NE	ENE : ESE	0·3	0·0	0·0	155	0·00
16	..	30·158	56·0	33·2	44·0	36·5	123·2	23·6	47·3	45·3	7·5	14·6	0·0	− 2·6	Calm : ENE	E : ESE	0·1	0·0	0·0	115	0·00
17	..	30·027	61·9	32·2	46·5	39·8	123·1	26·7	47·5	45·5	6·7	16·5	0·0	− 0·3	ESE	E : ENE : ESE	0·6	0·0	0·0	122	0·00
18	In Equator	29·920	62·0	32·5	47·8	37·7	138·0	23·8	48·3	46·3	10·1	19·0	0·0	+ 0·8	ESE : E	E : ESE	0·8	0·0	0·0	158	0·00
19	..	29·983	67·3	34·7	50·4	39·3	137·3	25·4	48·5	46·5	11·1	22·3	0·0	+ 3·2	E : ENE	ESE : E	1·7	0·0	0·1	178	0·00
20	Full	29·939	70·8	35·7	53·7	42·7	134·8	29·4	50·1	48·1	11·0	21·6	0·0	+ 6·3	E : ENE	E : S	0·7	0·0	0·0	148	0·00
21	..	29·703	68·6	40·0	53·2	41·8	104·2	30·6	51·3	49·1	11·4	20·5	0·0	+ 5·6	NE : SW	NNE : E : ENE	3·6	0·0	0·3	210	0·22
22	Apogee	29·713	43·3	38·0	39·4	33·9	58·7	33·0	51·3	49·1	5·5	8·6	2·4	− 8·4	ENE	E	3·0	0·0	0·7	324	0·10
23	..	29·851	53·4	31·2	41·6	34·8	120·3	24·0	51·7	48·8	6·8	15·8	1·8	− 6·4	NE : ENE	ENE : E : ESE	0·7	0·0	0·1	169	0·00
24	..	30·065	50·8	30·6	39·8	30·9	113·6	21·7	51·3	48·8	8·9	15·6	0·0	− 8·4	ENE : NE	ENE : E : SE	0·7	0·0	0·1	169	0·00
25	Greatest Declination S.	30·102	58·6	27·8	43·9	33·6	115·2	20·8	51·3	49·0	10·3	21·3	1·1	− 4·4	SW : NE	NE : SE : SSW	0·2	0·0	0·0	117	0·00
26	..	29·983	61·6	33·7	47·4	35·4	122·3	26·3	51·3	49·8	12·0	20·3	2·8	− 1·0	WSW : S	S : SSE	1·4	0·0	0·1	176	0·00
27	..	29·870	70·3	42·7	57·0	42·9	128·5	35·7	51·3	49·8	14·1	22·9	6·8	+ 8·4	ESE : SW	WSW	1·3	0·0	0·2	200	0·00
28	Last Qr.	29·971	70·2	45·2	57·2	45·6	129·1	37·7	53·3	51·3	11·6	22·0	0·0	+ 8·4	WSW	W : WSW	0·8	0·0	0·0	221	0·00
29	..	29·959	66·0	43·5	53·3	41·9	117·1	37·1	53·3	51·7	11·4	20·7	2·0	+ 4·2	WSW : WNW	NW : W : WSW	1·0	0·0	0·1	232	0·00
30	..	29·864	71·5	43·3	56·6	44·1	134·6	34·0	54·3	51·8	12·5	22·4	1·5	+ 7·2	SW	SW	0·2	0·0	0·0	140	0·00
Means	..	29·875	57·5	37·4	46·4	38·2	109·1	31·5	49·5	47·3	8·2	15·9	1·4	− 0·3	...	...	..	..	..	Sum 7070	Sum 1·55

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The absolute maximum in the month was 30ⁱⁿ·390 on the 1st; the first minimum in the month was 30ⁱⁿ·370 on the 1st.
The second maximum　　　,,　　　was 29ⁱⁿ·321 on the 6th; the absolute minimum　　,,　　was 29ⁱⁿ·130 on the 5th.
The third maximum　　　,,　　was 30ⁱⁿ·240 on the 15th; the third minimum　　　,,　　was 29ⁱⁿ·205 on the 7th.
The fourth maximum　　　,,　　was 30ⁱⁿ·014 on the 20th; the fourth minimum　　　,,　　was 29ⁱⁿ·920 on the 18th.
The fifth maximum　　　,,　　was 30ⁱⁿ·130 on the 25th; the fifth minimum　　　,,　　was 29ⁱⁿ·671 on the 21st.
The sixth maximum　　　,,　　was 29ⁱⁿ·996 on the 29th; the sixth minimum　　　,,　　was 29ⁱⁿ·844 on the 27th.
The range in the month was 1ⁱⁿ·260.
The mean for the month was 29ⁱⁿ·875, being 0ⁱⁿ·107 *higher* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.

The highest in the month was 71°·5 on the 30th; the lowest was 27°·8 on the 25th.
The range　　　,,　　was 43°·7.
The mean　　　,,　　of all the highest daily readings was 57°·5, being 0°·4 *lower* than the average of the preceding 34 years.
The mean　　　,,　　of all the lowest daily readings was 37°·4, being 1°·9 *lower* than the average of the preceding 34 years.
The mean daily range was 20°·1, being 1°·4 *greater* than the average of the preceding 34 years.
The mean for the month was 46°·4, being 0°·8 *lower* than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
April 1	w	o	10	10, cu.-s : v : o
2	wN	o	10 : sl. f, v	ci, ci.-cu : li.-cl
3	w	o	10	10 : v : cu.-s
4	o	o	ci, ci.-cu, cu, cu.-s	ci, ci.-cu, cu.-s : 10, sl.-r
5	o	o	10 : 10, sc	ci,ci.-cu,cu,ci. s : v, sl.-r : o
6	o	v,sp,g.-cur: w	ci, ci.-cu, cu, sl.-r	ci,ci.-cu,cu, cu.-s,r,hl,v : li.-cl, v, r
7	o	o	10, oc.-r	ci, cu, cu.-s, h : 10 : 10
8	o	o : wN	10, r : v : ci, ci.-cu, cu	ci,ci.-s,cu,cu.-s : 10, r : 10, c.-r
9	o	wN : o	10, c.-r : 10, th.-r	10, sl.-r : 10, th.-r
10	o	wN : o	10, r	10, oc.-r : 10, th.-r
11	o	o	10, th.-r	10 : 10
12	o	o : w	10, f	10 : v : th.-cl
13	o	o	10	ci.-cu, cu : o, v
14	w	o	o, f, v	ci, ci.-s, h : o, h : o, h, mt
15	o	o : w	o : 10	li.-cl, h : o : o
16	o	o	ci, ci.-cu	ci : o : o, h
17	o	w : o : m	o, mt	o : o, h.-d
18	w	w	o	o : o
19	w	o : w	o, mt : o	o : o
20	w	o : w	o, mt : o	o : o, mt
21	m	o	vv, glm	v : 10, r : 10, r
22	o	o	10, r : 10, th.-r	10, r, hl : 10 : 10
23	o	o	ci, ci.-s, h.-fr	10 : 10, sl.-r
24	o	o	h.-fr : ci, ci.-cu, cu.-s	ci,ci.-cu,cu,cu.-s: o : o
25	o	o	o, h.-fr : o, h	ci, ci.-cu : o
26	o	o	ci, ci.-cu, ci.-s	th.-cl : o, d, li.-cl
27	o	o : w	ci, ci.-s, ci.-cu, cu	ci,ci.-cu,cu,cu.-s : v : 10
28	w	o	th.-cl, h	ci, ci.-cu, cu, cu.-s : o
29	o	w	o : o : v	ci, ci.-cu : o
30	o	o	ci	ci, ci.-cu, cu, cu.-s, h : o

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 38°·2, being 2°·6 *lower* than the average of the preceding 34 years.

Elastic Force of Vapour.—The mean for the month was 0^{in}·231, being 0^{in}·025 *less* than the average of the preceding 34 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2^{grs}·7, being 0^{gr}·3 *less* than the average of the preceding 34 years.

Degree of Humidity.—The mean for the month was 74 (that of Saturation being represented by 100), being 5 *less* than the average of the preceding 34 years.

Weight of a Cubic Foot of Air.—The mean for the month was 547 grains, being 4 grains *greater* than the average of the preceding 34 years.

CLOUDS.

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

WIND.

The proportions were of N. 5, S. 7, W. 7, E. 11, and Calm 0. The greatest pressure in the month was 8^{lbs}·8 on the square foot on the 5th. The mean daily horizontal movement of the air for the month was 236 miles; the greatest, 530 miles on the 5th, and the least, 84 miles on the 14th.

RAIN.

Fell on 8 days in the month, amounting to 1^{in}·55, as measured in the simple cylinder gauge partly sunk below the ground; being 0^{in}·14 *less* than the average fall of the preceding 60 years.

RESULTS OF DAILY METEOROLOGICAL OBSERVATIONS

MONTH and DAY, 1875.	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. 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. 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.
May 1	..	29.737	55.2	47.0	49.1	48.3	76.0	37.1	55.3	52.3	0.8	1.6	0.0	− 0.7	ENE : E	ESE : SW	2.6	0.0	0.2	191	0.37
2	In Equator	29.776	60.5	46.0	50.5	45.3	90.0	40.0	55.3	52.3	5.2	12.9	0.6	+ 0.4	W: NW: NNW	NNW : SW	0.3	0.0	0.0	162	0.04
3	..	29.781	69.0	43.4	56.1	47.2	139.8	36.7	56.1	53.1	8.9	17.8	0.0	+ 5.7	WSW : SW	SW : SSW	1.2	0.0	0.1	172	0.00
4	..	29.833	67.0	44.6	56.2	50.5	133.0	37.4	57.1	54.1	5.7	15.1	0.0	+ 5.5	Calm : NE : E	SE	0.3	0.0	0.0	104	0.00
5	New: Perigee.	29.800	70.0	44.0	56.0	50.0	136.3	37.9	57.7	55.0	6.0	16.2	0.0	+ 5.0	Calm	SSW : S	0.8	0.0	0.1	137	0.00
6	..	29.607	68.5	50.5	57.1	49.3	139.8	42.1	58.1	55.5	7.8	15.8	4.2	+ 5.9	SSE: SSW: SW	SW : SSE	3.3	0.0	0.4	268	0.00
7	..	29.461	55.3	46.0	50.1	48.3	79.2	43.8	58.3	56.1	1.8	4.5	0.4	− 1.2	SSE : SW	WSW : SW	12.8	0.0	1.4	461	0.51
8	Greatest Declination N.	29.681	63.3	51.7	56.4	54.0	87.1	47.8	58.5	55.9	2.4	5.9	0.2	+ 5.0	SW : SSW	SW : SSW	4.2	0.0	0.5	305	0.02
9	..	29.754	66.7	48.0	55.0	47.3	125.7	43.0	59.5	56.5	7.7	16.7	0.8	+ 3.5	WSW	SW	3.9	0.0	0.7	364	0.01
10	..	30.038	66.8	47.4	55.6	45.1	124.2	40.7	59.3	56.8	10.5	19.4	0.0	+ 4.1	SW : WNW	NW : WSW	1.8	0.0	0.2	254	0.00
11	..	30.237	68.7	42.2	55.4	45.3	136.7	35.1	59.3	57.0	10.1	20.2	0.9	+ 3.8	SW	WSW	1.7	0.0	0.1	233	0.00
12	First Qr.	30.156	73.8	45.3	59.5	46.2	135.9	36.2	59.3	57.0	13.3	23.0	3.0	+ 7.8	WSW	W	1.7	0.0	0.3	275	0.00
13	..	30.120	77.1	47.0	61.1	52.0	127.9	39.8	60.3	57.3	9.1	19.7	0.4	+ 9.3	WSW	NW : N	0.7	0.0	0.0	140	0.00
14	..	30.064	76.8	49.7	62.2	52.7	120.8	41.6	61.5	58.3	9.5	19.7	0.0	+10.2	N : NNE	Variable	0.0	0.0	0.0	112	0.00
15	In Equator	30.003	81.9	52.5	66.2	52.7	131.8	44.9	62.1	58.9	13.5	25.8	1.4	+13.8	SW : WSW	NW : NNE: E	1.3	0.0	0.0	217	0.00
16	..	30.051	69.2	42.0	55.2	43.0	136.8	36.0	63.3	59.9	12.2	21.4	2.5	+ 2.4	NE	E : ESE	2.5	0.0	0.2	246	0.00
17	..	29.812	64.0	39.6	52.2	41.5	134.8	32.9	63.3	60.1	10.7	21.5	0.0	− 1.0	ENE : E : ESE	E	2.5	0.0	0.3	244	0.00
18	..	29.416	68.5	44.5	54.2	45.4	134.1	37.5	63.3	60.3	8.8	19.4	0.0	+ 0.7	E : WSW	W : SW	5.3	0.0	0.6	321	0.01
19	Apogee	29.514	62.6	42.6	47.6	39.0	131.2	33.8	63.3	60.1	8.6	15.2	2.2	− 6.0	WSW : W	W : WSW	4.2	0.0	0.6	371	0.10
20	Full	29.601	57.4	42.3	50.1	46.8	74.2	35.0	62.3	59.3	3.3	11.0	0.0	− 3.6	SW : SSW	SSW	13.0	0.0	1.5	456	0.14
21	..	29.521	70.3	51.6	59.1	48.6	135.0	45.9	61.1	58.7	10.5	19.4	0.2	+ 5.2	SSW: S: SSE	S : SW	13.2	0.0	1.0	390	0.00
22	..	29.719	66.7	50.5	58.6	45.7	130.4	43.2	61.1	59.1	12.9	18.4	3.1	+ 4.5	SSW	SW	8.0	0.0	1.4	463	0.02
23	Greatest Declination S.	30.028	67.9	45.6	55.1	41.7	132.7	38.0	60.5	59.1	13.4	25.4	0.0	+ 0.8	SW	WSW : W	5.4	0.0	0.8	401	0.00
24	..	30.212	71.8	43.1	57.4	46.2	141.8	36.8	60.3	57.8	11.2	22.9	0.4	+ 2.8	WSW	WSW : W	1.6	0.0	0.2	274	0.00
25	..	30.116	71.8	45.7	57.3	48.3	123.2	37.4	60.5	58.8	9.0	20.1	2.7	+ 2.3	WSW : W	NW: NNW: NNE	1.7	0.0	0.1	253	0.00
26	..	30.073	65.4	42.3	53.0	40.9	123.1	33.0	60.5	59.1	12.1	21.4	2.9	− 2.2	NNW	N : NE	2.2	0.0	0.3	256	0.00
27	..	30.004	62.2	42.5	51.5	41.8	105.4	32.6	60.3	58.8	9.7	19.0	3.3	− 3.8	N	NW	2.2	0.0	0.2	248	0.00
28	Last Qr.	29.660	65.8	49.5	55.0	49.2	98.8	44.0	60.3	58.3	5.8	13.9	1.7	− 0.5	W : WSW	WSW : NE	0.8	0.0	0.0	210	0.16
29	..	29.675	54.3	47.0	49.3	45.5	65.2	46.0	60.3	58.3	3.8	5.8	1.3	− 6.4	NNE : N	NNE	1.9	0.0	0.3	291	0.08
30	In Equator	29.760	64.8	42.2	52.1	41.1	143.8	38.2	59.7	58.0	11.0	18.4	0.0	− 3.9	NNE : NE	ENE : ESE	2.3	0.0	0.3	291	0.00
31	..	29.880	64.9	36.6	50.7	42.3	138.4	29.3	59.3	56.9	8.4	19.4	0.0	− 5.6	NE : ENE	ENE	2.5	0.0	0.3	278	0.00
Means	..	29.842	66.7	45.6	55.0	46.5	120.4	38.8	59.9	57.4	8.5	17.0	1.0	+ 2.1	...	...	..	..	..	Sum 8388	Sum 1.46

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29in.851 on the 4th ; the second minimum was 29in.411 on the 7th.

The first minimum in the month was 29in.716 on the 1st.

The absolute maximum ,, was 30in.266 on the 11th ; the third minimum ,, was 29in.962 on the 15th.

The third maximum ,, was 30in.074 on the 15th ; the absolute minimum ,, was 29in.397 on the 18th.

The fourth maximum ,, was 29in.629 on the 20th ; the fifth minimum ,, was 29in.438 on the 21st.

The fifth maximum ,, was 30in.260 on the 24th ; the sixth minimum ,, was 29in.610 on the 28th.

The range in the month was 0in.869.

The mean for the month was 29in.842, being 0in.060 *higher* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.

The highest in the month was 81°.9 on the 15th ; the lowest was 36°.6 on the 31st.

The range ,, was 45°.3.

The mean ,, of all the highest daily readings was 66°.7, being 2°.2 *higher* than the average of the preceding 34 years.

The mean ,, of all the lowest daily readings was 45°.6, being 1°.7 *higher* than the average of the preceding 34 years.

The mean daily range was 21°.1, being 0°.6 *greater* than the average of the preceding 34 years.

The mean for the month was 55°.0, being 2°.2 *higher* than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
May 1	o	o	v : 10, r : 10, r	10, r : 10, r
2	o	o	10, r : 10, mt	10 : v : o
3	o	o	o : ci, ci.-cu, cu, cu.-s	ci, ci.-cu, cu, cu.-s : 10, th.-r
4	w	o	ci, ci.-s, cu, cu.-s	cu.-s, ci.-cu : ci.-cu
5	o	wN : o : w	f : ci, cu, cu.-s	ci,ci.-cu,ci.-s,cu : li.-cl : v
6	o	o : m	10 : ci, ci.-s, ci.-cu	ci, ci.-cu, cu, cu.-s : li.-cl, v
7	o	o	10, r	10, r, sc : v, oc.-shs : 10
8	o	o	v : v : 10, th.-r	10, oc.-th.-r : 10, oc.-th.-r
9	w	o : w	ci, ci.-s, ci.-cu, cu.-s	ci, ci.-cu, cu, cu.-s : o
10	o	o	o : ci, ci.-cu, cu, cu.-s	ci, ci.-cu, cu : ci.-cu, cu.-s, l
11	o	o	ci, ci.-s, cu.-s	l, ci : o
12	o	o	o : ci, ci.-s	ci : v : o
13	o	o	th.-cl	ci, ci.-cu, cu, cu.-s : o
14	o	o	li.-cl, h	ci, ci.-cu, h : o
15	o	o	o : ci, ci.-s	ci, ci.-cu : li.-cl : 10
16	o	o	v : o	ci, ci.-cu : o : o
17	o	o	o : ci, ci.-s	o : li.-cl, l
18	o	sP,sN,sp : o	ci	cu.-s, sl.-r : cu.-s, oc.-r
19	o : sP, sN, sp	sP,sN,sp : o	ci, ci.-cu, cu, fr.-shs, hl	ci.-cu,cu,cu.-s,oc.-shs,t.-s : ci
20	o	o	10, w	10, r : 10, r : 10, th.-r
21	o	wN : o	ci, ci.-cu, cu, cu.-s, w	ci,ci.-cu,ci.-s,cu,cu.-s,w,sl.-r: o
22	o	mP,wN,sp,g.-cur: o	ci,ci.-cu,cu,cu.-s,sl.-r,w	ci,ci.-cu,cu,cu.-s,fr.-shs : ci, ci.-cu, cu.-s
23	w	o	ci.-cu, cu	ci, ci.-cu : o
24	o	o	ci, ci.-cu, cu	ci, ci.-cu, cu.-s : o
25	o	o	ci, ci.-cu, ci-s, cu.-s	ci,ci.-cu,cu,cu.-s : ci.-s : o
26	o	o	ci.-cu, cu	ci.-cu : ci, ci.-s
27	o	o	ci, ci.-cu	cu.-s, ci, ci.-cu, ci.-s : 10 : 10
28	o	o	10, r	10, sl.-r : v : 10, r
29	o	o	10, r : 10	10 : 10, oc.-th.-r : 10, oc.-th.-r
30	o	o	ci, ci.-cu, cu, cu.-s	ci, ci.-cu, cu, cu.-s : o
31	o	o	v	ci, ci.-cu, cu : o : o

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
  The mean for the month was 46°·5, being 1°·0 *higher* than the average of the preceding 34 years.
  Elastic Force of Vapour.—The mean for the month was 0^{in}·317, being 0^{in}·010 *greater* than the average of the preceding 34 years.
  Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 3^{grs}·6, being 0^{gr}·1 *greater* than the average of the preceding 34 years.
  Degree of Humidity.—The mean for the month was 74 (that of Saturation being represented by 100), being 3 *less* than the average of the preceding 34 years.
  Weight of a Cubic Foot of Air.—The mean for the month was 537 grains, being *the same as* the average of the preceding 34 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. 5, S. 9, W. 12, E. 5, and Calm 0. The greatest pressure in the month was 13^{lbs}·2 on the square foot on the 21st. The mean daily horizontal movement of the air for the month was 271 miles, the greatest, 463 miles on the 22nd, and the least, 104 miles on the 4th.

RAIN.
  Fell on 11 days in the month, amounting to 1^{in}·46, as measured in the simple cylinder gauge partly sunk below the ground ; being 0^{in}·64 *less* than the average fall of the preceding 60 years.

