RESULTS

OF THE

MAGNETICAL AND METEOROLOGICAL

OBSERVATIONS

MADE AT

THE ROYAL OBSERVATORY, GREENWICH,

IN THE YEAR

1878:

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.

LONDON:
PRINTED BY GEORGE EDWARD EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1880.

E R R A T A.

GREENWICH MAGNETICAL AND METEOROLOGICAL OBSERVATIONS, 1875.

Introduction, page xxxv, line