MONTH and DAY, 1875.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Dry. Highest.	Dry. Lowest.	Dry. Mean Daily Value.	Dew Point. Mean Daily Value.	Highest in the Sun, by 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, Highest.	In the Water of the Thames, Lowest.	Difference between Dew Point and Air Temp. Mean Daily Value.	Greatest.	Least.	Difference between Mean Temp. of Day and Mean of 50 Years.	General Direction. A.M.	General Direction. P.M.	Pressure Greatest.	Pressure Least.	Pressure Mean of 24 Obs.	Robinson's. Amount of Horizontal Movement.	Rain in Inches.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
June 1	..	29·992	74·3	41·0	58·5	45·8	145·2	33·5	59·5	56·8	12·7	23·4	0·0	+ 2·0	ENE	ENE	12·7	0·0	0·9	357	0·00
2	..	29·928	77·7	47·3	62·2	45·5	147·2	42·2	60·5	59·1	16·7	27·7	0·4	+ 5·5	ENE	ENE : NE	9·5	0·0	0·9	375	0·00
3	Perigee: New.	29·766	83·2	51·3	66·2	51·6	150·8	46·0	61·3	59·9	14·6	27·9	2·2	+ 9·3	NE	ESE : SW	1·2	0·0	0·1	216	0·00
4	Greatest Declination N.	29·727	83·3	54·5	66·3	54·1	144·0	46·7	62·1	60·3	12·2	23·5	2·8	+ 9·2	SW : WSW	W : NW : NNW	1·5	0·0	0·0	266	0·00
5		29·818	77·0	53·2	63·0	42·9	145·2	49·0	63·3	60·8	20·1	32·0	4·6	+ 5·7	NNW : N	WSW	2·5	0·0	0·1	231	0·00
6	..	29·783	76·8	52·7	60·3	50·5	144·2	47·1	63·7	61·8	9·8	21·8	0·0	+ 2·8	SW	WSW : W	4·0	0·0	0·9	447	0·00
7	..	29·953	73·7	53·7	61·3	55·3	125·7	49·2	64·1	61·9	6·0	14·6	3·4	+ 3·7	WSW	WSW	4·5	0·0	1·1	447	0·02
8	..	29·997	77·5	54·1	63·8	49·6	139·5	48·0	64·3	62·3	14·2	26·0	3·8	+ 6·1	WSW : WNW	NW : N : SSW	5·8	0·0	0·3	283	0·00
9	..	29·610	79·0	49·9	62·2	51·7	143·5	43·9	64·5	62·7	10·5	24·3	1·4	+ 4·3	SSE	S : SW	2·8	0·0	0·4	287	0·00
10	First Qr.	29·514	71·0	51·8	59·3	46·3	140·0	47·8	64·3	62·7	13·0	21·6	2·4	+ 1·2	SW	SSW	10·8	0·0	1·2	435	0·00
11	In Equator	29·520	64·5	47·7	53·8	45·2	130·3	43·2	64·3	62·7	8·6	17·8	0·2	− 4·5	WSW	WSW	11·5	0·0	1·8	491	0·71
12	..	29·526	60·6	47·1	51·5	47·7	115·0	44·0	64·1	61·5	3·8	10·8	0·8	− 7·0	WSW	SW : SSW	25·0	0·1	1·7	506	0·64
13	..	29·537	62·9	46·3	55·0	48·9	102·0	42·3	63·3	60·3	6·1	12·9	1·0	− 3·7	SSW	SSW	10·2	0·1	1·7	437	0·05
14	..	29·415	66·9	54·8	58·6	51·6	104·1	54·0	62·3	60·1	7·0	13·3	1·6	− 0·3	SSW	SSW	8·8	0·1	1·8	482	0·00
15	Apogee	29·324	64·3	50·4	55·6	47·2	126·0	47·7	62·3	60·3	8·4	14·2	1·6	− 3·4	SSW	SSW	18·6	0·0	3·7	584	0·15
16	..	29·474	64·7	49·6	54·1	46·9	125·0	45·8	62·3	60·3	7·2	14·4	2·5	− 5·0	SSW	SSW	6·7	0·0	1·2	416	0·06
17	..	29·660	71·5	45·1	55·9	47·3	134·2	39·9	61·8	59·7	8·6	20·7	0·0	− 3·4	S : SSW : SW	SW : S	0·6	0·0	0·0	159	0·00
18	Full	29·876	67·3	48·3	54·5	48·6	104·4	42·3	61·3	59·3	5·9	15·8	0·0	− 5·0	Calm	Variable	0·8	0·0	0·0	111	0·17
19	Greatest Declination S.	29·966	73·9	43·9	58·6	49·9	136·0	39·7	61·3	60·1	8·7	20·5	0·0	− 1·1	Variable	WSW : SW : SSW	1·0	0·0	0·1	144	0·00
20	..	29·719	69·0	50·7	57·2	54·9	99·1	47·0	63·5	61·3	2·3	8·3	0·2	− 2·7	SSW : SW	W : N : WSW	1·2	0·0	0·0	200	0·08
21	..	29·711	58·8	47·0	51·4	45·7	72·5	44·0	63·7	61·9	5·7	9·3	2·2	− 8·7	WSW : NNW : N	NNW : SW	1·9	0·0	0·1	186	0·00
22	..	29·996	75·3	44·5	58·2	46·1	136·6	39·4	62·7	61·7	12·1	24·8	0·0	− 2·2	SW	SW	1·0	0·0	0·0	173	0·00
23	..	30·009	72·7	48·6	59·0	51·5	136·6	41·7	62·5	61·7	7·5	18·7	2·3	− 1·7	SSE : SW	NW : N	0·4	0·0	0·0	135	0·00
24	..	30·016	74·3	50·4	61·1	51·6	137·1	46·0	62·9	61·7	9·5	18·5	0·0	+ 0·2	N	NNE : SE	0·3	0·0	0·0	140	0·00
25	..	29·854	78·0	51·2	62·6	54·5	139·0	44·5	64·3	63·5	8·1	18·0	0·0	+ 1·5	SW : WSW	WSW	1·5	0·0	0·1	211	0·00
26	In Equator: Last Quarter.	29·767	74·7	52·1	61·0	52·4	128·5	45·4	64·3	62·5	8·6	19·7	0·2	− 0·2	WSW	SW : W : NNW	2·3	0·0	0·2	269	0·00
27	..	29·818	74·0	43·7	58·7	46·0	144·2	38·2	64·5	63·3	12·7	21·9	0·0	− 2·6	SW	SSW : S	1·8	0·0	0·1	213	0·00
28	..	29·668	67·8	52·3	58·1	54·3	91·0	48·5	64·5	..	3·8	11·5	1·5	− 3·2	SE : SSE	SSE : E	0·7	0·0	0·0	171	0·34
29	..	29·682	74·3	55·9	61·3	55·7	139·0	55·9	64·9	..	5·6	14·9	0·0	0·0	SW	SW	1·2	0·0	0·0	169	0·05
30	..	29·685	68·3	55·3	59·2	54·0	121·7	52·1	65·1	62·6	5·2	12·8	0·6	− 2·0	SW	S : SSW	2·2	0·0	0·1	265	0·01
Means	..	29·744	71·9	49·8	59·0	49·8	128·3	45·2	63·1	61·2	9·2	18·7	1·2	− 0·2	...	...	..	..	..	Sum 8806	Sum 2·28

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·010 on the 1st ; the first minimum in the month was 29in·688 on the 4th.
The second maximum   ,,   was 29in·850 on the 5th ; the second minimum   ,,   was 29in·749 on the 6th.
The third maximum   ,,   was 30in·021 on the 8th ; the third minimum   ,,   was 29in·454 on the 11th.
The fourth maximum   ,,   was 30in·569 on the 11th ; the fourth minimum   ,,   was 29in·484 on the 12th.
The fifth maximum   ,,   was 29in·637 on the 13th ; the absolute minimum   ,,   was 29in·298 on the 15th.
The sixth maximum   ,,   was 30in·002 on the 19th ; the sixth minimum   ,,   was 29in·637 on the 21st.
The absolute maximum   ,,   was 30in·054 on the 24th ; the seventh minimum   ,,   was 29in·740 on the 26th.
The eighth maximum   ,,   was 29in·865 on the 27th.
The range in the month was 0in·756.
The mean for the month was 29in·744, being 0in·071 *lower* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.

The highest in the month was 83°·3 on the 4th ; the lowest was 41°·0 on the 1st.
The range   ,,   was 42°·3.
The mean   ,,   of all the highest daily readings was 71°·9, being 0°·8 *higher* than the average of the preceding 34 years.
The mean   ,,   of all the lowest daily readings was 49°·8, being 0°·2 *lower* than the average of the preceding 34 years.
The mean daily range was 22°·1, being 1°·0 *greater* than the average of the preceding 34 years.
The mean for the month was 59°·0, being *the same as* the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
June 1	o	o	o	o : o
2	o	o	o	o : o, l
3	o	o	o	ci, ci.-cu, t : o
4	o	o	o, ci, ci.-cu	ci, ci.-cu, cu : 10
5	o	o	ci, ci.-cu, cu, cu.-s	ci, ci.-cu, cu, cu.-s : 10
6	o	o	10 : ci.-cu, cu, cu.-s	ci, ci.-cu, cu.-s : ci.-cu, cu, cu.-s
7	o	o	10 : 10, sl.-r	10, sl.-r : 10, sc, w
8	o	o	ci.-cu, cu, cu.-s	ci,ci.-cu,cu,cu.-s,h : o : o
9	o	s,sp,g.-cur : o	v : ci, ci.-s, ci.-cu, cu.-s	ci, ci.-cu, cu, cu.-s, t, sl.-r : ci, ci.-s
10	o	o	ci, ci.-cu, ci.-s, cu, cu.-s, w	ci.-cu, ci.-s, cu, w : li.-cl
11	o	s : o : o	10, h.-r : ci, ci.-cu, cu, r, st.-w	ci,ci.-cu,cu,cu.-s,st.-w,sl.-r: ci.-s, cu.-s, oc.-h.-shs
12	o	o	10 : 10, r	v, oc.-h.-r, st.-w : ci.-cu, cu.-s, fr.-shs
13	o	o	ci.-cu, sl.-r	10, oc.-r : oc.-r
14	o	o	10, st.-w	ci, ci.-cu : 10, sl.-r
15	o	o	10, r : ci.-cu, st.-w	ci.-cu, cu, oc.-r, ci : v, st.-w
16	o	o	ci, ci.-cu, oc.-shs	ci, ci.-cu : ci, ci.-cu
17	o	o	ci, ci.-cu, cu, cu.-s	ci, cu, cu.-s : cu.-s, li.-cl, t, l
18	o	sP,wN: o : o	10	ci,ci.-cu,cu.-s,n,mt,oc.-r,t: 10, mt
19	o	o	ci, ci.-cu, cu, cu.-s	ci, ci.-cu : o
20	o	o	10, r : 10, th.-r	10, r : v : ci, ci.-s, cu.-s
21	o	o	10	10, sl.-r : 10
22	o	o	h	ci, ci.-cu, cu, so.-ha : ci.-s, s
23	o	o	10, m.-t, h	ci, ci.-cu, cu, cu.-s : mt
24	o	o	ci.-cu	ci.-cu : 10
25	o	o	ci.-cu, f	ci.-cu, cu : o
26	o	o	v : 10, v	ci,ci.-cu,ci.-s,cu,cu.-s,sl.-r,hl : o
27	o	o	ci, ci.-cu	ci.-cu, cu.-s : ci, ci.-cu
28	o	o	10, oc.-r	10, th.-r : 10, oc.-r
29	o	o	10, r : 10	ci, ci.-cu, cu, cu.-s, sl.-r, h: 10
30	o		ci.-cu, cu.-s	10, r : ci.-cu, cu.-s, v

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The mean for the month was 49°·8, being 1°·1 *lower* than the average of the preceding 34 years.
Elastic Force of Vapour.—The mean for the month was 0^{in}·358, being 0^{in}·017 *less* than the average of the preceding 34 years.
Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 4^{grs}·0, being 0^{gr}·2 *less* than the average of the preceding 34 years.
Degree of Humidity.—The mean for the month was 72 (that of Saturation being represented by 100), being 3 *less* the average of the preceding 34 years.
Weight of a Cubic Foot of Air.—The mean for the month was 530 grains, being 1 grain *less* than the average of the preceding 34 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. 5, S. 12, W. 9, E. 3, and Calm 1. The greatest pressure in the month was 25^{lbs}·0 on the square foot on the 12th. The mean daily horizontal movement of the air for the month was 294 miles; the greatest, 584 miles on the 15th, and the least, 111 miles on the 18th.

RAIN.
Fell on 11 days in the month, amounting to 2^{in}·28, as measured in the simple cylinder gauge partly sunk below the ground; being 0^{in}·33 *greater* than the average fall of the preceding 60 years.

MONTH and DAY, 1875.	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. 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. 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.
July 1	Perigee	29·549	67·4	54·8	59·9	58·5	85·3	51·0	65·1	63·1	1·4	4·3	0·4	− 1·3	SE	SSE : SSW	0·5	0·0	0·0	166	0·73
2	Greatest Declination N.	29·600	72·5	54·2	60·7	53·9	128·3	49·9	65·3	63·3	6·8	15·3	1·4	− 0·4	SSW	SW : SSW	2·1	0·0	0·2	267	0·00
3	New	29·775	69·5	55·2	60·3	57·1	115·2	51·7	65·3	63·3	3·2	10·1	1·3	− 0·9	SW : NNW	W : N	0·3	0·0	0·0	175	0·21
4	..	30·107	63·0	48·5	54·8	52·0	85·8	43·5	65·3	63·5	2·8	8·5	0·0	− 6·5	N	NNE	5·5	0·0	0·5	313	0·09
5	..	30·130	71·2	45·6	58·8	52·0	136·9	40·6	64·3	62·8	6·8	18·5	0·4	− 2·7	N	NNE	2·6	0·0	0·3	257	0·00
6	..	30·133	76·5	55·2	64·6	57·1	143·9	54·8	64·1	62·1	7·5	18·0	2·2	+ 3·0	NNE : N	NE : ENE	1·3	0·0	0·1	252	0·00
7	..	30·055	70·2	53·2	60·4	55·0	105·2	48·9	65·1	63·5	5·4	13·3	1·8	− 1·4	NE	ENE : E	1·2	0·0	0·1	265	0·00
8	..	29·772	63·4	53·0	57·4	54·2	83·5	46·0	65·3	63·7	3·2	7·4	0·0	− 4·6	NE	NE : N : WSW	2·4	0·0	0·1	209	0·00
9	In Equator	29·397	63·1	49·3	55·7	54·5	89·8	42·1	64·7	63·1	1·2	5·9	0·0	− 6·4	SW	SW	4·6	0·0	0·5	295	0·44
10	First Qr.	29·512	68·9	50·7	57·7	49·5	126·0	48·0	64·5	63·5	8·2	18·7	2·5	− 4·5	W	W : WSW : SW	15·0	0·2	2·0	550	0·01
11	..	29·414	64·5	46·5	55·3	51·1	121·8	43·0	64·3	63·5	4·2	12·9	2·3	− 7·0	SW	W : WSW	11·5	0·0	1·8	530	0·20
12	..	29·907	66·5	48·0	55·8	45·2	119·0	43·0	63·1	60·3	10·6	18·2	1·9	− 6·6	W by S : NW	NW : W	10·5	0·0	0·9	390	0·00
13	Apogee	30·011	66·0	42·5	54·3	47·8	104·2	36·3	63·1	61·3	6·5	17·3	0·0	− 8·2	WSW : W	SW	0·5	0·0	0·0	173	0·00
14	..	29·740	64·2	47·2	55·1	52·2	100·8	40·9	62·3	60·8	2·9	12·2	0·6	− 7·5	S : SE	E : ESE	1·8	0·0	0·1	179	0·50
15	..	29·499	59·5	54·2	56·6	56·4	70·0	53·7	62·1	60·1	0·2	1·1	0·0	− 6·1	ESE : E	ENE : NE	5·1	0·0	1·1	388	1·28
16	Greatest Declination S.	29·645	61·5	56·5	57·8	56·0	71·8	55·9	61·9	60·3	1·8	4·9	0·0	− 4·9	NE	NE	3·8	0·0	0·5	392	0·76
17	..	29·631	64·7	55·2	58·2	57·0	74·9	54·4	61·8	60·3	1·2	5·0	0·0	− 4·5	NNE : N	N	3·1	0·0	0·3	267	0·53
18	Full	29·585	77·4	56·7	64·1	61·3	133·5	56·7	61·3	60·1	2·8	10·5	0·0	+ 1·5	NNE : NE : E	SE : SW	0·0	0·0	0·0	104	0·01
19	..	29·675	64·2	56·6	59·5	59·2	75·0	53·0	62·1	60·3	0·3	2·5	0·0	− 3·0	WSW	SW : E : SSE	0·0	0·0	0·0	90	0·10
20	..	29·767	72·4	55·9	62·8	58·2	119·5	52·2	62·3	60·5	4·6	12·1	0·0	+ 0·4	WSW	W by N : W by S	1·6	0·0	0·1	251	0·00
21	..	29·668	65·7	53·4	56·8	56·1	90·9	51·0	62·5	61·1	0·7	3·1	0·0	− 5·5	WSW	W by S	2·2	0·0	0·3	308	0·29
22	..	29·597	70·1	52·5	58·9	54·3	104·7	49·3	62·5	61·1	4·6	13·5	0·0	− 3·4	WSW : WNW	W : SW	1·0	0·0	0·0	203	0·00
23	In Equator	29·503	70·0	52·2	59·9	57·2	117·7	47·2	63·1	61·7	2·7	12·2	0·0	− 2·3	SW : WSW	WSW : SW	2·0	0·0	0·1	246	0·03
24	..	29·558	70·0	54·0	59·3	55·5	130·3	50·0	63·1	61·7	3·8	13·7	1·2	− 2·9	SSW : SW	SW : WSW	2·2	0·0	0·2	289	0·06
25	Last Qr.	29·817	72·3	47·6	59·0	49·3	139·3	43·2	63·1	61·9	9·7	20·3	0·2	− 3·2	WSW	SW : NW : WSW	3·5	0·0	0·1	209	0·04
26	..	30·146	73·3	44·4	58·8	49·3	138·8	38·2	63·3	61·3	9·5	19·9	0·0	− 3·4	WSW : SW	WSW : SW	0·3	0·0	0·0	182	0·00
27	..	30·185	71·4	46·8	59·0	47·2	128·4	42·1	63·5	61·3	11·8	22·0	0·6	− 3·2	SW : ESE	E : ENE	1·8	0·0	0·2	199	0·00
28	..	30·127	76·6	49·1	63·6	53·0	138·8	42·0	63·5	61·1	10·6	20·6	0·0	+ 1·4	NE : ENE	ENE : E	0·7	0·0	0·1	201	0·00
29	Perigee: Greatest Dec. N.	30·119	77·5	48·7	63·5	53·8	142·0	42·2	64·3	62·5	9·7	23·0	0·2	+ 1·2	N : NE	SE : S	0·0	0·0	0·0	124	0·00
30	..	29·979	74·2	55·1	63·7	55·6	126·8	50·0	65·1	63·5	8·1	14·5	2·0	+ 1·4	SSW : WSW : NW	NNW : N : NE	1·3	0·0	0·1	220	0·00
31	..	29·940	69·9	50·7	58·2	49·0	129·0	43·2	65·7	64·3	9·2	18·7	2·8	− 4·1	NNW : N	N : NE	1·5	0·0	0·1	176	0·00
Means	..	29·792	69·0	51·4	59·0	53·8	112·2	47·2	63·6	62·0	5·2	12·8	0·7	− 3·1	...	...	..	..	..	Sum. 7870	Sum. 5·28

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·169 on the 4th ; the absolute minimum ,, was 29in·187 on the 9th.

The first minimum in the month was 29in·529 on the 1st.

The second maximum ,, was 29in·548 on the 10th ; the third minimum ,, was 29in·331 on the 11th.

The third maximum ,, was 30in·046 on the 13th ; the fourth minimum ,, was 29in·471 on the 15th.

The fourth maximum ,, was 29in·689 on the 16th ; the fifth minimum ,, was 29in·568 on the 18th.

The fifth maximum ,, was 29in·789 on the 20th ; the sixth minimum ,, was 29in·498 on the 23rd.

The absolute maximum ,, was 30in·214 on the 27th ; the seventh minimum ,, was 29in·925 on the 31st.

The range in the month was 1in·027.

The mean for the month was 29in·792, being 0in·010 *lower* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.

The highest in the month was 77°·5 on the 29th ; the lowest was 42°·5 on the 13th.

The range ,, was 35°·0.

The mean ,, of all the highest daily readings was 69°·0, being 5°·4 *lower* than the average of the preceding 34 years.

The mean ,, of all the lowest daily readings was 51°·4, being 1°·8 *lower* than the average of the preceding 34 years.

The mean daily range was 17°·6, being 3°·7 *less* than the average of the preceding 34 years.

The mean for the month was 59°·0, being 3°·3 *lower* than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.			
	A.M.	P.M.	A.M.		P.M.	
July 1	o	o	10, h.-r		10, oc.-r	: ci.-cu, cu.-s
2	o	o : w	10		10 : v	: ci.-s, s
3	o	v : o	10	: 10, oc.-shs	10, t, r	: 10
4	o	o	10, r		10 : v	: o
5	o	o	v, ci, ci.-cu, cu		10	: 10
6	o	o	ci, ci.-cu, cu, cu.-s		ci,ci.-cu,cu,cu.-s : v	: o
7	o	o	v	: 10	10	: 10
8	o	o	10	: 10, sl.-r	10, sl.-r	: ci, mt
9	o	o	v	: 10, r	10, r	: ci.-cu, cu.-s, h.-r
10	o	o	ci, ci.-cu, w		ci, ci.-cu, cu	: ci, ci.-cu
11	o	o	10, r, w	: ci,ci.-cu,cu,cu.-s,sl.-r,w	ci, cu.-s, sl.-r	: ci, ci.-s, cu.-s, sl.-r
12	o	o	ci.-cu, cu.-s		ci, ci.-cu, cu.-s	: ci, ci.-cu
13	o	o : w	ci, ci.-cu, mt		ci.-cu, cu : 10	: 10
14	o	w : o	10	: 10, r	10, r	: 10, c.-r
15	o	w : o	10, c.-r	: 10, c.-r	10, c.-r	: 10, c.-r
16	o	o	10, c.-r	: 10, oc.-r	10, fr.-shs	: 10, oc.-th.-r
17	o	o	10, r		10, fr.-shs	: 10, h.-r
18	o	o	10, th.-r	: 10	ci.-cu, cu, cu.-s	: ci, ci.-s
19	o	o	10, r, mt	: 10, mt, fr.-shs	10, fr.-shs, glm	: v
20	o	o	10, mt	: 8, mt	ci, ci.-cu, h, s, cu.-s	: 10, ci.-s, s
21	o : s,sp,g.-cur	o	10	: 10, h.-r	10, h.-r	: ci.-cu, cu.-s
22	o	o	10, th.-r		10	: 10, sl.-r
23	o	o	10, ci, ci.-cu, cu		ci,ci.-cu,ci.-s,r: v	: v
24	o	o	ci, ci.-cu, cu, cu.-s		ci.-cu,cu,cu.-s : v	: v
25	o	o	o	: ci, ci.-cu, cu	ci.-cu,cu,oc.-shs : v	: o
26	o	o	ci, ci.-cu, cu, cu.-s		ci, ci.-cu, cu, cu.-s	: o
27	o	o	ci, ci.-s		li.-cl, h	10
28	o	o	v	: ci.-cu, cu	ci.-cu, cu	: ci
29	o	o	ci, ci.-cu		ci, ci.-cu	: ci, ci.-s
30	o	w : o	ci, ci.-s, v, t		ci, ci.-cu, cu, cu.-s, h	: ci, ci.-s, cu.-s
31	o	w : o	ci, ci.-cu		ci.-cu, cu	: o

HUMIDITY OF THE AIR.

   Temperature of the Dew Point.

     The mean for the month was $53°\cdot8$, being $0°\cdot3$ *lower* than the average of the preceding 34 years.

   Elastic Force of Vapour.—The mean for the month was $0^{in}\cdot415$, being $0^{in}\cdot005$ *less* than the average of the preceding 34 years.

   Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $4^{grs}\cdot7$, being *the same as* the average of the preceding 34 years.

   Degree of Humidity.—The mean for the month was 83 (that of Saturation being represented by 100), being 8 *greater* than the average of the preceding 34 years.

   Weight of a Cubic Foot of Air.—The mean for the month was 531 grains, being 4 grains *greater* than the average of the preceding 34 years.

CLOUDS.

   The mean amount for the month, a clear sky being represented by o and a cloudy sky by 10, was $7\cdot5$.

WIND.

   The proportions were of N. 9, S. 7, W. 9, E. 6, and Calm o.   The greatest pressure in the month was $15^{lbs}\cdot o$ on the square foot on the 10th. The mean daily horizontal movement of the air for the month was 254 miles; the greatest, 550 miles, on the 10th, and the least, 90 miles, on the 19th.

RAIN.

   Fell on 16 days in the month, amounting to $5^{in}\cdot28$, as measured in the simple cylinder gauge partly sunk below the ground; being $2^{in}\cdot74$ *greater* than the average fall of the preceding 60 years.

| MONTH and DAY, 1875. | Phases of the Moon. | Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit). | READINGS OF THERMOMETERS. | | | | 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. | | Difference between the Dew Point Temperature and Air Temperature. | | | 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. | | | | | 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. |
| | | | Dry. | | | Dew Point. | | | | | | | | | OSLER'S. | | Pressure in lbs. on the square foot. | | | | |
			Highest.	Lowest.	Mean Daily Value.	Mean Daily Value.			Highest.	Lowest.	Mean Daily Value.	Greatest.	Least.		General Direction. A.M.	P.M.	Greatest.	Least.	Mean of 24 Obs.		
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Aug. 1	New	30.012	70.6	48.0	57.2	50.3	129.0	42.9	65.3	63.8	6.9	19.3	0.0	− 5.1	N	NNE	1.3	0.0	0.1	222	0.00
2	..	30.050	70.6	43.6	57.0	51.2	141.8	36.2	65.3	63.5	5.8	14.8	0.0	− 5.3	NNE	NE : SE	0.0	0.0	0.0	125	0.00
3	..	29.920	73.2	49.2	59.7	52.7	131.7	43.7	65.3	63.3	7.0	16.3	0.0	− 2.5	Calm : NE	ESE : ENE	1.1	0.0	0.1	152	0.00
4	..	29.902	67.2	49.5	57.2	49.9	110.5	44.6	65.3	63.6	7.3	14.8	0.4	− 5.0	NE : N	N	2.2	0.0	0.4	291	0.00
5	In Equator	29.804	70.1	47.5	57.8	52.0	126.4	41.0	64.5	62.9	5.8	17.3	0.0	− 4.3	NNW : N	N	6.6	0.0	1.0	350	0.01
6	..	29.725	78.2	57.5	64.2	61.1	130.6	56.8	64.1	62.3	3.1	12.8	1.1	+ 2.1	N	N	2.2	0.0	0.4	269	0.00
7	..	29.815	77.5	59.7	65.4	63.3	122.0	58.9	64.3	62.7	2.1	10.2	0.0	+ 3.4	N : NE	NE : SW	0.5	0.0	0.0	159	1.24
8	..	29.845	76.8	57.5	66.5	63.2	117.8	52.4	65.1	63.7	3.3	13.4	0.0	+ 4.5	WSW:NNW:NE	NE : ESE	0.1	0.0	0.0	117	0.00
9	First Qr.	29.664	75.9	60.0	65.5	58.8	130.9	58.0	65.5	64.5	6.7	13.8	1.0	+ 3.4	E : SW	WSW : SSW	2.8	0.0	0.4	265	0.02
10	Apogee	29.663	76.4	58.1	65.6	59.7	133.9	56.0	65.8	64.5	5.9	14.1	2.5	+ 3.5	SSE	SW	8.2	0.0	0.8	308	0.02
11	..	29.733	73.5	60.5	64.8	60.6	127.0	57.1	66.1	64.5	4.2	9.9	1.9	+ 2.6	SSW : SW	SW	3.1	0.0	0.5	317	0.03
12	Greatest Declination S.	29.623	72.0	59.1	63.9	61.4	125.2	57.0	66.3	64.9	2.5	8.7	0.0	+ 1.7	S : SSE	SW : S	2.6	0.0	0.1	196	0.12
13	..	29.708	75.8	58.8	65.1	60.2	129.7	55.8	66.5	65.3	4.9	13.4	0.8	+ 2.9	SSW : S : WNW	W : WSW	2.3	0.0	0.3	290	0.02
14	..	29.915	78.9	58.4	65.3	58.6	137.9	53.0	66.5	65.3	6.7	15.3	2.3	+ 3.3	SW : SSW	WSW : SW	1.8	0.0	0.1	244	0.00
15	..	30.020	78.4	56.5	65.7	60.9	140.7	51.7	67.1	65.5	4.8	12.1	0.7	+ 4.0	SW : WSW	SW : S	1.6	0.0	0.2	246	0.00
16	..	29.887	85.4	59.1	72.5	62.4	144.8	54.6	67.5	66.3	10.1	19.9	0.8	+11.1	SSE : S	SSW	2.3	0.0	0.2	221	0.00
17	Full	29.840	83.6	61.6	71.9	58.4	143.2	54.3	67.5	66.3	13.5	23.1	0.9	+10.7	SSW : SW : WSW	WSW : SW	1.6	0.0	0.1	262	0.00
18	..	29.928	76.5	56.5	65.9	58.5	136.2	49.0	69.1	67.5	7.4	16.8	2.3	+ 4.9	WSW	SW	2.1	0.0	0.3	306	0.00
19	In Equator	29.993	72.7	54.7	62.4	57.5	116.0	47.1	69.1	67.5	4.9	13.1	0.0	+ 1.5	WSW : NE	NE : SE : NW	0.0	0.0	0.0	94	0.38
20	..	30.072	73.4	54.2	63.6	56.9	117.9	48.4	69.1	..	6.7	15.1	0.0	+ 2.8	N : NNE	NNE : SW	0.1	0.0	0.0	108	0.01
21	..	30.162	76.3	53.8	64.3	57.4	128.8	47.0	69.1	67.3	6.9	14.6	1.0	+ 3.6	WSW	WSW	0.4	0.0	0.0	162	0.00
22	..	30.054	75.7	52.3	62.5	55.1	127.0	46.9	69.3	67.5	7.4	15.8	0.4	+ 1.8	WSW : NNE	WSW : SW	0.1	0.0	0.0	110	0.00
23	..	29.870	75.8	49.1	62.0	54.4	134.2	41.6	68.8	67.3	7.6	18.9	0.0	+ 1.3	SW	SSW	0.5	0.0	0.0	175	0.00
24	Last Quarter: Perigee.	29.716	75.4	52.3	62.8	54.8	121.0	46.2	69.1	66.9	8.0	18.2	1.0	+ 2.2	SW	WSW : SW	0.1	0.0	0.0	121	0.00
25	..	29.732	72.9	52.2	62.9	55.9	124.0	46.7	68.5	66.3	7.0	15.3	0.0	+ 2.4	SW	SW	2.3	0.0	0.4	278	0.00
26	Greatest Declination N.	29.855	70.0	59.6	64.3	61.6	106.0	52.3	68.5	66.3	2.7	6.5	0.2	+ 3.9	SW	SSW : SW	2.7	0.0	0.4	332	0.00
27	..	29.982	74.5	53.3	62.0	54.3	120.3	45.9	67.9	65.3	7.7	17.8	0.0	+ 1.7	SW : NW	Variable	0.2	0.0	0.0	140	0.00
28	..	29.842	68.0	51.2	58.7	54.6	79.0	45.3	68.3	67.1	4.1	11.0	0.2	− 1.5	NE : SE	ESE : ENE : N	0.2	0.0	0.0	113	0.34
29	..	29.781	67.2	52.0	58.4	54.8	99.8	45.0	67.3	65.5	3.6	12.1	0.0	− 1.7	N : NNW	NW : WSW	1.3	0.0	0.0	159	0.09
30	New	29.899	71.3	50.6	59.8	53.9	128.9	43.4	67.1	65.3	5.9	14.4	0.2	− 0.2	WSW	WSW	2.3	0.0	0.3	316	0.00
31	..	29.903	68.8	48.5	59.0	47.8	132.0	40.0	66.3	64.7	11.2	19.4	3.6	− 0.8	WSW : WNW	WNW : NW	5.4	0.0	1.2	452	0.00
Means	..	29.868	74.3	54.4	63.0	56.8	125.6	49.0	67.0	65.2	6.2	14.8	0.7	+ 1.7	...	...	..	..	..	Sum 6900	Sum 2.28

BAROMETER READINGS FROM EYE-OBSERVATIONS.
The first maximum in the month was 30in·092 on the 2nd ; the first minimum in the month was 29in·708 on the 6th.
The second maximum　　,,　　was 29in·888 on the 8th ; the second minimum　　,,　　was 29in·632 on the 9th.
The third maximum　　,,　　was 29in·724 on the 9th ; the third minimum　　,,　　was 29in·634 on the 10th.
The fourth maximum　　,,　　was 29in·771 on the 11th ; the absolute minimum　　,,　　was 29in·578 on the 12th.
The fifth maximum　　,,　　was 30in·032 on the 15th ; the fifth minimum　　,,　　was 29in·835 on the 17th.
The absolute maximum　　,,　　was 30in·190 on the 21st ; the sixth minimum　　,,　　was 29in·706 on the 24th.
The seventh maximum　　,,　　was 29in·991 on the 27th ; the seventh minimum　　,,　　was 29in·751 on the 29th.
The range in the month was 0in·612.
The mean for the month was 29in·868, being 0in·076 *higher* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.
The highest in the month was 85°·4 on the 16th ; the lowest was 43°·6 on the 2nd.
The range　　,,　　was 41°·8.
The mean　　,,　　of all the highest daily readings was 74°·3, being 1°·4 *higher* than the average of the preceding 34 years.
The mean　　,,　　of all the lowest daily readings was 54°·4, being 1°·3 *higher* than the average of the preceding 34 years.
The mean daily range was 19°·9, being 0°·1 *greater* than the average of the preceding 34 years.
The mean for the month was 63°·0, being 1°·5 *higher* than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Aug. 1	o	o	10, cu.-s, th.-cl	cu,cu.-s,ci, ci.-cu,ci.-s,h : o
2	o	o	v, cu, ci.-cu	8, ci, ci.-cu, cu, cu.-s : 10, ci.-cu
3	o	o	ci, ci.-cu, cu, cu.-s	7, ci, ci.-cu, cu : 2, cu.-s, l, m
4	o	o	ci.-cu : 9, cu, cu.-s,ci.-s,th.-r	10, cu, cu.-s : li.-cl
5	o	o	ci.-cu, cu, w	9, cu, cu.-s, ci.-cu, sl.-r, w : 10, cu.-s, ci.-cu, oc.-s, l
6	o	o	10	v, ci.-cu, t : v
7	o	sP,sN,sp,g.-cur: o	10	v, cu.-s, ci.-s, t.-s : 10
8	o	o	9, ci.-cu, mt	9, cu.-s, cu, th.-cl : 7, ci.-s, ci
9	o	o	v : ci.-cu, r	6, ci.-cu, ci : 10
10	o	o	r : 10	7, cu, cu.-s, ci, ci.-cu,w : 10, r
11	o	o	10, oc.-r	v, ci, ci.-cu, cu : v, m
12	o	o	r : 10, oc.-r	v, r : 9, sl.-r
13	o	o	10 : cu, cu.-s, ci	8, cu, cu.-s, ci.-s, ci
14	o	w	10	6, cu, ci.-cu, ci
15	o	o	ci.-cu	v, ci.-cu, cu, ci.-s, ci
16	o	w : o	ci, ci.-s, ci.-cu	1, ci : o, d
17	o	o : w	o	4, li.-cl : 10, sl.-r
18	w	o : w	9, ci.-cu, cu.-s, ci	8, cu, cu.-s, ci.-cu, ci : v, lu.-ha
19	w	o	v, th.-cl : 10, mt	10 : 10, r
20	o	o	v	1, h : 9, cu.-s, cu, ci.-cu
21	o	o	v, h : so.-ha	6, ci.-cu, cu, cu.-s, h : v, h
22	w	o	6, ci, ci.-cu, cu, h : m	4, cu, ci, ci.-cu, h : 1, ci, ci.-cu, ci.-s
23	w	o	5, ci, ci.-s, h	ci, ci.-cu, cu, h : ci
24	o	o	ci.-cu, cu.-s	9, cu.-s, ci.-s, ci.-cu : o
25	o	o	cu.-s, ci.-s, ci.-cu	v, cu, cu.-s, ci, ci.-s
26	o	o	ci.-s, cu.-s	9, ci.-cu, cu.-s, oc.-th.-r: ci.-cu
27	o	o	li.-cl, h	6, ci.-cu, ci, ci.-s, h : s, h.-d
28	o	o	v : 10, th.-r	10, oc.-r : 10, h.-r
29	o	o	8, cu.-s, ci.-cu, h	v, sl.-r : 1, ci.-s, m
30	o	o	d, ci, ci.-cu, cu, h	4, ci.-cu, cu, ci, w : o
31	o	o	2, ci, ci.-cu, w	3, cu, ci, ci.-cu, w : o

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The mean for the month was 56°·8, being 3°·0 *higher* than the average of the preceding 34 years.

Elastic Force of Vapour.—The mean for the month was 0^{in}·462, being 0^{in}·045 *greater* than the average of the preceding 34 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 5^{grs}·1, being 0^{grs}·5 *greater* than the average of the preceding 34 years.

Degree of Humidity.—The mean for the month was 80 (that of Saturation being represented by 100), being 3 *greater* than the average of the preceding 34 years.

Weight of a Cubic Foot of Air.—The mean for the month was 528 grains, being *the same as* the average of the preceding 34 years.

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

WIND.
The proportions were of N. 8, S. 10, W. 9, E. 4, and Calm o. The greatest pressure in the month was 8^{lbs}·2 on the square foot on the 10th. The mean daily-horizontal movement of the air for the month was 223 miles; the greatest, 452 miles, on the 31st, and the least, 94 miles, on the 19th.

RAIN.
Fell on 11 days in the month, amounting to 2^{in}·28, as measured in the simple cylinder gauge partly sunk below the ground; being 0^{in}·10 *less* than the average fall of the preceding 60 years.

RESULTS OF DAILY METEOROLOGICAL OBSERVATIONS

MONTH and DAY, 1875.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	Dry Highest.	Dry Lowest.	Dry Mean Daily Value.	Dew Point Mean Daily Value.	Highest in the Sun, 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.	Thames Highest.	Thames Lowest.	Diff. Mean Daily Value.	Diff. Greatest.	Diff. Least.	Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	Osler's Direction A.M.	Osler's Direction P.M.	Pressure Greatest.	Pressure Least.	Pressure Mean of 24 Obs.	Robinson's Amount of Horizontal Movement of the Air on each Day.	Rain.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Sept. 1	In Equator	30·085	72·5	44·6	58·6	54·7	112·2	38·0	66·3	65·1	3·9	13·9	0·4	− 0·8	WSW:W:NW	WNW: W: SW	0·1	0·0	0·0	164	0·00
2	..	30·016	74·9	58·2	65·0	60·3	119·0	56·3	65·3	64·1	4·7	10·0	0·8	+ 5·7	SW : SSW	SSW	0·8	0·0	0·1	215	0·00
3	..	29·838	68·1	52·0	59·4	57·8	119·0	44·5	66·0	64·3	1·6	5·8	0·0	+ 0·3	SSW	SW : W	3·8	0·0	0·4	338	0·14
4	..	29·956	72·0	49·5	60·0	53·3	133·2	42·6	65·3	63·8	6·7	14·8	0·0	+ 1·2	SW : WSW	W : NW : WSW	1·0	0·0	0·1	240	0·00
5	..	30·083	68·9	49·0	59·5	54·2	88·0	42·3	65·3	63·7	5·3	9·0	0·2	+ 0·9	SW : WSW	NNW : WSW	0·0	0·0	0·0	127	0·00
6	..	30·115	76·3	47·7	61·0	53·6	135·1	43·6	65·0	63·3	7·4	16·5	0·0	+ 2·6	SW : NE	SSE : SE	0·0	0·0	0·0	100	0·00
7	Apogee: First Quarter.	29·903	76·8	50·7	64·3	54·4	135·0	42·6	65·3	63·8	9·9	18·5	1·0	+ 5·9	SE : SSE	SSE	1·0	0·0	0·1	172	0·00
8	..	29·680	79·9	55·3	66·2	57·6	125·3	49·2	65·5	64·1	8·6	19·2	0·0	+ 7·9	SSE : SE	E : SW	1·1	0·0	0·0	163	0·00
9	Greatest Declination S.	29·760	72·4	49·5	59·7	48·1	135·4	44·0	66·3	64·3	11·6	20·4	1·3	+ 1·6	WSW	SW : S	1·1	0·0	0·2	277	0·00
10	..	29·794	65·2	48·6	57·0	51·5	92·1	43·0	66·1	64·3	5·5	11·5	0·4	− 1·0	SE : ENE	NE : N	0·0	0·0	0·0	90	0·00
11	..;	30·055	64·4	50·3	57·6	54·9	79·0	42·4	65·3	63·8	2·7	6·3	0·0	− 0·2	N : NE	NE : ENE	0·7	0·0	0·0	172	0·00
12	..	30·112	74·1	57·5	61·7	57·3	133·2	53·1	65·1	63·5	4·4	13·9	0·0	+ 4·1	NE	NNE : NE	1·1	0·0	0·1	279	0·00
13	..	30·051	76·6	56·1	64·7	57·5	133·8	51·2	65·0	63·3	7·2	19·0	0·2	+ 7·3	NE	ENE	4·8	0·0	0·5	339	0·00
14	..	30·017	72·5	56·0	63·3	52·3	123·8	54·5	64·8	63·1	11·0	20·3	0·9	+ 6·1	ENE	ENE : NE	4·5	0·0	0·8	374	0·00
15	Full	29·981	71·8	52·0	60·5	49·0	134·4	44·0	65·3	63·1	11·5	23·8	0·0	+ 3·4	NE : ENE	ENE : NE	7·2	0·0	0·8	316	0·00
16	In Equator	29·910	71·0	47·8	60·4	46·7	130·9	39·8	65·0	62·5	13·7	25·7	0·0	+ 3·5	NNE: NE: ENE	ENE	1·6	0·0	0·2	218	0·00
17	..	29·911	77·0	55·5	65·5	59·9	130·0	49·2	64·3	62·3	5·6	16·5	0·0	+ 8·9	SE : SSE	SE : SSE	0·0	0·0	0·0	116	0·18
18	..	29·864	81·0	53·3	66·0	58·1	130·4	46·8	64·8	62·7	7·9	20·6	0·0	+ 9·6	E : ENE	E : ENE	0·7	0·0	0·0	145	0·00
19	Perigee	29·822	80·0	54·6	66·0	57·7	140·0	49·3	65·3	63·3	8·3	19·6	1·4	+ 9·9	E : SE	SSW : SW	1·0	0·0	0·0	142	0·01
20	..	29·802	73·4	53·5	62·1	57·1	134·1	47·3	65·3	64·1	5·0	13·0	0·0	+ 6·3	SW	SW	2·0	0·0	0·2	239	0·14
21	..	29·733	65·8	53·8	60·0	57·5	80·6	47·3	65·3	64·1	2·5	6·3	0·0	+ 4·5	WSW : SSE	S : SE	0·0	0·0	0·0	138	0·25
22	Last Quarter: Greatest Dec. N.	29·627	69·1	58·6	62·8	59·3	88·5	58·3	65·1	63·8	3·5	7·9	0·2	+ 7·5	SSW : WSW	W : N : NE	3·1	0·0	0·3	297	0·43
23	..	29·960	59·3	52·4	55·0	50·5	67·0	52·0	65·1	63·8	4·5	6·8	1·4	− 0·2	ENE	ESE	1·2	0·0	0·1	242	0·49
24	..	29·906	60·3	51·5	55·0	50·3	98·8	50·8	64·5	62·5	4·7	7·6	1·2	0·0	ESE	ESE	4·1	0·0	0·7	316	0·23
25	..	29·762	69·8	51·5	59·5	55·7	104·7	47·0	63·3	61·5	3·8	10·6	1·8	+ 4·7	SE : SSE : SW	W : WSW	3·2	0·0	0·4	323	0·70
26	..	29·612	68·4	50·3	60·5	55·0	102·2	46·2	63·3	61·5	5·5	11·7	0·6	+ 5·8	SSW	SSW : SW	8·6	0·0	0·8	352	0·01
27	..	29·603	65·2	49·7	55·9	45·7	122·1	45·1	62·3	60·3	10·2	16·0	3·6	+ 1·3	WSW	WSW : SW	17·0	0·2	2·6	580	0·00
28	..⌐	29·528	64·5	49·3	55·6	51·5	104·3	46·0	61·9	59·9	4·1	10·1	0·6	+ 1·1	WSW	WSW : WNW	8·6	0·0	1·5	482	0·08
29	In Equator : New.	29·658	65·1	45·5	53·8	46·8	99·0	41·4	60·3	59·1	7·0	15·2	0·2	− 0·6	W	WSW : WNW	3·0	0·0	0·3	342	0·00
30	..	29·868	63·2	46·8	53·5	45·1	99·5	41·0	60·5	59·1	8·4	15·6	2·5	− 0·8	WSW : W : NW	WNW : SW	2·1	0·0	0·4	297	0·00
Means	..	29·867	70·6	51·7	60·3	53·8	114·4	46·6	64·6	62·9	6·6	14·2	0·6	+ 3·6	...	...	..	..	..	Sum 7595	Sum 2·66

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·106 on the 1st.

The absolute maximum ,, was 30in·155 on the 6th; the first minimum in the month was 29in·808 on the 3rd.

The third maximum ,, was 30in·136 on the 12th; the second minimum ,, was 29in·578 on the 8th.

The fourth maximum ,, was 29in·986 on the 23rd; the third minimum ,, was 29in·539 on the 22nd.

The fifth maximum ,, was 29in·861 on the 25th; the fourth minimum ,, was 29in·716 on the 25th.

The sixth maximum ,, was 29in·698 on the 27th; the absolute minimum ,, was 29in·403 on the 26th.

The seventh maximum ,, was 29in·900 on the 30th; the sixth minimum ,, was 29in·502 on the 28th.

The range in the month was 0in·752.

The mean for the month was 29in·867, being 0in·062 *higher* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.

The highest in the month was 81°·0 on the 18th; the lowest was 44°·6 on the 1st.

The range ,, was 36°·4.

The mean ,, of all the highest daily readings was 70°·6, being 2°·9 *higher* than the average of the preceding 34 years.

The mean ,, of all the lowest daily readings was 51°·7, being 2°·5 *higher* than the average of the preceding 34 years.

The mean daily range was 18°·9, being 0°·4 *greater* than the average of the preceding 34 years.

The mean for the month was 60°·3, being 3°·1 *higher* than the average of the preceding 34 years.

ERRATUM.—In the heading to column 15 on pages (xxvi), (xxviii), &c., to (xl), *for* 50 years *read* 60 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Sept. 1	o	o : w	o, h	4, ci, cu, ci.-cu, h : 9, cu.-s, ci
2	w	o	9, h, ci.-cu, ci.-s, cu.-s	10, ci.-cu, cu.-s : v
3	o	o	10 : 10, r, w	v, r, cu, ci, ci.-cu, w : o, ms
4	o	o	4, ci, ci.-s, cu	6, cu, ci, ci.-cu, cu.-s : v, ci.-s
5	o	o	9, ci.-cu, mt, h	9, ci.-cu : o
6	o	o	o, mt	4, cu, ci, ci.-cu : o, h.-d
7	o	o	o	ci : o
8	o	o	v : 10, sl.-r	7, ci, ci.-cu, cu.-s : 9, ci.-cu, cu.-s, ci
9	o	o	3, ci, ci.-cu, cu	3, ci, ci.-cu, cu.-s, cu : ci
10	o	o	8, ci, ci.-cu, h : li.-cl, so.-ha	10, sl.-r : 9, ci.-cu, cu.-s
11	o	o : w	10	10 : 9
12	w	w	10, h	cu, ci, ci.-cu : li.-cl
13	w	w	v, cu.-s, ci.-cu	v, ci.-cu, w : 10, sl.-r, w
14	w	o	li.-cl : 6, ci, ci.-cu, cu, cu.-s, w	v, ci, ci.-cu, cu, w : v, li.-cl, ms
15	w	o	v, st.-w, ci, cu, ci.-cu	3, ci, ci.-cu, cu, w : o
16	w	w : o	o	o : v, ci, ci.-cu, cu, cu.-s
17	o	o : w	v, t.-s : 7, ci.-cu, cu.-s, ci	v, ci, cu, ci.-cu : o
18	w	o	th.-f : o, h, mt	cu, li.-cl : o, lu.-co, lu.-ha
19	w	w	4, ci	v, sh.-r : v, l
20	v, sp, g.-cur	v : o	v : v, cu, ci.-cu, cu.-s, sh.-r	v, cu.-s, ci.-cu, cu, ci : o
21	o	w : o	v : 10, mt	10, r : 10, h.-r
22	w	w : o	10, h.-r : 8, cu.-s, ci.-s	10, li.-shs
23	o	o	10, r	10, r : 10
24	o	o	10, h.-r : 10, oc.-r	9, cu.-s, cu, ci.-cu, ci, oc.-shs : v, l, w
25	mN, sp, g.-cur	o	10, t.-s, w : ci, ci.-s, cu.-s, sh.-r	7, cu.-s, ci.-cu, cu, ci, oc.-shs : o
26	w	o	10, cu.-s, ci.-cu	9, cu.-s, ci.-cu, w : oc.-r, st.-w
27	o	w : o	st.-w : v, ci.-s, cu.-s, so.-ha, w, sl.-r	v, ci.-cu, cu.-s, cu, st.-w : v, w, sh.-r, m
28	o	sN, sP : o : w	v, oc.-shs, cu, cu.-s, ci.-cu, w	v, fr.-shs, w : v, shs.-r
29	w	w	o, mt : v, ci, cu, ci.-cu	9, cu, ci.-cu, cu.-s : 4, m
30	o	o : w	ci.-cu, cu	6, cu.-s, cu, ci.-cu, ci : o

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was 53°·8, being 2°·6 *higher* than the average of the preceding 34 years.

Elastic Force of Vapour.—The mean for the month was 0�·415, being 0ᵢₙ·036 *greater* than the average of the preceding 34 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 4ᵍʳˢ·6, being 0ᵍʳ·3 *greater* than the average of the preceding 34 years.

Degree of Humidity.—The mean for the month was 79 (that of Saturation being represented by 100), being 1 *less* than the average of the preceding 34 years.

Weight of a Cubic Foot of Air.—The mean for the month was 531 grains, being 2 grains *less* than the average of the preceding 34 years.

CLOUDS.

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

WIND.

The proportions were of N. 3, S. 9, W. 9, E. 9, and Calm 0. The greatest pressure in the month was 17ˡᵇˢ·0 on the square foot on the 27th. The mean daily horizontal movement of the air for the month was 253 miles, the greatest, 580 miles on the 27th, and the least, 90 miles on the 10th.

RAIN.

Fell on 11 days in the month, amounting to 2ᵢₙ·66, as measured in the simple cylinder gauge partly sunk below the ground; being 0ᵢₙ·21 *greater* than the average fall of the preceding 60 years.

RESULTS OF DAILY METEOROLOGICAL OBSERVATIONS

(xliv)

MONTH and DAY, 1875.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	READINGS OF THERMOMETERS.								Difference between the Dew Point Temperature and Air Temperature.			Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	WIND AS DEDUCED FROM ANEMOMETERS.					ROBINSON'S.	Rain in inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
			Dry.			Dew Point.	Highest in the Sun, as shown by a S.-f. 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.						Osler's.						
			Highest.	Lowest.	Mean Daily Value.	Mean Daily Value.			Highest.	Lowest.	Mean Daily Value.	Greatest.	Least.		General Direction.		Pressure in lbs. on the square foot.			Amount of Horizontal Movement of the Air on each Day.	
															A.M.	P.M.	Greatest.	Least.	Mean of 24 Obs.		
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Oct. 1	..	29·779	62·5	47·5	56·0	53·0	75·0	41·0	59·5	58·1	3·0	6·1	0·8	+ 1·6	SSW	SW	3·3	0·0	0·3	315	0·01
2	..	29·571	62·2	45·3	50·7	49·2	105·6	41·0	59·5	58·1	1·5	6·3	0·4	− 3·5	SSW : SW	NW : WSW	13·3	0·0	0·4	322	0·74
3	..	29·649	56·7	44·4	51·4	48·8	67·4	38·8	59·3	57·5	2·6	4·4	1·3	− 2·5	WSW : SW	SSW : SW	6·0	0·0	0·6	357	0·28
4	Apogee	29·653	66·5	52·2	59·4	57·1	76·1	47·4	58·5	56·9	2·3	5·9	0·0	+ 5·9	SW : WSW	W : WSW	6·1	0·0	0·8	437	0·00
5	..	29·862	68·8	49·0	58·3	54·5	92·1	43·8	58·5	57·1	3·8	8·8	1·5	+ 5·1	SW : WSW	SW : WSW	3·3	0·0	0·8	418	0·14
6	Greatest Declination S.	30·262	62·2	45·4	52·6	43·2	110·3	38·7	58·9	57·1	9·4	18·0	2·2	− 0·3	WSW	W : WSW	3·3	0·0	0·6	372	0·00
7	First Qr.	30·194	63·4	44·6	54·4	47·8	100·1	37·8	58·5	56·5	6·6	10·6	1·1	+ 1·8	WSW	WSW : SW	2·2	0·0	0·3	308	0·00
8	..	29·868	62·4	47·7	53·7	47·5	99·0	40·1	57·5	55·5	6·2	13·9	1·3	+ 1·5	SSW	S : SE	0·7	0·0	0·0	168	0·00
9	..	29·479	61·0	43·0	50·4	46·3	78·3	39·3	58·1	56·5	4·1	10·8	0·6	− 1·5	SSE : WSW : S	SSE : WSW : S	17·0	0·0	1·3	392	0·07
10	..	29·699	58·5	39·2	48·9	39·4	111·0	33·8	57·5	55·3	9·5	16·5	2·1	− 2·7	W : WSW	SW : SSW	6·1	0·0	0·5	323	0·14
11	..	29·107	58·0	37·0	46·4	40·7	104·2	32·0	56·5	54·7	5·7	13·0	0·7	− 4·9	S : WSW : W	W : SW	8·2	0·0	0·5	325	0·12
12	..	29·202	54·6	33·6	43·5	37·8	85·3	28·6	55·5	53·7	5·7	13·4	0·6	− 7·5	WSW	W : SW	0·2	0·0	0·0	178	0·00
13	In Equator	29·028	53·9	33·5	43·7	38·0	79·2	29·4	55·5	53·7	5·7	13·2	0·0	− 7·0	S : SE : ENE	E : ENE : NNE	0·5	0·0	0·0	170	0·07
14	Full	29·052	49·4	39·2	44·9	42·3	61·0	33·3	54·7	52·3	2·6	4·6	1·3	− 5·5	N : NNW	NNW : NNE	4·5	0·0	0·6	308	0·14
15	..	29·368	55·5	43·1	48·2	44·4	79·0	38·8	53·8	51·3	3·8	9·7	1·1	− 2·0	NNE : N	NNE : NNW	1·6	0·0	0·1	222	0·01
16	Perigee	29·546	53·0	38·0	45·0	41·9	71·8	33·0	53·8	51·5	3·1	8·4	0·5	− 5·0	NW : WSW	W : SSW : S	0·6	0·0	0·0	197	0·00
17	..	29·642	60·2	33·5	47·9	42·9	107·3	29·1	52·3	50·7	5·0	11·8	0·6	− 1·9	ESE : SE	SE : ESE	0·6	0·0	0·0	155	0·00
18	..	29·625	57·5	44·7	50·6	45·4	90·6	39·6	52·1	49·3	5·2	10·1	1·5	+ 0·9	ESE	E	8·8	0·0	0·7	331	0·02
19	Greatest Declination N.	29·547	50·5	47·3	48·4	46·1	56·2	46·1	51·3	48·3	2·3	3·8	1·7	− 1·1	E : ENE	E : ENE	7·1	0·0	0·9	357	0·54
20	..	29·274	51·3	48·5	49·4	48·4	53·1	47·6	51·3	48·9	1·0	1·4	0·6	+ 0·1	ENE	E : SW : S	5·8	0·0	0·7	296	0·79
21	Last Qr.	29·388	62·2	47·8	54·2	50·3	102·3	42·2	50·9	49·1	3·9	11·5	0·0	+ 5·2	SSE : S	SSE	3·0	0·0	0·3	229	0·13
22	..	29·349	57·3	45·3	50·7	48·6	81·6	40·4	51·3	49·5	2·1	6·5	0·4	+ 2·0	SSE : SE	SSE : SE	3·1	0·0	0·3	249	0·23
23	..	29·269	50·4	42·9	46·8	46·0	54·0	37·0	51·7	50·3	0·8	2·1	0·0	− 1·5	ESE : ENE	W : NNE	0·8	0·0	0·0	170	0·45
24	..	29·867	55·0	42·0	47·2	43·1	86·8	39·0	50·5	50·1	4·1	10·6	1·1	− 0·7	NNE	NNE : NE	2·1	0·0	0·2	216	0·00
25	..	30·023	54·2	34·5	44·3	38·8	89·2	28·7	50·8	49·1	5·5	11·8	0·5	− 3·2	ENE : ESE	E : ESE : SE	0·2	0·0	0·0	148	0·00
26	In Equator	29·887	51·7	35·4	43·1	35·0	81·0	29·1	50·1	47·9	8·1	13·9	0·8	− 4·1	SE	SE	4·0	0·0	0·5	265	0·08
27	..	29·549	44·2	39·7	41·4	38·7	48·7	39·1	49·1	47·1	2·7	5·3	1·5	− 5·5	ESE : E	ESE	3·3	0·0	0·8	321	0·17
28	..	29·731	47·7	41·7	44·8	41·7	52·0	41·6	47·7	45·8	3·1	5·5	2·2	− 1·9	ENE	ENE : NE	1·1	0·0	0·1	241	0·00
29	New	29·885	47·7	39·8	43·3	38·5	58·4	34·1	47·3	45·3	4·8	8·4	1·1	− 3·3	ENE	E : ESE	1·1	0·0	0·1	191	0·00
30	..	29·777	43·2	40·2	41·0	34·8	47·0	39·1	46·7	45·3	6·2	7·7	3·9	− 5·5	ESE	ESE : E	0·9	0·0	0·0	149	0·00
31	..	29·713	48·0	39·5	43·1	36·4	68·8	38·8	46·1	44·3	6·7	10·7	2·3	− 3·3	E	ENE	0·0	0·0	0·0	134	0·00
Means	..	29·608	55·8	42·1	48·5	44·1	79·8	37·7	53·7	51·8	4·4	9·2	1·1	− 1·6	...	...	..	..	..	Sum 8264	Sum 4·13

BAROMETER READINGS FROM EYE-OBSERVATIONS.
The first maximum in the month was 29ⁱⁿ·759 on the 3rd; the first minimum in the month was 29ⁱⁿ·459 on the 2nd.
The absolute maximum ,, was 30ⁱⁿ·299 on the 6th; the second minimum ,, was 29ⁱⁿ·507 on the 3rd.
The third maximum ,, was 29ⁱⁿ·779 on the 10th; the third minimum ,, was 29ⁱⁿ·388 on the 9th.
The fourth maximum ,, was 29ⁱⁿ·253 on the 12th; the fourth minimum ,, was 29ⁱⁿ·096 on the 11th.
The fifth maximun ,, was 29ⁱⁿ·678 on the 17th; the absolute minimum ,, was 29ⁱⁿ·010 on the 14th.
The sixth maximum ,, was 29ⁱⁿ·406 on the 21st; the sixth minimum ,, was 29ⁱⁿ·226 on the 20th.
The seventh maximum ,, was 30ⁱⁿ·048 on the 25th; the seventh minimum ,, was 29ⁱⁿ·198 on the 23rd.
The eighth maximum ,, was 29ⁱⁿ·900 on the 29th; the eighth minimum ,, was 29ⁱⁿ·535 on the 27th.
The range in the month was 1ⁱⁿ·289.
The mean for the month was 29ⁱⁿ·608, being 0ⁱⁿ·091 lower than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.
The highest in the month was 68°·8 on the 5th; the lowest was 33°·5 on the 13th and 17th.
The range ,, was 35°·3.
The mean ,, of all the highest daily readings was 55°·8, being 2°·6 lower than the average of the preceding 34 years.
The mean ,, of all the lowest daily readings was 42°·1, being 1°·6 lower than the average of the preceding 34 years.
The mean daily range was 13°·7, being 1°·0 less than the average of the preceding 34 years.
The mean for the month was 48°·5, being 1°·7 lower than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Oct. 1	o	o	sl.-r : 10	10, oc.-th.-r
2	o	sP,sN,sp,g.-cur : o	10, r : 9, cu.-s, ci.-s	v, fr.-h.-sqs : o, m
3	o	o	v : 10, r	10, sc, r : 10, r, w
4	o	o	10	10, cu.-s, ci.-cu, w : 10
5	o	o	v 10, sl.-r	v, h.-sh
6	o	o	v, cu.-s, cu, ci.-cu, ci	v, cu, cu.-s, ci, ci.-cu : o, h.-d, m
7	w	w	ci, cu, ci.-cu, ci.-s	8, cu.-s, cu, ci.-cu, ci : 10
8	w	w	10	7, ci.-cu, cu.-s, cu, ci : o, h.-d
9	w	w	5, cu, ci, ci.-s, sh.-r	vv, shs.-r, g : vv,cu.-s,ci.-cu,sc,g,oc.-th.-r
10	w	w : o	r : 1, ci.-cu	9, oc.-r : 10
11	o	sP,sN,sp,g.-cur:o:m,sp,g-cur	10, r, st.-w : v, ci, ci.-cu, t, r, hl	cu.-s, cu, ci : o, h.-d
12	w	w	o, mt	6, cu.-s, ci.-s, mt, h : o, h.-d
13	w : s,sp,g.-cur	w	10, r	8, cu.-s, cu, ci, sc : cu.-s, ci.-cu, lu.-ha
14	w	w : o	cu.-s, ci.-cu : 9,cu.-s,ci.-cu,sc,oc.-shs,glm	10, r, w : 10, oc.-r
15	o	w : o :m,sp,g.-cur	10 : 9, cu.-s, cu, ci.-cu	9, cu.-s, cu, ci : 10, sc
16	w	w : v,sp,g.-cur	10, mt, f	6, cu.-s, ci.-cu : o, mt, h, h.-d, lu.-ha
17	w	w	v : 8, ci.-cu, cu.-s, mt, h.-d	v, ci.-s, cu.-s, ci.-cu
18	w	w	3, ci.-s, ci	9, cu.-s, cu, ci.-s, w : 10, sh.-r, w
19	o	w	10, h.-r, w : 10, oc.-shs, w	10 : 10, w
20	w	o	10, r : 10, h.-r, w :	10, h.-r : 10, h.-r
21	w	w : o : o	v, ci.-cu, cu, ci, cu.-s	9, cu.-s, cu, ci, th.-r, t, l : vv, ms, li.-cl, l
22	o	v,sp,g.-cur: w	ci, ci.-s, ci.-cu : 9, oc.-th.-r	10, fr.-h.-shs : o, l, ms
23	w	sP,sN,sp,g.-cur: o	ms : 10, r	10, r : 10, oc.-r
24	w	w	10 : v	10 : 10
25	w	w	9, f, mt, ci, ci.-cu	5, cu, ci, ci.-cu : o
26	w	w : o	7, ci, ci.-s, cu.-s	9, cu.-s, cu, ci, w : 10, r, w
27	o	o	10, r	10, oc.-th.-r : 10, th.-r
28	o	o	10	10, th.-r
29	o	o	10	10, cu.-s, cu
30	o	o : w	10	10
31	o	o : w	10	9, cu.-s, ci.-cu v, cu.-s, ci.-cu

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The mean for the month was 44°·1, being 2°·2 *lower* than the average of the preceding 34 years.

Elastic Force of Vapour.—The mean for the month was 0^{in}·289, being 0^{in}·028 *less* than the average of the preceding 34 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 3^{grs}·3, being 0^{gr}·3 *less* than the average of the preceding 34 years.

Degree of Humidity.—The mean for the month was 85 (that of Saturation being represented by 100), being 2 *less* than the average of the preceding 34 years.

Weight of a Cubic Foot of Air.—The mean for the month was 539 grains, being *the same as* the average of the preceding 34 years.

CLOUDS.
The mean amount for the month, a clear sky being represented by o and a cloudy sky by 10, was 7·8.

WIND.
The proportions were of N. 4, S. 10, W. 7, E. 10, and Calm o. The greatest pressure in the month was 17^{lbs}·o on the square foot on the 9th. The mean daily horizontal movement of the air for the month was 267 miles; the greatest, 437 miles on the 4th, and the least, 134 miles on the 31st.

RAIN.
Fell on 18 days in the month, amounting to 4^{in}·13, as measured in the simple cylinder gauge partly sunk below the ground; being 1^{in}·33 *greater* than the average fall of the preceding 60 years.

MONTH and DAY, 1875.	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 60 Years.	WIND AS DEDUCED FROM ANEMOMETERS. OSLER'S. General Direction. A.M.	P.M.	Pressure in lbs. on the square foot. Greatest.	Least.	Mean of 24 Obs.	ROBINSON'S. Amount of Horizontal Movement of the Air on each Day.	Rain in Inches, collected in a Gauge whose receiving surface is 5 inches above the Ground.
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Nov. 1	Apogee	29·727	47·2	37·7	42·6	36·4	58·8	32·0	45·8	44·1	6·2	10·1	1·9	− 3·6	ENE: ESE	ESE	1·0	0·0	0·1	186	0·00
2	Greatest Declination S.	29·719	49·6	39·8	45·5	40·7	75·9	37·8	45·6	43·7	4·8	8·8	2·3	− 0·5	SE	SE: SSE	1·7	0·0	0·2	225	0·0L
3	..	29·654	52·0	48·2	49·9	48·6	58·0	48·2	45·1	43·5	1·3	2·3	0·0	+ 4·1	SSE: SE	SSE	1·7	0·0	0·2	250	0·11
4	..	29·670	58·5	47·2	52·0	50·5	72·0	40·0	46·3	44·1	1·5	5·1	0·2	+ 6·4	SW: SSW	SW: WSW	0·5	0·0	0·0	213	0·00
5	..	29·609	56·6	44·8	50·9	50·1	76·0	39·3	48·1	45·3	0·8	3·0	0·0	+ 5·5	WSW: SW	SW	2·2	0·0	0·4	291	0·08
6	First Qr.	28·998	57·0	49·5	53·1	47·0	74·0	46·0	48·3	46·3	6·1	8·5	1·2	+ 8·0	SSW: SW: WSW	WSW: W	25·0	0·0	2·7	585	0·42
7	..	29·207	50·0	38·0	44·0	39·0	81·0	35·0	49·3	47·5	5·0	10·1	1·5	− 0·7	WSW	SW: ENE	4·1	0·0	0·9	396	0·29
8	..	29·300	45·4	33·5	39·3	32·8	68·0	29·0	49·8	47·8	6·5	10·9	0·5	− 5·0	NE: N: NW: WNW	WNW: SW	3·8	0·0	1·0	394	0·10
9	..	29·160	52·0	30·3	41·1	38·0	58·0	24·6	49·3	47·3	3·1	7·3	0·0	− 2·8	SW: S: SE: NE	SE: SSE: SSW	3·0	0·0	0·2	221	0·00
10	In Equator	28·787	53·1	43·5	47·3	43·7	78·5	40·3	49·3	47·3	3·6	6·5	1·0	+ 3·8	SE: SW: WNW	W: WSW: ENE	13·0	0·0	1·2	392	0·50
11	..	29·158	45·5	37·5	41·3	37·0	50·5	32·2	47·5	45·3	4·3	6·6	1·1	− 1·9	NE: N: NW	WNW: W: SW	7·6	0·0	1·1	400	0·44
12	..	29·727	48·3	36·7	42·0	37·9	71·0	30·8	46·3	43·7	4·1	7·4	1·2	− 0·9	WSW	W: SW: S	2·1	0·0	0·3	278	0·00
13	Full	29·389	57·0	36·7	46·2	45·2	57·0	32·1	44·3	42·8	1·0	4·4	0·0	+ 3·5	ESE	E: SE: SSW	8·3	0·0	1·3	324	0·59
14	Perigee	29·116	56·4	40·8	45·9	39·1	56·4	36·0	44·3	42·8	6·8	9·0	1·5	+ 3·4	SSW: SW	WSW: NNW	23·0	0·2	5·9	744	0·15
15	..	30·054	48·5	33·5	39·5	35·0	82·5	28·3	46·3	44·3	4·5	9·7	1·4	− 2·8	NW: WSW	WSW: SW: S	1·5	0·0	0·1	240	0·00
16	Greatest Declination N.	29·840	51·3	33·7	44·9	39·4	73·8	28·1	45·5	42·9	5·5	10·2	1·1	+ 2·7	SSE: S	S: SW: WSW	4·1	0·0	0·3	288	0·11
17	..	29·873	54·2	41·8	47·9	45·6	59·7	35·5	44·3	42·7	2·3	4·6	0·7	+ 5·9	WSW	SW: SSW: WSW	5·0	0·0	0·7	376	0·05
18	..	29·913	58·4	52·5	54·6	46·1	83·7	43·2	44·5	43·1	8·5	9·9	1·4	+12·7	W by S	W: WSW	4·2	0·0	1·2	503	0·00
19	..	29·478	55·7	45·5	50·1	43·3	76·0	43·0	46·1	44·1	6·8	10·0	4·0	+ 8·3	SW	W: NW: NNW	23·5	0·6	5·0	694	0·01
20	Last Qr.	29·818	45·5	36·0	37·9	28·4	68·0	31·2	46·3	44·3	9·5	11·3	7·0	− 3·8	NNW	NNW	11·6	0·5	3·2	455	0·00
21	..	29·809	44·0	34·5	38·2	33·9	63·8	30·2	47·3	45·1	4·3	7·7	2·9	− 3·5	NNW: N	N: NNE	7·2	0·0	1·2	371	0·00
22	In Equator	29·966	43·6	33·5	38·0	33·9	76·9	28·0	45·7	43·7	4·1	8·4	1·4	− 3·7	NNE: N	N: NNE	2·8	0·0	0·6	326	0·00
23	..	29·998	45·6	34·7	39·6	37·0	76·6	31·8	45·3	43·7	2·6	7·9	0·0	− 2·1	N	NNE	1·1	0·0	0·1	231	0·00
24	..	29·974	39·4	35·0	36·8	33·6	46·3	34·0	42·3	39·8	3·2	5·3	2·2	− 4·8	NE	ENE: NE	1·6	0·0	0·2	270	0·01
25	..	29·862	37·1	29·8	33·5	30·0	73·2	25·5	40·5	38·7	3·5	6·8	1·6	− 8·1	NE	NNE: N	0·7	0·0	0·0	192	0·00
26	..	29·806	34·8	29·5	31·9	28·6	45·0	25·5	39·7	38·1	3·3	5·4	0·0	− 9·7	NNW:N: NNE	NNE: N	0·3	0·0	0·0	141	0·00
27	N	29·858	37·2	29·3	33·8	31·2	45·8	23·7	39·3	37·5	2·6	4·8	0·9	− 7·8	N: NNE	NNE: NE	7·8	0·0	0·4	292	0·00
28	Apogee	29·943	35·9	33·5	34·3	29·5	36·2	32·5	39·1	37·3	4·8	7·3	1·8	− 7·3	NE	NE	6·4	0·0	0·7	371	0·01
29	..	29·789	35·9	29·7	32·8	26·2	39·5	25·5	39·1	37·3	6·6	7·8	4·8	− 8·9	NE	ENE: NE	4·7	0·0	1·1	439	0·00
30	Greatest Declination S.	29·688	33·2	28·3	30·0	24·6	33·2	26·2	38·3	36·5	5·4	7·4	3·2	−11·8	NE	NE: ENE	3·6	0·0	0·7	422	0·02
Means	..	29·630	47·6	37·5	42·2	37·7	63·8	33·2	45·0	43·0	4·4	7·5	1·6	− 0·8	...	...	..	..	...	Sum 10510	Sum 2·90

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 29ⁱⁿ·721 on the 5th ; the first minimum in the month was 29ⁱⁿ·649 on the 3rd.

The second maximum	,,	was 29ⁱⁿ·297 on the 7th ;	the second minimum	,,	was 28ⁱⁿ·954 on the 6th.	
The third maximum	,,	was 29ⁱⁿ·437 on the 8th ;	the third minimum	,,	was 29ⁱⁿ·062 on the 7th.	
The fourth maximum	,,	was 28ⁱⁿ·980 on the 10th ;	the absolute minimum	,,	was 28ⁱⁿ·519 on the 10th.	
The fifth maximum	,,	was 29ⁱⁿ·791 on the 12th ;	the fifth minimum	,,	was 28ⁱⁿ·868 on the 11th.	
The absolute maximum	,,	was 30ⁱⁿ·080 on the 15th ;	the sixth minimum	,,	was 28ⁱⁿ·874 on the 14th.	
The seventh maximum	,,	was 29ⁱⁿ·913 on the 17th ;	the seventh minimum	,,	was 29ⁱⁿ·726 on the 16th.	
The eighth maximum	,,	was 29ⁱⁿ·937 on the 18th ;	the eighth minimum	,,	was 29ⁱⁿ·810 on the 18th.	
The ninth maximum	,,	was 30ⁱⁿ·027 on the 23rd ;	the ninth minimum	,,	was 29ⁱⁿ·390 on the 19th.	
The tenth maximum	,,	was 29ⁱⁿ·962 on the 28th ;	the tenth minimum	,,	was 29ⁱⁿ·802 on the 26th.	

The range in the month was 1ⁱⁿ·561.

The mean for the month was 29ⁱⁿ·630, being 0ⁱⁿ·125 *lower* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.

The highest in the month was 58°·5 on the 4th; the lowest was 28°·3 on the 30th.

The range   ,,   was 30°·2.

The mean   ,,   of all the highest daily readings was 47°·6, being 1°·3 *lower* than the average of the preceding 34 years.

The mean   ,,   of all the lowest daily readings was 37°·5, being 0°·2 *higher* than the average of the preceding 34 years.

The mean daily range was 10°·1, being 1°·5 *less* than the average of the preceding 34 years.

The mean for the month was 42°·2, being 0°·7 *lower* than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.	
	A.M.	P.M.	A.M.	P.M.
Nov. 1	w	w : o	10	10
2	w	o	v, ci, ci.-s	10, oc.-th.-r
3	o	o	10, th.-r	10 : 10, h.-r
4	w	v, g.-cur : s,sp,g.-cur	8, cu.-s, ci.-cu, sl.-r	5, ci, ci.-cu, ci.-s : o, h.-d
5	w	v	f, mt, ci, ci.-cu, ci.-s : sl.-r	10, r : 10, oc.-th.-r
6	o	o	10, h.-r : v, g, sc, cu.-s, cu, ci	8, cu.-s, cu, ci, sc, r, g : 8, ci.-cu, cu.-s, r, w
7	w	w : sN,sp,g.-cur	ci.-cu, cu.-s, mt	7, ci, ci.-cu, cu : 10, h.-r
8	o	w	10, r : ci.-cu, mt	v, ci, ci.-cu, ci.-s, cu : o
9	w	v	h, fr : 10, sl.-r	v, oc.-r : 10, th.-cl
10	w	w	10, r, f, w : 10, st.-w	10, cu, cu.-s, ci, sc : 10, h.-r
11	o	o	10, h.-r, w : 10, st.-w	10, w : 9, th.-cl, lu.-ha, h, h.-d
12	w	w	7, ci, ci.-s, mt, h	1, cu, ci,ci.-cu, h, sl.-mt : v,th.-cl,mt,lu.-ha,lu.-co
13	o	o	10, f, mt, r : 10, r	10, h.-r : 10, th.-r, st.-w
14	o	o	10, r, g, m : 10, sl.-r, g	10, oc.-r, g : v, w
15	o	o	o, h.-fr, ms : o, h.-fr, mt	4, ci, ci.-s, ci.-cu : 2, li.-cl, h, lu.-ha
16	o	o	ci.-cu, cu.-s, ci.-s	10, cu.-s, ci.-cu : 10, r
17	o	o	th.-cl, mt, so.-ha	10, r : 10, w
18	w	w : o	v, cu, ci.-s, sc, w	vv, cu.-s, ci.-cu, w : cu.-s, ci.-cu, w
19	o	o	w : v,cu.-s,cu,ci,ci.-cu,st.-w	9, sl.-r, st.-w : 9, st.-w
20	o	o	cu.-s, cu, ci.-cu, w	vv, ci, ci.-cu, w
21	o	o	cu.-s, ci, w : 7, ci, ci.-s, cu.-s, sl.-mt	vv, ci.-cu, cu, w
22	o	o	h.-fr, f, ci, ci.-s	9, cu, cu.-s, ci.-cu, sl.-r : 10
23	w	w : o	f, ci.-cu, cu.-s	9, cu.-s, cu,ci.-cu,ci,th.-r : 10, th.-r
24	w	w	10, th.-r	10, sl.-r : 10
25	o	w	10, f : 10, f, sn	v, cu, cu.-s, ci : 10, mt
26	w	w	10, sl.-sn	9, cu.-s, cu, ci : v
27	w	w : o	10, f, sl	v, sl : 10, sl
28	o	o	10, w : 10, sc, sl	10, sl : 10
29	o	o	10, w	10 : o
30	o	w : w	v : 10, sl	10, fr.-sn

HUMIDITY OF THE AIR.

Temperature of the Dew Point.
The mean for the month was 37°·7, being 1°·8 *lower* than the average of the preceding 34 years.

Elastic Force of Vapour.—The mean for the month was 0in·226, being 0in·020 *less* than the average of the preceding 34 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was 2grs·6, being 0gr·2 *less* than the average of the preceding 34 years.

Degree of Humidity.—The mean for the month was 85 (that of Saturation being represented by 100), being 3 *less* than the average of the preceding 34 years.

Weight of a Cubic Foot of Air.—The mean for the month was 547 grains, being 1 grain *less* than the average of the preceding 34 years.

CLOUDS.
The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was 8·1.

WIND.
The proportions were of N. 9, S. 8, W. 7, E. 6, and Calm 0. The greatest pressure in the month was 25lbs·0 on the square foot on the 6th. The mean daily horizontal movement of the air for the month was 350 miles; the greatest, 744 miles on the 14th, and the least, 141 miles on the 26th.

RAIN.
Fell on 16 days in the month, amounting to 2in·90, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·58 *greater* than the average fall of the preceding 60 years.

MONTH and DAY, 1875.	Phases of the Moon.	Mean Daily Reading of the Barometer (corrected and reduced to 32° Fahrenheit).	READINGS OF THERMOMETERS.								Difference between the Dew Point Temperature and Air Temperature.			Difference between the Mean Temperature of the Day and the Mean Temperature of the same Day on an Average of 60 Years.	WIND AS DEDUCED FROM ANEMOMETERS.					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.
			Dry.			Dew Point.	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.					OSLER'S.						
			Highest.	Lowest.	Mean Daily Value.	Mean Daily Value.			Highest.	Lowest.	Mean Daily Value.	Greatest.	Least.		General Direction.		Pressure in lbs. on the square foot.				
															A.M.	P.M.	Greatest.	Least.	Mean of 24 Obs.		
		in.	°	°	°	°	°	°	°	°	°	°	°	°			lbs.	lbs.	lbs.	miles.	in.
Dec. 1	..	29·694	32·3	28·1	30·2	22·8	41·5	25·0	36·8	35·3	7·4	11·6	3·6	−11·5	NE: NNE	NNE	3·7	0·0	0·7	426	0·01
2	..	29·580	33·5	29·3	31·4	30·1	37·0	26·7	36·7	35·3	1·3	2·3	0·8	−10·5	N	NN NE	2·3	0·0	0·3	288	0·17
3	..	29·646	32·5	27·0	30·0	27·8	35·2	24·0	36·1	34·7	2·2	3·2	0·0	−11·9	NNE: N	N: SW	0·2	0·0	0·0	202	0·11
4	..	29·680	31·0	23·7	27·5	26·6	31·7	20·1	35·7	34·3	0·9	2·8	0·0	−14·4	WSW: SW	SE: ESE: NE: NNE	0·4	0·0	0·0	147	0·09
5	..	29·819	31·7	23·3	27·2	23·5	58·2	21·3	35·3	34·1	3·7	6·2	2·0	−14·6	NNE	NNE: N	2·2	0·0	0·3	292	0·02
6	First Qr.	29·984	33·1	25·0	30·0	25·8	36·3	21·7	34·7	33·3	4·2	10·1	0·0	−11·7	NNE: NE	ENE	12·5	0·0	1·3	487	0·24
7	In Equator	30·209	35·9	27·3	31·4	27·6	43·5	25·0	34·3	32·9	3·8	8·0	1·0	−10·1	ENE: NE	NNE: N	2·9	0·0	0·2	224	0·00
8	..	30·225	36·8	30·6	34·5	28·1	40·2	28·2	34·3	32·8	6·4	9·5	1·9	− 6·8	N	N: NW	1·2	0·0	0·1	194	0·00
9	..	30·215	38·4	30·2	34·6	31·9	54·3	27·2	34·8	33·1	2·7	4·8	0·0	− 6·5	NW: WNW: NNW	N: NNW	0·0	0·0	0·0	127	0·00
10	..	30·092	39·3	28·5	34·9	33·7	45·0	25·7	34·9	33·3	1·2	4·1	0·0	− 6·0	WSW	W	0·5	0·0	0·0	248	0·01
11	..	29·934	42·8	36·6	40·5	39·1	43·0	33·5	35·3	33·7	1·4	2·9	0·0	− 0·2	W: WNW	NW: WNW: W	1·9	0·0	0·3	321	0·04
12	Perigee : Full.	29·938	44·7	36·6	40·8	37·9	51·0	31·1	36·3	34·3	2·9	5·5	2·2	+ 0·3	WNW: W	WNW: W	1·9	0·0	0·2	326	0·00
13	Greatest Declination N.	30·032	46·6	29·8	37·4	32·2	61·0	26·9	37·9	35·8	5·2	11·2	1·7	− 3·2	WSW	NE: SE	0·0	0·0	0·0	125	0·00
·14	..	29·968	39·3	24·2	33·2	32·9	70·6	22·0	38·1	35·3	0·3	3·7	0·0	− 7·5	SE: S	ESE: SSE	0·1	0·0	0·0	129	0·00
15	..	29·991	37·4	33·6	35·6	33·8	43·2	33·6	37·9	35·8	1·8	2·9	0·8	− 5·1	SSE: SSW	S: SSW	0·0	0·0	0·0	130	0·00
16	..	29·951	37·9	30·8	32·8	32·1	37·9	30·8	38·1	36·3	0·7	1·3	0·0	− 7·9	SSW	SSW: SE	0·0	0·0	0·0	80	0·00
17	..	29·789	49·7	33·2	41·2	39·6	78·7	31·2	38·8	36·6	1·6	8·0	0·0	+ 0·7	SE: S	S: SSE	0·0	0·0	0·0	132	0·01
18	..	29·692	45·3	34·3	41·3	41·1	49·1	27·7	39·3	37·3	0·2	1·5	0·0	+ 1·1	S	SSW: S	1·3	0·0	0·0	209	0·00
19	Last Quarter : In Equator.	29·471	47·2	41·1	44·4	42·0	59·0	35·2	40·1	37·8	2·4	3·3	0·9	+ 4·4	S	SSW: SW	2·5	0·0	0·2	303	0·05
20	..	29·489	51·2	39·5	45·9	43·5	52·1	34·2	40·9	38·5	2·4	5·3	0·0	+ 6·2	SW	SSW: SW	7·0	0·0	1·7	540	0·03
21	..	29·722	53·8	42·1	46·7	41·6	53·8	37·0	42·1	38·9	5·1	8·2	2·1	+ 7·4	WSW	SW: SSW	11·1	0·0	1·7	487	0·07
22	..	29·572	54·5	44·3	49·5	45·5	64·0	40·0	43·1	40·6	4·0	6·3	0·0	+10·7	SW	SW	16·5	0·3	4·5	689	0·20
23	..	29·988	50·2	41·8	45·5	38·8	75·8	36·0	42·9	41·1	6·7	10·9	3·7	+ 7·1	WSW: SW	WSW	8·6	0·2	1·7	543	0·00
24	..	29·999	53·0	43·2	48·3	43·8	85·6	38·2	42·8	40·9	4·5	8·2	2·6	+10·1	WSW	WSW	13·5	0·5	2·8	605	0·00
25	Apogee	30·216	48·0	39·2	42·2	37·4	56·3	32·1	43·1	41·9	4·8	7·3	1·4	+ 4·2	W : WSW	W : WSW	1·3	0·0	0·2	320	0·00
26	..	30·261	46·0	37·4	43·2	42·3	66·7	31·8	43·3	42·3	0·9	1·3	0·7	+ 5·4	WSW : W	WSW : W	0·3	0·0	0·0	177	0·00
27	Greatest Dec. S: New.	30·271	46·3	41·9	43·8	42·5	48·2	41·5	43·8	42·5	1·3	2·2	0·7	+ 6·2	WSW : W	W: WSW: SW	0·3	0·0	0·0	140	0·01
28	..	30·333	46·3	41·5	43·9	39·3	50·2	40·4	44·3	42·8	4·6	5·5	4·0	+ 6·4	W: WSW: SW	WSW	0·2	0·0	0·0	212	0·00
29	..	30·219	46·4	41·8	43·9	39·9	52·2	39·3	44·1	42·8	4·0	5·7	2·2	+ 6·5	WSW : W	W : WSW	0·4	0·0	0·0	240	0·00
30	..	30·119	47·6	42·6	44·7	40·2	51·0	41·2	44·3	42·8	4·5	7·1	1·3	+ 7·4	WSW	WSW:SW:SSW	0·0	0·0	0·0	189	0·00
31	..	29·946	45·0	39·6	42·2	37·3	54·1	35·9	44·9	42·8	4·9	6·8	3·4	+ 5·0	SSW: SW	SSW: SW	2·8	0·0	0·4	363	0·00
Means	..	29·937	42·7	34·5	38·7	35·5	52·5	31·1	39·2	37·4	3·2	5·7	1·2	− 1·3	...	...	..	..	..	Sum 8895	Sum 1·06

BAROMETER READINGS FROM EYE-OBSERVATIONS.

The first maximum in the month was 30in·237 on the 8th ; the first minimum in the month was 29in·555 on the 2nd.

The second maximum　　,,　　was 30in·045 on the 13th ; the second minimum　　,,　　was 29in·929 on the 11th.

The third maximum　　,,　　was 29in·570 on the 20th ; the third minimum　　,,　　was 29in·457 on the 19th.

The fourth maximum　　,,　　was 29in·796 on the 21st ; the absolute minimum　　,,　　was 29in·412 on the 20th.

The fifth maximum　　,,　　was 30in·081 on the 23rd ; the fifth minimum　　,,　　was 29in·512 on the 22nd.

The absolute maximum　　,,　　was 30in·358 on the 28th ; the sixth minimum　　,,　　was 29in·966 on the 24th.

The range in the month was 0in·946.

The mean for the month was 29in·937, being 0in·139 *higher* than the average of the preceding 34 years.

TEMPERATURE OF THE AIR.

The highest in the month was 54°·5 on the 22nd ; the lowest was 23°·3 on the 5th.

The range　　,,　　was 31°·2.

The mean　　,,　　of all the highest daily readings was 42°·7, being 1°·9 *lower* than the average of the preceding 34 years.

The mean　　,,　　of all the lowest daily readings was 34°·5, being 0°·7 *lower* than the average of the preceding 34 years.

The mean daily range was 8°·2, being 1°·2 *less* than the average of the preceding 34 years.

The mean for the month was 38°·7, being 1°·4 *lower* than the average of the preceding 34 years.

MONTH and DAY, 1875.	ELECTRICITY.		CLOUDS AND WEATHER.			
	A.M.	P.M.	A.M.		P.M.	
Dec. 1	w	w	10	: 10, sn	v, oc.-sn	: o
2	v, g.-cur	s, g.-cur : w	10, sl.-sn		10, sn	
3	o	w	10, sn		v, sl.-sn	: 8, f
4	w	v, g.-cur, sp	10, sl.-sn, f	: 10, sn, f	10, sl.-sn	: v
5	w	w, g.-cur	sn	: ci, ci.-cu, cu.-s, ci.-s	v, cu.-s, ci, ci.-s	: li.-cl
6	o	w : o	10	: 10, sn	10, sn, w	: 10, w
7	o	s, g.-cur	10		10, f	: 9, sl.-f, lu.-co
8	w	v, g.-cur	8, li.-cl, f		10, mt	: 10, f
9	w	s, g.-cur	10	: cu.-s, ci.-cu, ci, f	10	
10	m	m : w	10, f	: 10, th.-cl, h, sl.-f	10	: 10, th.-r
11	o	o	10	: 10, th.-r	10, oc.-th.-r	: 10, sc
12	o	o	10, sl.-f		v, cu.-s, ci.-cu, sc, sl.-f	
13	w	o : w	8, ci.-cu, cu.-s, ci		v, li.-cl, f	: v, f, h.-fr
14	m	v	th.-cl, h.-fr		10, cu.-s, cu, ci, f	: 10, f
15	o	w	10, li.-cl		10	: 10, th.-r
16	s	s, g.-cur : m	10, f, th.-r		10, f	
17	o	v : m	10, m.-r		2, ci, ci.-s	: o, h.-d
18	o	w	6, ci, ci.-s		10, m.-r	: 10, th.-r
19	o	o : w	10	: 10, r	vv	: vv, r
20	o	o	10	: 10, w	10, r, st.-w	: v, w
21	s	s : o	10, r, w	: 8, li.-cl, so.-ha	9, li.-cl, oc.-th.-r	: 10, st.-w
22	o	o	10, r, g		cu, st.-w	: o, w
23	o	o	o, w		ci.-cu, w	: o
24	o	o	v, ci.-cu, cu.-s, w		10, ci, ci.-cu, st.-w	: 10, th.-r, w
25	m	v, g.-cur	v	: 3, li.-cl, h, sl.-f	li.-cl, h	: o
26	s, g.-cur	s, g.-cur	v, f, h		10, f	: 10
27	o	s : w	10, mt, f, sl.-r		10, th.-r, glm	: 10, th.-r
28	o	s, g.-cur	10		9, th.-cl	: 10
29	w	s, g.-cur	10	: 9, cu.-s, ci.-s	10, cu.-s, ci.-s, li.-cl	: 10
30	w	s, g.-cur : w	10	: 10, sl.-r	10, sl.-r	
31	o	v	10		9	: v

HUMIDITY OF THE AIR.

Temperature of the Dew Point.

The mean for the month was $35°·5$, being $1°·2$ lower than the average of the preceding 34 years.

Elastic Force of Vapour.—The mean for the month was $0^{in}·208$, being $0^{in}·014$ less than the average of the preceding 34 years.

Weight of Vapour in a Cubic Foot of Air.—The mean for the month was $2^{grs}·4$, being $0^{gr}·2$ less than the average of the preceding 34 years.

Degree of Humidity.—The mean for the month was 89 (that of Saturation being represented by 100), being 1 greater than the average of the preceding 34 years.

Weight of a Cubic Foot of Air.—The mean for the month was 556 grains, being 4 grains greater than the average of the preceding 34 years.

CLOUDS.

The mean amount for the month, a clear sky being represented by 0 and a cloudy sky by 10, was $7·9$.

WIND.

The proportions were of N. 6, S. 9, W. 12, E. 4, and Calm 0. The greatest pressure in the month was $16^{lbs}·5$ on the square foot on the 22nd. The mean daily horizontal movement of the air for the month was 287 miles, the greatest 689 miles on the 22nd, and the least 80 miles on the 16th.

RAIN.

Fell on 14 days in the month, amounting to $1^{in}·06$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}·90$ less than the average fall of the preceding 60 years.

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

MAXIMA		MINIMA		MAXIMA		MINIMA	
Approximate Mean Solar Time, 1875.	Reading.	Approximate Mean Solar Time, 1875.	Reading.	Approximate Mean Solar Time, 1875.	Reading.	Approximate Mean Solar Time, 1875.	Reading.
d h m	in.	d h m	in.	d h m	in.	d h m	in.
January 2. 5.50	29·858	January 1.14.45	29·510	April 5.23.45	29·325	April 4.22.30	29·105
3. 5.45	29·930	2.15. 0	29·622	11.21.30	30·050	6.16.50	29·166
7.10. 0	30·000	4. 9. 0	29·616	14.23. 0	30·245	12. 4. 0	29·970
14. 8.50	29·964	9.19.10	29·615	19. 8.30	30·025	18. 5. 0	29·892
17.14. 0	29·660	15.21.10	29·433	21.12. 0	29·763	21. 4. 0	29·665
18.22.40	29·765	18. 3.40	29·490	24.23.10	30·130	22. 5. 0:	29·690
19.21.20	29·575	19.14.10	29·456	28.12. 0	30·014	27. 5.50	29·840
20.22. 0	29·310	20.18. 0	29·141	May 4. 8.50	29·860	May 1. 6. 0	29·710
22. 8.30	29·852	21. 8. 0	29·040	7.22.10	29·730	6.15.40	29·392
23.23.30	29·068	23.20. 0	28·968	10.21.10	30·268	8.12.45	29·646
26. 9.10	30·113	24. 4.40	28·918	15.18.30	30·085	15. 4.30	29·962
28.21. 0	30·146	27.17. 5	30·005	19.14. 0	29·673	17.23.50	29·382
30. 8.20	30·496	29.11.30	30·015	20.17.30	29·670	20. 5. 0	29·550
February 4.23.15	30·210	February 3. 2.30	29·735	23.20. 0	30·264	21. 3.10	29·425
8. 9.30	30·085	6.18.35	29·926	June 1. 8.55	30·022	28.15.30	29·610
10.11.40	30·049	9. 4.35	29·900	4.19.40	29·860	June 4. 4.15	29·672
12.23.30	29·920	12. 3.20	29·685	6.19.40	29·990	5.16.30	29·743
15.20.30	30·330	14. 3.50	29·821	7.22.50	30·035	7. 5.50	29·903
21.13. 0	30·000	19.21.30	29·840	11. 8. 0	29·588	10.14.45	29·329
March 3.23.45	29·845	24. 1.45	29·120	12.18.50	29·660	12. 1.20	29·450
8. 6. 0	29·925	March 6. 4.50	29·500	18.18.45	30·002	15. 3.15	29·282
9.21.45	30·290	8.18.40	29·660	23.20.30	30·058	20.15.30:	29·590
15.21.30	30·070	12. 5.15	29·745	26.15.50	29·880	26. 0.40	29·734
17.22. 5	30·420	16. 5. 0	29·998	July 4.11. 0	30·185	July 1.12. 0:	29·529
21. 8.35	30·025	19. 5. 0	29·930	10. 2.35	29·550	9.11.20	29·158
23. 8.50	30·227	22. 3.55	29·882	12.19. 0	30·058	10.22.35	29·305
31.11. 0	30·400	27. 5. 0	29·841	16.10.10	29·705	14.22.30:	29·471
April 0.21.30	30·390	April 0.17. 0	30·370	20.12.30	29·790	17.17.20	29·549

MAXIMA.		MINIMA.		MAXIMA.		MINIMA.	
Approximate Mean Solar Time, 1875.	Reading.	Approximate Mean Solar Time, 1875.	Reading.	Approximate Mean Solar Time, 1875.	Reading.	Approximate Mean Solar Time, 1875.	Reading.
d h m	in.	d h m	in.	d h m	in.	d h m	in.
July 26. 19. 40	30·225	July 23. 3. 5	29·493	October 17. 11. 50	29·696	October 14. 3. 30	29·007
August 1. 20. 0	30·096	31. 5. 40	29·910	21. 11. 30	29·425	20. 5. 5	29·220
7. 20. 0	29·900	August 6. 4. 0	29·698	24. 22. 40	30·060	22. 21. 10	29·195
9. 10. 30	29·745	8. 18. 30	29·610	28. 22. 15	29·920	27. 5. 0	29·534
11. 9. 30	29·780	10. 3. 0	29·634	November 4. 18. 50	29·760	November 3. 1. 45	29·642
15. 9. 40	30·040	12. 18. 0	29·505	6. 22. 40	29·320	5. 20. 30	28·893
20. 21. 40	30·196	16. 17. 0	29·823	8. 8. 50	29·445	7. 12. 30	28·850
26. 21. 15	30·003	24. 5. 30	29·700	10. 5. 30	29·024	9. 21. 0	28·519
29. 21. 20	29·930	28. 16. 30	29·705	12. 9. 50	29·805	10. 14. 40	28·446
September 0. 21. 50	30·114	30. 16. 45	29·799	15. 8. 0	30·095	13. 23. 10	28·850
5. 21. 10	30·160	September 3. 3. 15	29·803	16. 22. 35	29·920	16. 8. 55	29·720
11. 20. 30	30·150	8. 9. 0	29·578	18. 6. 0	29·950	17. 9. 30	29·806
23. 12. 45	29·993	21. 16. 20	29·462	22. 20. 35	30·030	19. 2. 50	29·390
25. 10. 20	29·882	24. 20. 0	29·710	27. 23. 0	29·965	26. 2. 10	29·797
27. 9. 5	29·720	26. 12. 0	29·345	December 7. 23. 50	30·250	December 2. 3. 0	29·555
30. 8. 30	29·900	28. 4. 0	29·500	13. 10. 0	30·060	12. 2. 0	29·920
October 2. 18. 40	29·785	October 2. 0. 15	29·440	19. 20. 0	29·571	19. 2. 0	29·448
6. 7. 30	30·300	3. 9. 15	29·498	20. 23. 50	29·825	20. 9. 5	29·411
9. 20. 50	29·780	9. 3. 15	29·380	23. 9. 40	30·101	21. 18. 0	29·432
12. 8. 10	29·260	11. 3. 0	29·096	27. 22. 0	30·359	24. 6. 35	29·925
13. 12. 0	29·086	13. 2. 0	29·005				

ABSOLUTE MAXIMA AND MINIMA READINGS OF THE BAROMETER for each Month in the YEAR 1875.
[Extracted from the preceding Table.]

1875, MONTH.	Readings of the Barometer.		Range of Reading in each Month.
	Maxima.	Minima.	
	in.	in.	in.
January..............	30·496	28·918	1·578
February.............	30·330	29·120	1·210
March...............	30·420	29·500	0·920
April................	30·390	29·105	1·285
May.................	30·268	29·382	0·886
June	30·058	29·282	0·776
July	30·225	29·158	1·067
August..............	30·196	29·505	0·691
September........·....	30·160	29·345	0·815
October..............	30·300	29·005	1·295
November............	30·095	28·446	1·649
December	30·359	29·411	0·948

The highest reading in the year was 30in·496 on January 30.   The lowest reading in the year was 28in·446 on November 11.
The range of reading in the year was 2in·050.

MONTHLY MEANS of RESULTS for METEOROLOGICAL ELEMENTS.

| 1875, MONTH. | Mean Reading of the Barometer. | TEMPERATURE OF THE AIR. | | | | | | | 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. |
		Highest.	Lowest.	Range in the Month.	Mean of all the Highest.	Mean of all the Lowest.	Mean Daily Range.	Mean Temperature.				
	in.	°	°	°	°	°	°	°	°	in.	grs.	gr.
January ..	29·763	53·7	18·2	35·5	47·8	38·8	9·0	43·3	39·2	0·239	2·7	0·5
February..	29·860	51·3	23·3	28·0	40·4	30·6	9·8	35·2	30·3	0·169	2·0	0·4
March	29·968	57·4	25·5	31·9	47·1	34·5	12·6	40·4	33·8	0·194	2·3	0·7
April	29·875	71·5	27·8	43·7	57·5	37·4	20·1	46·4	38·2	0·231	2·7	1·0
May	29·842	81·9	36·6	45·3	66·7	45·6	21·1	55·0	46·5	0·317	3·6	1·3
June	29·744	83·3	41·0	42·3	71·9	49·8	22·1	59·0	49·8	0·358	4·0	1·6
July......	29·792	77·5	42·5	35·0	69·0	51·4	17·6	59·0	53·8	0·415	4·7	0·9
August ...	29·868	85·4	43·6	41·8	74·3	54·4	19·9	63·0	56·8	0·462	5·1	1·3
September.	29·867	81·0	44·6	36·4	70·6	51·7	18·9	60·3	53·8	0·415	4·6	1·2
October ...	29·608	68·8	33·5	35·3	55·8	42·1	13·7	48·5	44·1	0·289	3·3	0·6
November .	29·630	58·5	28·3	30·2	47·6	37·5	10·1	42·2	37·7	0·226	2·6	0·5
December .	29·937	54·5	23·3	31·2	42·7	34·5	8·2	38·7	35·5	0·208	2·4	0·4
Means	29·813	Highest. 85·4	Lowest. 18·2	Annual Range. 67·2	57·6	42·4	15·3	49·3	43·3	0·294	3·3	0·9

1875, MONTH.	Mean Degree of Humidity. (Saturation = 100.)	Mean Weight of a Cubic Foot of Air.	Mean Amount of Cloud. (0—10.)	RAIN.			WIND.										From Robinson's Anemometer.
				Number of Rainy Days.	Amount collected on the Ground.		From Osler's Anemometer.									Mean Daily Pressure in lbs. on the Square Foot.	
					Gauge read Daily.	Gauge read Monthly.	Number of Hours of Prevalence of each Wind, referred to different Points of Azimuth.								Number of Calm or nearly Calm Hours.		Mean Daily Horizontal Movement of the Air in Miles.
							N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.			
		grs.			in.	in.											
January.........	85	548	7·4	17	2·99	3·05	1	28	6	53	173	263	184	36	0	0·95	339
February........	82	559	7·8	12	0·82	0·99	101	191	126	45	35	112	42	20	0	0·31	246
March	78	555	7·8	7	0·56	0·60	148	159	140	36	18	110	75	46	12	0·58	309
April...........	74	547	5·7	8	1·55	1·42	28	181	156	49	65	141	82	18	0	0·26	236
May........,....	74	537	6·0	11	1·46	1·35	81	72	69	29	63	267	116	47	0	0·39	271
June.....,.....	72	530	6·5	11	2·28	2·18	61	43	30	34	137	297	80	23	15	0·62	294
July....,......	83	531	7·5	16	5·28	5·06	132	122	58	36	46	203	122	25	0	0·32	254
August	80	528	6·9	11	2·28	2·23	136	71	29	36	73	297	74	28	0	0·24	223
September.......	79	531	5·7	11	2·66	2·62	36	123	93	84	75	185	106	18	0	0·35	253
October.........	85	539	7·8	18	4·13	4·12	56	84	145	113	73	163	94	16	0	0·37	267
November.......	85	547	8·1	16	2·90	2·93	120	159	35	71	67	143	95	30	0	1·03	350
December	89	556	7·9	14	1·06	1·05	103	70	18	37	97	225	162	32	0	0·54	287
Sums	..	..	..	152	27·97	27·60	1003	1303	905	623	922	2406	1232	339	27	..	..
Means	80	542	7·1	..	..	..	..	..	..	..	..	..	..	..	..	0·50	277

The greatest recorded pressure of the wind on the square foot in the year was 30 lbs. + on January 25.
The greatest recorded daily horizontal movement of the air   „   „ 847 miles on January 19.
The least recorded daily horizontal movement of the air   „   „   80 miles on December 16.

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

Days of the Month, 1875.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	52·80	52·01	51·15	50·35	49·70	49·44	49·70	50·40	51·23	52·06	52·77	52·95
2	52·84	51·97	51·12	50·34	49·68	49·43	49·74	50·44	51·27	52·07	52·79	52·97
3	52·83	51·92	51·09	50·30	49·67	49·44	49·75	50·47	51·28	52·10	52·80	52·98
4	52·81	51·88	51·08	50·27	49·66	49·44	49·75	50·47	51·32	52·14	52·85	52·96
5	52·78	51·87	51·06	50·25	49·65	49·45	49·78	50·50	51·35	52·17	52·85	52·98
6	52·76	51·84	51·04	50·23	49·63	49·44	49·82	50·54	51·38	52·20	52·81	52·95
7	52·73	51·78	51·04	50·20	49·60	49·45	49·83	50·57	51·42	52·23	52·87	52·95
8	52·72	51·76	51·02	50·18	49·59	49·45	49·83	50·60	51·43	52·24	52·86	52·95
9	52·68	51·74	50·99	50·15	49·58	49·46	49·85	50·63	51·45	52·26	52·87	52·95
10	52·65	51·69	50·94	50·13	49·57	49·45	49·87	50·66	51·48	52·28	52·90	52·95
11	52·65	51·66	50·91	50·10	49·56	49·45	49·89	50·66	51·50	52·30	52·90	52·96
12	52·62	51·65	50·86	50·08	49·55	49·46	49·91	50·70	51·55	52·31	52·95	52·94
13	52·55	51·64	50·85	50·05	49·55	49·47	49·94	50·73	51·58	52·33	52·95	52·94
14	52·57	51·60	50·83	50·04	49·54	49·47	49·96	50·75	51·60	52·35	52·97	52·92
15	52·55	51·57	50·80	50·00	49·46	49·48	49·97	50·79	51·58	52·40	52·97	52·90
16	52·52	51·52	50·82	50·00	49·52	49·49	49·99	50·83	51·65	52·46	53·00	52·93
17	52·49	51·53	50·74	49·97	49·50	49·52	50·03	50·85	51·70	52·47	53·03	52·91
18	52·48	51·47	50·72	49·96	49·50	49·52	50·05	50·87	51·72	52·48	53·05	52·89
19	52·44	51·44	50·69	49·94	49·47	49·54	50·08	50·89	51·76	52·47	53·02	52·88
20	52·42	51·39	50·65	49·93	49·45	49·55	50·11	50·92	51·75	52·50	53·00	52·87
21	52·38	51·38	50·63	49·90	49·47	49·55	50·11	50·95	51·79	52·55	53·03	52·86
22	52·32	51·35	50·61	49·83	49·46	49·57	50·15	50·96	51·83	52·56	53·03	52·87
23	52·32	51·32	50·60	49·83	49·45	49·58	50·19	51·00	51·83	52·57	53·03	52·85
24	52·29	51·27	50·56	49·83	49·45	49·60	50·20	51·04	51·85	52·63	53·03	52·84
25	52·24	51·27	50·55	49·79	49·45	49·62	50·23	51·05	51·90	52·65	53·01	52·80
26	52·21	51·26	50·53	49·79	49·44	49·63	50·26	51·07	51·97	52·65	53·00	52·78
27	52·19	51·20	50·45	49·78	49·43	49·64	50·28	51·10	51·95	52·67	53·01	52·76
28	52·18	51·17	50·45	49·76	49·43	49·65	50·32	51·12	51·97	52·70	52·99	52·75
29	52·15		50·45	49·74	49·42	49·68	50·34	51·14	52·00	52·71	53·00	52·74
30	52·07		50·42	49·73	49·42	49·70	50·36	51·18	52·03	52·73	52·99	52·70
31	52·05		50·40		49·42		50·39	51·20		52·75		52·70
Means.	52·49	51·58	50·78	50·02	49·52	49·52	50·02	50·81	51·64	52·42	52·94	52·88

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

Days of the Month, 1875.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	50·40	48·34	47·38	46·43	47·12	49·61	52·05	53·97	55·81	56·76	55·70	53·38
2	50·40	48·33	47·35	46·42	47·17	49·68	52·14	54·04	55·95	56·75	55·65	53·30
3	50·29	48·31	47·27	46·42	47·24	49·80	52·18	54·09	55·93	56·70	55·58	53·23
4	50·16	48·29	47·24	46·42	47·29	49·86	52·21	54·12	56·03	56·71	55·54	53·14
5	50·06	48·30	47·23	46·44	47·36	49·92	52·35	54·15	56·08	56·84	55·47	53·05
6	49·90	48·27	47·16	46·46	47·38	49·98	52·44	54·22	56·14	56·82	55·37	52·95
7	49·79	48·27	47·11	46·45	47·43	50·07	52·54	54·32	56·20	56·84	55·28	52·82
8	49·68	48·26	47·07	46·46	47·50	50·16	52·55	54·40	56·18	56·77	55·15	52·76
9	49·54	48·27	47·01	46·47	47·55	50·26	52·60	54·45	56·24	56·77	55·10	52·66
10	49·44	48·21	46·95	46·50	47·62	50·33	52·74	54·52	56·25	56·73	55·06	52·58
11	49·39	48·29	46·90	46·52	47·68	50·38	52·74	54·54	56·26	56·70	54·90	52·53
12	49·29	48·26	46·83	46·54	47·77	50·45	52·79	54·59	56·32	56·67	54·85	52·37

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

Days of the Month, 1875.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
13	49·20	48·16	46·73	46·57	47·86	50·58	52·91	54·66	56·40	56·65	54·82	52·27
14	49·12	48·10	46·75	46·60	47·94	50·69	52·96	54·73	56·43	56·60	54·71	52·25
15	49·05	48·04	46·71	46·63	48·03	50·79	53·00	54·80	56·44	56·60	54·60	52·01
16	48·99	48·00	46·72	46·66	48·08	50·89	53·21	54·90	56·46	56·60	54·58	51·85
17	48·83	47·97	46·66	46·70	48·18	50·98	53·26	54·94	56·50	56·59	54·49	51·84
18	48·88	47·91	46·64	46·73	48·25	51·09	53·42	54·96	56·51	56·60	54·45	51·70
19	48·84	47·86	46·60	46·76	48·31	51·20	53·48	55·01	56·55	56·40	54·35	51·60
20	48·82	47·78	46·60	46·76	48·41	51·27	53·55	55·07	56·52	56·30	54·24	51·49
21	48·77	47·75	46·57	46·80	48·54	51·31	53·52	55·14	56·55	56·40	54·17	51·40
22	48·63	47·70	46·59	46·77	48·61	51·40	53·61	55·19	56·57	56·37	54·10	51·30
23	48·63	47·65	46·56	46·82	48·72	51·50	53·68	55·27	56·54	56·27	54·02	51·18
24	48·63	47·60	46·56	46·87	48·83	51·59	53·70	55·36	56·54	56·25	53·95	51·00
25	48·57	47·52	46·56	46·88	48·92	51·66	53·74	55·40	56·59	56·20	53·90	50·91
26	48·50	47·55	46·55	46·94	49·02	51·72	53·76	55·45	56·68	56·11	53·77	50·87
27	48·41	47·50	46·54	47·00	49·10	51·79	53·82	55·53	56·68	56·03	53·72	50·77
28	48·47	47·43	46·54	47·03	49·20	51·86	53·87	55·57	56·68	55·96	53·62	50·70
29	48·43		46·48	47·06	49·28	51·92	53·90	55·60	56·75	55·89	53·56	50·60
30	48·40		46·47	47·08	49·40	51·97	53·93	55·73	56·73	55·84	53·50	50·55
31	48·40		46·46		49·46		53·95	55·78		55·76		50·51
Means .	49·16	48·00	46·80	46·67	48·17	50·82	53·12	54·85	56·38	56·47	54·61	51·92

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

Days of the Month, 1875.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	45·86	46·61	44·50	45·27	48·31	53·44	56·70	58·26	60·74	60·00	55·02	50·88
2	45·76	46·67	44·44	45·40	48·53	53·50	56·87	58·41	60·78	59·81	54·88	50·65
3	45·51	46·62	44·33	45·52	48·80	53·61	56·92	58·54	60·61	59·66	54·68	50·45
4	45·22	46·57	44·24	45·66	49·00	53·72	57·00	58·60	60·60	59·60	54·59	50·20
5	45·13	46·53	44·18	45·81	49·18	53·87	57·12	58·67	60·57	59·47	54·43	49·98
6	45·04	46·37	44·10	45·95	49·33	54·08	57·21	58·72	60·57	59·30	54·31	49·70
7	45·04	46·26	43·98	46·10	49·50	54·36	57·26	58·83	60·55	59·20	54·21	49·52
8	45·22	46·08	43·97	46·21	49·72	54·62	57·25	59·18	60·43	59·02	54·10	49·24
9	45·27	46·02	43·97	46·31	49·94	54·88	57·31	59·11	60·42	58·92	54·04	49·00
10	45·36	45·90	44·04	46·44	50·11	55·04	57·43	59·20	60·38	58·80	53·95	48·90
11	45·43	45·80	44·26	46·50	50·28	55·21	57·50	59·24	60·37	58·68	53·32	48·68
12	45·42	45·64	44·41	46·57	50·47	55·37	57·52	59·33	60·38	58·51	53·40	48·47
13	45·55	45·52	44·57	46·60	50·65	55·58	57·59	59·46	60·44	58·38	53·31	48·29
14	45·61	45·36	44·69	46·63	50·81	55·68	57·57	59·58	60·41	58·15	52·88	48·11
15	45·74	45·28	44·74	46·66	51·10	55·68	57·50	59·64	60·38	58·00	52·79	48·04
16	45·85	45·30	44·78	46·72	51·24	55·68	57·80	59·80	60·39	57·73	52·81	47·90
17	45·97	45·33	44·80	46·74	51·50	55·70 ·	57·89	59·90	60·44	57·59	52·77	47·90
18	46·13	45·33	44·83	46·81	51·76	55·70	57·94	59·97	60·50	57·36	52·63	47·77
19	46·21	45·40	44·82	46·91	52·00	55·72	57·72	60·08	60·47	57·10	52·59	47·69
20	46·33	45·35	44·80	46·98	52·18	55·73	57·70	60·27	60·40	56·90	52·43	47·61
21	46·50	45·31	44·79	47·14	52·40	55·70	57·61	60·41	60·45	56·64	52·44	47·57
22	46·57	45·22	44·81	47·23	52·49	55·77	57·76	60·50	60·50	56·47	52·40	47·59
23	46·68	45·12	44·80	47·42	52·60	55·83	57·82	60·60	60·43	56·28	52·30	47·60
24	46·78	45·00	44·78	47·61	52·68	55·89	57·82	60·67	60·43	56·11	52·20	47·63
25	46·67	44·90	44·76	47·70	52·78	55·97	57·88	60·70	60·51	56·04	52·03	47·69
26	46·50	44·82	44·73	47·80	52·87	56·01	57·90	60·74	60·53	55·90	51·85	47·74

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

Days of the Month, 1875.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
27	46·55	44·67	44·79	47·88	52·97	56·13	57·97	60·80	60·41	55·80	51·73	47·80
28	46·59	44·58	44·80	47·90	53·11	56·27	58·02	60·79	60·29	55·69	51·52	47·75
29	46·54		44·94	48·00	53·17	56·45	58·05	60·78	60·30	55·50	51·37	47·88
30	46·50		45·09	48·16	53·29	56·59	58·10	60·87	60·08	55·32	51·10	47·90
31	46·58		45·20		53·34		58·17	60·81		55·18		47·91
Means.	45·94	45·63	44·58	46·75	51·16	55·26	57·58	59·76	60·46	57·65	53·07	48·52

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

Days of the Month, 1875.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	39·70	44·13	40·12	44·24	50·02	55·50	59·97	61·58	62·58	59·66	51·49	45·20
2	39·32	43·72	39·93	44·60	50·32	55·90	60·00	61·62	62·48	59·36	51·30	44·70
3	39·18	43·36	39·70	44·88	50·47	56·58	59·89	61·60	62·38	59·07	51·05	44·40
4	39·38	43·08	39·59	45·02	50·58	57·38	59·91	61·51	62·51	58·72	51·17	44·00
5	40·16	42·73	39·60	45·32	51·00	58·10	59·90	61·48	62·30	58·54	51·53	43·78
6	40·87	42·28	39·60	45·62	51·42	58·59	59·71	61·29	62·22	58·68	51·70	43·40
7	41·32	42·01	39·80	45·71	51·90	58·90	60·00	61·40	62·20	58·50	52·00	43·15
8	41·67	41·95	40·67	45·71	52·11	59·18	60·38	62·13	62·10	58·18	51·80	42·89
9	41·74	41·71	41·67	45·69	52·11	59·39	60·42	62·32	62·30	58·10	51·28	42·70
10	41·85	41·31	42·50	45·63	52·22	59·51	60·29	62·59	62·36	57·90	50·52	42·68
11	41·98	41·06	42·74	45·50	52·51	59·48	59·91	62·63	62·15	57·40	49·86	42·54
12	42·20	40·90	42·71	45·30	52·86	59·10	59·68	62·75	61·90	56·98	49·97	42·60
13	42·52	41·07	42·58	45·33	53·37	58·68	59·48	62·87	62·05	56·40	49·58	42·82
14	42·94	41·38	42·40	45·33	53·90	58·37	59·18	62·90	62·21	55·61	49·00	42·90
15	43·40	41·80	42·31	45·50	54·50	57·90	58·99	63·09	62·40	55·30	49·33	42·72
16	43·84	42·20	42·30	45·67	54·90	57·82	59·00	63·55	62·50	54·99	49·22	42·52
17	44·10	42·28	42·26	45·88	55·40	57·82	58·79	63·96	62·40	54·90	48·93	42·70
18	44·30	42·20	42·18	46·20	55·61	57·80	58·88	64·35	62·49	54·55	49·00	42·71
19	44·53	42·04	42·08	46·61	55·60	57·86	59·18	64·61	62·58	54·34	49·30	42·83
20	44·80	41·66	42·02	47·08	55·23	57·78	59·69	64·64	62·60	54·25	49·60	43·20
21	45·09	41·27	41·89	47·69	54·89	57·90	59·69	64·41	62·70	54·03	49·49	43·49
22	44·90	41·00	41·90	47·98	54·79	57·98	59·90	64·28	62·55	54·04	49·00	43·88
23	44·43	40·72	41·82	47·92	55·00	57·91	59·82	64·30	62·34	53·90	48·45	44·41
24	44·12	40·55	41·87	47·56	55·12	58·25	59·92	64·27	61·99	53·61	48·11	44·66
25	44·10	40·42	42·03	47·32	55·31	58·70	59·93	64·17	61·45	53·50	47·87	44·73
26	43·94	40·20	42·40	47·38	55·59	59·22	59·90	64·09	61·18	53·29	47·40	44·78
27	43·85	40·22	42·97	47·62	55·68	59·75	59·98	64·10	60·93	52·90	47·00	44·70
28	43·93	40·27	43·46	48·19	55·58	59·90	60·30	63·85	60·67	52·50	46·53	44·80
29	44·07		43·54	49·00	55·40	59·93	60·60	63·60	60·40	52·13	46·20	44·91
30	44·31		43·70	49·60	55·25	59·90	61·00	63·30	60·01	52·00	45·70	44·95
31	44·50		43·98		55·11		61·43	62·87		51·70		45·02
Means.	42·81	41·70	41·82	46·37	53·67	58·37	59·86	63·10	62·03	55·65	49·45	43·70

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

Days of the Month, 1875.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	31.2	40.0	33.8	46.7	52.3	60.0	62.3	61.9	59.7	57.6	46.4	35.0
2	36.1	39.3	34.2	47.0	51.5	62.6	62.2	62.0	64.6	58.0	46.3	35.5
3	40.8	39.5	35.6	46.3	54.3	64.9	61.5	63.3	63.3	54.2	50.0	36.0
4	43.1	37.2	36.0	48.0	56.1	64.8	60.0	62.2	61.8	57.4	51.2	35.0
5	42.8	36.4	36.5	48.2	56.0	64.8	59.8	60.9	62.0	59.6	51.0	34.8
6	43.0	35.0	38.9	47.2	58.0	63.1	63.2	63.0	61.8	56.0	53.0	35.0
7	41.0	38.5	45.7	45.2	54.2	64.0	64.0	65.8	63.8	55.8	48.3	34.8
8	40.1	35.3	48.1	46.2	56.0	64.0	62.5	66.3	64.0	56.8	44.9	36.4
9	41.0	34.4	47.5	43.9	55.5	65.5	61.0	66.0	63.6	56.6	43.0	37.0
10	40.0	35.7	43.0	44.4	56.2	62.4	59.7	66.2	61.7	52.4	48.0	36.2
11	43.8	34.7	41.8	45.0	56.1	59.8	58.7	65.7	60.9	53.0	46.0	38.7
12	43.0	39.8	38.8	44.0	58.4	57.2	57.8	65.3	62.1	49.6	45.0	40.0
13	44.7	40.2	40.0	44.0	59.5	56.4	58.2	65.0	64.6	51.5	44.3	39.6
14	46.7	43.8	41.5	45.0	60.7	59.0	60.0	66.2	65.5	49.0	47.3	38.5
15	46.6	42.0	39.5	44.4	63.0	58.0	58.8	67.2	64.0	51.0	44.0	37.5
16	45.8	38.0	39.4	46.2	61.3	58.0	58.9	70.0	62.0	50.3	44.7	37.5
17	45.6	40.7	39.4	47.3	58.3	58.8	58.3	70.0	64.7	50.0	46.0	40.0
18	47.9	39.0	38.5	48.7	60.3	59.0	61.8	69.0	65.0	52.0	50.0	40.0
19	47.0	36.2	40.0	50.4	56.0	59.0	62.3	66.9	65.8	51.0	50.2	43.0
20	47.7	35.3	39.2	52.0	55.0	60.2	63.0	65.7	64.0	51.0	44.0	43.7
21	44.1	36.0	40.0	53.8	58.2	58.0	59.8	66.0	63.0	53.0	43.0	43.0
22	39.0	36.0	39.0	46.0	58.0	57.8	61.0	64.5	64.0	52.5	42.3	48.0
23	41.8	35.3	39.7	46.7	58.0	61.0	62.0	65.0	60.3	50.5	43.0	44.4
24	44.8	35.2	40.5	45.2	57.9	62.3	61.2	65.8	57.7	50.2	42.0	45.8
25	41.9	36.3	44.1	46.0	59.2	64.0	60.4	66.2	61.3	49.0	38.8	43.7
26	40.8	38.7	46.8	49.0	58.0	63.8	59.7	66.2	60.0	48.0	38.8	43.4
27	44.0	36.1	45.9	53.0	56.7	63.0	61.8	64.9	59.0	46.0	39.0	44.5
28	45.1	36.0	43.0	54.7	58.0	62.2	64.0	63.7	59.8	47.0	38.8	44.0
29	46.3		45.1	54.4	55.0	63.0	63.9	62.2	56.8	47.0	38.0	43.8
30	42.0		46.3	55.2	55.2	62.3	64.9	62.1	56.4	46.0	36.2	44.0
31	40.0		47.3		55.8		63.3	61.8		46.7		43.0
Means.	42.8	37.5	41.1	47.8	57.1	61.3	61.2	65.1	62.1	51.9	44.8	40.1

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

Days of the Month, 1875.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	30.3	45.2	31.0	50.8	51.9	72.1	65.5	65.5	63.8	61.5	47.0	31.5
2	42.7	43.0	32.5	53.6	55.0	74.0	68.8	68.1	71.4	58.2	48.7	34.0
3	48.6	39.8	35.2	49.0	65.6	78.5	63.7	72.0	63.7	54.0	51.0	32.5
4	50.0	37.8	37.9	54.1	67.0	75.0	60.3	66.2	69.0	61.8	56.2	29.9
5	45.9	34.8	42.3	53.0	66.9	71.2	68.2	65.7	67.4	65.0	53.6	32.7
6	47.9	37.3	43.4	49.6	66.8	68.6	73.0	66.8	71.8	59.4	54.5	33.0
7	41.2	37.2	55.3	47.2	53.7	68.0	70.0	75.7	74.5	60.5	48.0	33.6
8	40.3	33.2	55.8	53.2	61.8	71.3	64.1	72.4	69.9	57.8	43.0	35.5
9	42.8	32.8	52.8	43.0	61.7	75.6	61.5	69.2	71.0	58.2	42.6	35.5
10	41.7	33.1	48.7	46.1	62.4	66.9	62.0	74.7	66.5	56.8	47.8	36.5
11	48.8	32.9	44.8	49.0	65.1	62.8	59.3	68.8	64.7	53.5	44.5	41.5
12	47.6	43.7	37.8	44.1	70.1	55.2	59.7	67.7	66.9	51.6	46.7	41.8
13	48.5	42.3	38.7	47.0	68.8	60.4	59.0	70.0	73.7	54.0	44.7	40.5
14	51.0	48.6	45.7	50.0	69.8	64.0	64.5	72.9	72.0	48.0	47.8	39.0
15	50.8	45.1	42.9	45.2	76.5	60.0	60.3	73.0	70.5	52.8	46.0	37.2

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

Days of the Month, 1875.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
16	47·9	39·2	39·3	53·8	69·3	60·4	60·2	82·6	70·4	50·8	49·1	34·3
17	47·1	42·0	38·9	57·9	64·5	65·9	59·8	80·8	73·8	58·0	48·9	46·5
18	51·7	39·6	40·8	59·2	68·3	63·7	69·7	73·6	76·2	56·3	56·6	43·8
19	51·1	33·8	42·9	64·4	58·5	69·0	64·7	71·1	76·3	49·5	52·8	46·1
20	49·4	33·8	41·5	65·3	55·9	65·0	69·9	71·7	67·0	50·5	39·6	46·8
21	44·0	36·9	42·0	65·1	66·8	58·0	58·6	73·8	66·6	58·5	42·1	45·0
22	37·8	38·8	46·0	43·5	63·6	64·8	65·1	70·1	67·0	55·2	42·9	53·0
23	49·3	36·0	44·4	51·8	65·0	66·3	69·2	73·2	59·6	49·5	44·5	45·0
24	46·3	33·9	46·9	49·8	67·2	71·5	66·3	71·6	56·5	52·1	39·7	49·7
25	41·3	40·5	52·9	53·8	67·2	74·4	69·0	71·0	66·8	53·5	37·5	44·8
26	40·8	44·1	54·0	56·3	61·3	68·0	68·0	69·7	64·0	50·0	35·0	45·8
27	48·5	34·9	52·9	66·6	60·7	71·2	70·8	70·0	63·9	43·2	36·8	45·5
28	50·4	32·2	44·0	66·9	63·8	64·0	73·3	65·8	60·0	47·2	35·3	45·0
29	50·6		51·9	63·0	54·8	68·7	73·6	64·2	61·0	46·5	35·2	44·7
30	40·2		52·8	65·6	63·5	65·7	72·0	69·1	60·6	43·8	32·0	45·0
31	41·7		54·8		61·2		67·5	67·3 ·		48·3		43·3
Means .	45·7	38·3	44·9	53·9	63·7	67·3	65·7	70·8	67·5	53·7	45·0	40·6

WEEKLY MEANS of READINGS of THERMOMETERS.						
	Thermometers sunk in the ground.					Thermometer inclosed in the box which covers the scales of the deep-sunk Thermometers, and placed on a level with their scales.
1875. Period.	Bulb 24 French Feet deep.	Bulb 12 French Feet deep.	Bulb 6 French Feet deep.	Bulb 3 French Feet deep.	Bulb 1 Inch deep.	
d　　　　　　　d	°	°	°	°	°	°
January　1 to January　7	52·79	50·14	45·37	39·99	39·7	43·8
8 to　　　　　14	52·63	49·38	45·41	42·13	42·8	45·8
15 to　　　　　21	52·47	48·88	46·10	44·29	46·4	48·9
22 to　　　　　28	52·25	48·55	46·62	44·18	42·5	44·9
29 to February　4	52·01	48·36	46·58	43·88	40·6	42·6
February　5 to　　11	51·76	48·27	46·14	41·86	35·7	34·5
12 to　　　　　18	51·57	48·06	45·39	41·69	40·5	42·9
19 to　　　　　25	51·35	47·69	45·19	41·09	35·8	36·2
26 to March　　4	51·15	47·39	44·51	40·00	35·8	35·4
March　5 to　　　11	51·00	47·06	44·07	40·94	43·1	49·0
12 to　　　　　18	50·80	46·72	44·69	42·39	39·6	40·6
19 to　　　　　25	50·61	46·58	44·79	41·94	40·4	45·2
26 to April　　1	50·44	46·50	44·97	43·47	45·9	51·6
April　2 to　　　8	50·25	46·44	45·81	45·27	46·9	51·4
9 to　　　　　15	50·08	46·55	46·53	45·47	44·4	46·3
16 to　　　　　22	49·93	46·74	46·93	46·73	49·2	58·5
23 to　　　　　29	49·79	46·94	47·76	47·86	49·9	58·3
30 to May　　　6	49·67	47·23	48·76	50·49	54·8	62·7
May　7 to　　　13	49·57	47·63	50·10	52·44	56·6	63·4
14 to　　　　　20	49·49	48·17	51·51	55·02	59·2	66·1
21 to　　　　　27	49·45	48·82	52·68	55·20	58·0	64·5
28 to June　　　3	49·43	49·49	53·35	55·62	58·8	66·8
June　4 to　　　10	49·45	50·08	54·37	58·72	64·1	70·9
11 to　　　　　17	49·48	50·68	55·56	58·45	58·2	61·2
18 to　　　　　24	49·56	51·34	55·76	57·93	59·6	65·5
25 to July　　　1	49·66	51·85	56·30	59·62	62·9	68·2
July　2 to　　　8	49·79	52·34	57·09	59·97	61·9	66·9
9 to　　　　　15	49·91	52·82	57·49	59·71	59·2	60·9
16 to　　　　　22	50·07	53·44	57·77	59·30	60·7	64·0
23 to　　　　　29	50·26	53·78	57·92	60·06	61·9	70·0
30 to August　5	50·43	54·04	58·39	61·46	62·6	68·1
August　6 to　　12	50·62	54·43	59·09	62·16	65·5	70·8
13 to　　　　　19	50·82	54·86	59·78	63·62	67·8	74·9
20 to　　　　　26	51·00	55·27	60·56	64·31	65·6	71·6
27 to September 2	51·18	55·71	60·80	63·25	62·7	67·4
September 3 to　　9	51·38	56·11	60·54	62·29	62·9	69·6
10 to　　　　　16	51·56	56·37	60·39	62·22	63·0	69·2
17 to　　　　　23	51·77	56·53	60·46	62·52	63·8	69·5
24 to　　　　　30	51·95	56·66	60·36	60·95	58·7	61·8
October　1 to October 7	52·14	56·77	59·58	58·93	56·9	60·1
8 to　　　　　14	52·30	56·70	58·64	57·22	52·7	54·3
15 to　　　　　21	52·48	56·50	57·33	54·62	51·2	53·8
22 to　　　　　28	52·63	56·17	56·04	53·39	49·0	50·1
29 to November 4	52·77	55·71	55·02	51·55	47·7	48·8
November 5 to　　11	52·87	55·19	54·05	51·24	47·7	47·7
12 to　　　　　18	52·99	54·64	52·94	49·29	45·9	48·5
19 to　　　　　25	53·02	54·10	52·34	48·83	43·3	42·7
26 to December 2	52·99	53·55	51·30	46·10	37·3	34·3
December 3 to　　9	52·96	52·94	49·73	43·47	35·6	33·2
10 to　　　　　16	52·93	52·27	48·34	42·68	38·3	38·7
17 to　　　　　23	52·88	51·50	47·68	43·32	43·2	46·6
24 to　　　　　31	52·76	50·74	47·79	44·82	44·0	45·5

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

1875, Month	Direction of the Wind. At beginning of Month.	At end of Month.	Apparent Motion.	Times of Shifts of the Recording Pencil.	Amount of Motion.	Monthly Excess of Motion. Direct.	Retrograde.
			°	d h m	°	°	°
January ..	S.E.	S.W.	−270	0. 22. 0	+360		
				9. 22. 0	−360		
				10. 22. 0	+360	450	
				21. 9. 10	−360		
				26. 2. 45	+360		
				30. 22. 0	+360		
February .	S.W.	N.E.	+180	10. 22. 0	+360		
				12. 22. 0	+360	900	
				24. 22. 0	+360		
				26. 22. 0	−360		
March ...	N.E.	S.S.E.	+112½	5. 20. 55	+360		
				5. 22. 50	+720		
				13. 9. 15	−360	1552½	
				18. 9. 50	+360		
				23. 22. 0	+360		
April	S.S.E.	E.	−427½	1. 10. 0	+360		
				2. 0. 10	+360		
				14. 9. 35	−360		
				18. 22. 0	−360		67½
				20. 22. 0	+360		
				29. 2. 45	−360		
				30. 9. 20	+360		
May	E.	E.N.E.	+337½	0. 22. 0	−360		
				1. 9. 5	+360		
				2. 10. 30	+360		
				3. 22. 0	−360		
				4. 22. 0	+360		
				14. 9. 10	+360	697½	
				17. 20. 55	−360		
				20. 22. 0	+360		
				28. 9. 0	−360		
				29. 22. 0	−360		
				30. 1. 0	+360		
June	E.N.E	S.S.E.	−270	3. 22. 0	+360		
				8. 9. 15	+360		
				9. 2. 45	+360		
				18. 20. 45	+360		
				18. 22. 0	+360	2970	
				19. 2. 45	+360		
				20. 8. 50	+360		
				24. 20. 45	+360		
				26. 22. 0	+360		
July.....	S.S.E.	N.	+202½	13. 22. 0	−360		
				14. 22. 0	−360		

1875, Month	Direction of the Wind. At beginning of Month.	At end of Month.	Apparent Motion.	Times of Shifts of the Recording Pencil.	Amount of Motion.	Monthly Excess of Motion. Direct.	Retrograde.
			°	d h m	°	°	°
July—cont.				15. 8. 15	−360		
				18. 7. 15	−360		
				18. 20. 45	+720		1237½
				26. 0. 10	−360		
				26. 22. 0	−360		
				29. 0. 10	−360		
				29. 22. 0	+360		
August ..	N.	W.N.W.	− 67½	1. 22. 0	−360		
				8. 20. 45	+360		
				12. 21. 0	−360		
				18. 22. 0	−360		
				19. 20. 40	+360	1012½	
				20. 2. 50	+360		
				22. 0. 30	+360		
				29. 7. 15	+360		
				29. 20. 45	+360		
September	W.N.W.	S.S.W.	− 90	5. 22. 0	−360		
				7. 3. 0	+720		
				7. 22. 0	−360		
				8. 9. 15	+360		
				9. 22. 0	−360		
				12. 1. 15	−360	90	
				12. 7. 45	−360		
				17. 2. 50	+360		
				19. 8. 15	+360		
				23. 2. 50	+360		
				24. 9. 0	−360		
October ..	S.S.W.	E.	+247½	13. 9. 30	−360		
				18. 20. 50	−720		
				19. 20. 50	−720		
				20. 9. 30	+360		
				21. 2. 45	−360		1552½
				25. 22. 0	+360		
				26. 1. 15	+360		
				26. 8. 45	−360		
				27. 22. 0	−360		
November	E.	N.E.	− 45	3. 20. 55	+360		
				7. 20. 50	−360		
				8. 22. 0	−360		45
				9. 2. 50	+360		
				12. 20. 50	−360		
				16. 2. 45	+360		
December.	N.E.	S.S.W.	−202½	4. 2. 50	−360		
				15. 8. 50	+360		562½
				26. 21. 0	−360		

The whole excess of direct motion for the year was 4027½°.

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

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

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

MEAN HOURLY MEASURES of the HORIZONTAL MOVEMENT of the AIR in each Month, and GREATEST and LEAST HOURLY MEASURES, as derived from the Records of ROBINSON'S ANEMOMETER.

Hour ending	1875. January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Mean for the Year.
h	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.
1 a.m.	13·0	8·7	11·6	8·0	8·3	10·4	8·8	8·0	10·2	10·8	14·2	11·5	10·3
2 a.m.	13·8	9·6	11·6	8·4	8·7	10·1	9·2	8·0	10·2	11·2	13·8	11·7	10·5
3 a.m.	15·0	9·4	11·6	8·4	8·6	9·6	9·3	7·8	8·9	10·2	13·3	11·3	10·3
4 a.m.	15·1	9·4	11·6	8·1	8·4	9·4	9·0	7·4	9·4	10·3	13·4	11·8	10·3
5 a.m.	14·3	9·2	11·8	8·1	8·8	9·3	8·8	7·5	9·1	9·9	13·7	12·2	10·2
6 a.m.	14·3	9·7	11·8	7·8	8·4	9·3	8·5	7·5	9·0	9·8	14·1	11·7	10·2
7 a.m.	14·1	9·1	12·3	7·9	9·0	10·2	9·1	7·2	8·8	9·9	14·0	11·5	10·3
8 a.m.	14·3	9·1	12·5	8·3	10·6	11·9	10·4	7·6	9·4	10·4	13·9	11·7	10·8
9 a.m.	14·0	9·4	12·6	9·2	10·7	12·2	10·8	8·3	10·4	9·8	15·3	10·9	11·1
10 a.m.	14·5	10·3	14·1	10·0	12·3	12·6	11·9	9·2	11·3	10·9	16·1	11·8	12·1
11 a.m.	15·4	11·5	15·0	11·6	14·6	14·2	12·7	10·4	11·9	11·8	17·8	12·7	13·3
Noon.	16·7	12·1	16·0	11·9	14·0	14·2	12·6	11·1	13·0	12·9	17·4	13·3	13·8
1 p.m.	15·9	12·8	15·6	12·6	15·3	14·9	12·5	11·5	13·4	13·6	16·8	13·5	14·0
2 p.m.	15·4	12·3	14·8	12·4	14·8	15·2	13·4	11·4	13·1	13·4	16·1	12·7	13·8
3 p.m.	14·2	12·3	15·0	11·9	14·3	15·5	12·6	12·0	13·0	12·7	15·5	12·6	13·5
4 p.m.	13·6	11·7	14·4	11·5	14·5	15·1	12·0	12·1	12·7	11·9	14·0	11·9	13·0
5 p.m.	13·0	11·1	14·5	11·8	14·5	15·4	11·6	11·8	11·7	11·4	14·6	12·0	12·8
6 p.m.	12·5	10·6	12·5	11·3	13·9	14·5	11·3	11·4	10·1	10·7	13·9	12·1	12·1
7 p.m.	13·7	10·2	11·7	10·3	12·2	13·3	10·5	9·4	9·8	10·1	13·3	12·1	11·4
8 p.m.	14·2	9·9	12·2	9·4	11·4	12·4	10·5	9·2	9·5	11·7	14·1	12·9	11·5
9 p.m.	13·3	9·8	11·5	9·7	10·3	11·5	9·8	8·6	10·2	11·1	13·5	11·5	10·9
10 p.m.	13·2	9·4	11·1	9·5	9·5	11·2	10·1	8·7	9·2	10·9	13·5	11·6	10·7
11 p.m.	13·2	9·1	11·5	9·3	9·0	10·7	9·1	8·2	9·4	11·1	13·9	11·2	10·5
Midnight.	12·9	9·2	11·0	8·3	8·4	10·4	9·3	8·2	9·6	10·1	14·4	10·8	10·2
Means	14·2	10·2	12·8	9·8	11·3	12·2	10·6	9·3	10·6	11·1	14·6	12·0	11·6
Greatest Hourly Measures - }	43	30	44	32	32	36	33	26	33	37	48	38	..
Least Hourly Measures - }	1	1	1	0	0	0	0	0	0	1	1	1	..

AMOUNT OF RAIN COLLECTED IN EACH MONTH OF THE YEAR 1875.

1875, MONTH.	Monthly Amount of Rain collected in each Gauge.							
	Self-registering Gauge of Osler's Anemometer.	Second Gauge at Osler's Anemometer.	On the Roof of the Octagon Room.	On the Roof of the Library.	On the Roof of the Photographic Thermometer Shed.	Crosley's.	Cylinder partly sunk in the Ground read daily.	Cylinder partly sunk in the Ground read Monthly.
	in.	in.	in.	in.	in.	in.	in.	in.
January.............	1·67	1·76	2·21	2·27	2·85	3·34	2·99	3·05
February...........	0·40	0·47	0·69	0·74	0·84	0·99	0·82	0·99
March	0·29	0·35	0·39	0·44	0·52	0·62	0·56	0·60
April	0·81	0·95	1·15	1·46	1·48	1·72	1·55	1·42
May...............	0·93	0·91	1·17	1·16	1·36	1·66	1·46	1·35
June..............	1·61	1·54	1·83	1·91	2·22	2·80	2·28	2·18
July..............	3·91	4·02	4·49	5·09	5·12	6·34	5·28	5·06
August	1·91	2·04	2·05	2·19	2·30	2·36	2·28	2·23
September..........	2·00	2·20	2·31	2·39	2·64	3·21	2·66	2·62
October...........	2·97	3·07	3·46	3·97	4·11	4·89	4·13	4·12
November..........	2·13	2·27	2·44	2·77	2·84	3·46	2·90	2·93
December	0·44	0·45	0·62	0·79	0·95	0·81	1·06	1·05
Sums	19·07	20·03	22·81	25·18	27·23	32·20	27·97	27·60

The heights of the receiving surfaces are as follows:

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

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

LUMINOUS METEORS.

1875.

Month and Day, 1875.		Greenwich Mean Solar Time.	Observer.	Apparent Size of Meteor in Star-Magnitudes.	Colour of Meteor.	Duration of Meteor in Seconds of Time.	Appearance and Duration of Train.	Length of Meteor's Path in Degrees.	No. for Reference.
		h m s						°	
July	29	10. 26. 30	T.	3	Bluish-white	0·5	None	..	1
"		10. 29. 18	G.	2	Bluish-white	0·5	None	7	2
"		10. 38. 18	G.	3	Bluish-white	0·4	None	5	3
"		10. 56. 48	G.	<Jupiter	Bluish-white	2·5	Splendid	..	4
August	3	10. 50. 0	G.	2	Bluish-white	0·4	Slight	3	5
August	11	9. 24. 20	C.	1	Bluish-white	0·8	Train	12	6
August	29	8. 45.	N.	Venus	Yellowish	1·5	Fine	..	7
September	3	9. 52.	G.L.T.	Very large	White	1^s to $1^s·5$	Train	..	8
"		10. 17.	N.	1	Bluish-white	0·5	Train	..	9
September	14	8. 27.	G.L.T.	Venus × 3	. . .	2^s to $2^s·5$	Train	..	10
"		9. 50.	N.	1	Bluish-white	0·5	Train	8	11
September	26	10. 35.	N.	>1	Bluish-white	>1	Train	15° to 20°	12
September	27	7. 22.	N.	2	Bluish-white	0·3	None	3	13
September	29	6. 40. 0	M.	Arcturus × 5	Bright yellow	. . .	White; 1^s or 2^s	..	14
October	2	7. 29. 0	C.	1	Bluish-white	0·5	Slight	8	15
October	6	9. 24. 15	C.	>1	White	1	Train	14	16
October	21	8. 35.	N.	1	Bluish-white	0·5	Train	7	17
"		8. 36.	N.	1	Bluish-white	0·5	Train	5	18
"		8. 45.	N.	>1	Bluish-white	1	Fine	44	19
October	22	9. 48. 48	T.	1	Bluish-white	0·8	Train	..	20
"		10. 45.	N.	1	Bluish-white	>1	Fine	15	21
"		10. 52. 30±	T.	2	Bluish-white	0·7	None	..	22
"		11. 4.	N.	1	Bluish-white	>1	Fine	30	23
November	13	13. 39. 10±	E.	Jupiter	. . .	. . .	. . .	15	24
November	14	12. 53. 50	N.	>1	White	0·4	None	6	25
"		13. 2. 40	G.	2	Bluish-white	0·6	Slight	..	26
"		13. 48. 38	N.	Jupiter	Bluish-white	. . .	Train	16	27
"		14. 14. 20	G.	1	Bluish-white	0·7	Train	..	28
"		14. 31. 27	N.	2	White	. . .	None	5	29
"		14. 32. 39	N.	2	Bluish-white	. . .	None	6	30
"		14. 46. 13	N.	1	Bluish-white	0·2	None	0·5	31
"		14. 46. 49	N.	1	Bluish-white	0·6	Train	10	32
"		14. 48. 35	N.	2	Bluish-white	0·5	Train	12	33
"		14. 49. 17	N.	1	Bluish-white	0·4	Train	3	34
"		15. 9. 41	G.	1	Bluish-white	0·8	Train	..	35
"		15. 15. 1	G.	2	Bluish-white	0·8	Train	..	36
"		15. 21. 36	G.	1	Bluish-white	0·4	None	..	37
"		15. 26. 51	G.	1	Bluish-white	0·6	Slight	..	38
"		15. 30. 57	N.	2	Bluish-white	. . .	. . .	5	39
"		15. 36. 40	N.	2	Bluish-white	. . .	None	5	40
"		15. 41. 34	N.	Jupiter	Bluish-white	. . .	Train	8	41
"		15. 58. 52	N.	1	Bluish-white	. . .	. . .	5	42
"		16. 3. 7	G.	3	Bluish-white	0·4	None	..	43
"		16. 9. 33	G.	2	Bluish-white	0·6	Slight	..	44
"		16. 11. 24	G.	1	Bluish-white	0·7	Fine	..	45
"		16. 14. 22	G.	2	Bluish-white	0·8	Slight	..	46

No. for Refer-ence.	Path of Meteor through the Stars.
1	Shot from a point a little to the left of γ Sagittæ, and passed about midway between β Delphini and α Aquilæ towards θ Aquilæ.
2	From near α Aquilæ shot downwards towards δ Aquilæ, and disappeared a little under that star.
3	From near θ Cassiopeiæ shot towards and disappeared about midway between α and η Cassiopeiæ.
4	From α Lyræ downwards to western horizon, passing about 10° to left of Arcturus.
5	Shot from Arcturus towards ε Boötis.
6	From a little to the left of α Cygni passed γ Cygni in direction of β Cygni.
7	From ζ Cygni passed across ζ Pegasi.
8	Passed on left of α Aquilæ exactly vertically downwards. First seen in R.A. 298°, N.P.D. 79°, disappeared in R.A. 293°, N.P.D.
9	From direction of δ Aquilæ passed close to ζ Serpentis. [108°. Two maxima of brilliancy. Actual commencement not seen.
10	From 55 Camelopardali (R.A. 120°, N.P.D. 21°) to λ Ursæ Majoris (R.A. 152°, N.P.D. 47°).
11	Passed almost across δ Ursæ Majoris, from direction of a point 3° or 4° to right of β Ursæ Minoris.
12	From direction of α Lyræ passed across δ Aquilæ.
13	Moved from direction of η Ursæ Majoris towards γ Ursæ Majoris. Center of path opposite ε Ursæ Majoris.
14	From near η Ursæ Majoris to a little beyond α Serpentis.
15	Shot downwards a little to south of γ Arietis.
16	Appeared a little below ν Ursæ Majoris and passed just below β Ursæ Majoris.
17	Passed a few degrees above α Lyræ towards η Herculis.
18	Moved from direction of γ Draconis, passing close to α Lyræ.
19	From Capella to Polaris.
20	From c Camelopardali towards γ Cassiopeiæ.
21	Passed across λ and α Draconis.
22	From a point midway between Capella and Pleiades moved towards θ Aurigæ.
23	Passed midway between γ Pegasi and α Andromedæ and across α Pegasi.
24	From region of upper part of Cancer moved towards zenith. Very cloudy night throughout; observed through a break in [the clouds.
25	Moved from direction of δ Draconis towards α Cygni.
26	Shot downwards from α Ursæ Majoris, and disappeared between γ and δ Ursæ Majoris, but nearer to δ Ursæ Majoris.
27	From a point about 5° below γ Ursæ Majoris fell vertically, passing almost midway between η Ursæ Majoris and α Canum [Venaticorum.
28	Shot from α Orionis towards Sirius.
29	From direction of ε Leonis passed across ζ Hydræ.
30	Passed across α Orionis towards γ Orionis.
31	Appeared at a point about 5° below μ Ursæ Majoris and about 8° to right of ψ Ursæ Majoris. (Very short motion.)
32	From direction of γ Ursæ Minoris passed across ι Draconis.
33	From direction of δ Leonis, passed about 10° below α Canum Venaticorum.
34	From a point about 10° below Regulus fell at an angle of 30° from vertical to left. Disappeared about 15° to left of α Hydræ.
35	Shot from about midway between α and β Ursæ Majoris towards κ Draconis.
36	Appeared near α Orionis and disappeared near β Orionis.
37	Shot from θ Geminorum towards Castor.
38	Shot from ε Ursæ Majoris towards η Ursæ Majoris.
39	Moved from direction of a point midway between η Ursæ Majoris and α Canum Venaticorum towards γ Boötis.
40	From direction of γ Ursæ Majoris towards ψ Ursæ Majoris.
41	Center of path about 10° to right of Sirius, moving from direction of α Cancri towards ε Canis Majoris.
42	Center of path 15° below α Hydræ, moving from direction of Regulus.
43	Shot from γ Geminorum at an angle of 45° towards west.
44	Shot from Castor towards γ Geminorum.
45	Shot from Aldebaran towards γ Orionis.
46	Shot from Procyon towards Sirius.

Month and Day, 1875.		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	14	16. 24. 32	G.	1	Bluish-white	0·7	Train	..	1
„		16. 43. 3	G.	2	Bluish-white	0·4	Slight	..	2
„		16. 49. 3	N.	1	Bluish-white	. . .	Train	12	3
November	29	9. 20. 0	N.	1	Bluish-white	0·6	. . .	10	4
„		9. 39. 27	T.	1	White	0·8	Brilliant	15	5
„		9. 42. 2	T.	3	Bluish-white	0·5	None	4	6
„		10. 19. 53	T.	2	Bluish-white	0·7	. . .	..	7
„		10. 35. 19	T.	2	Bluish-white	0·8	. . .	18	8
„		10. 44. 20	T.	3	White	0·7	None	..	9
„		11. 11. 17	T.	2	Bluish-white	0·8	. . .	..	10
„		11. 23. 26	T.	2	Bluish-white	0·6	None	18	11
„		11. 35. 17	T.	3	Bluish-white	0·5	. . .	15	12

No. for Reference.	Path of Meteor through the Stars.
1	Shot from Sirius towards β Canis Majoris.
2	Shot from ζ Draconis towards β Draconis.
3	From direction of α Canum Venaticorum, passed about 2° north of Arcturus.
4	From direction of α Persei passed near β Tauri.
5	From direction of β Tauri towards a point midway between the Pleiades and Aldebaran.
6	Shot from a point slightly below the Pleiades towards 41 Arietis.
7	Dropped perpendicularly from a point slightly below 5 Monocerotis towards β Canis Majoris.
8	Shot from near δ Aurigæ in direction of 23 Ursæ Majoris.
9	Shot from a point a little to the left and below α Orionis towards a point a little to the left of κ Orionis.
10	Shot from a point midway between the Pleiades and δ Arietis towards a point a little below β Arietis.
11	Shot from a point near υ Orionis towards Sirius.
12	Shot from a point midway between 41 Arietis and α Arietis, and disappeared at a point a little below and to left of β Arietis.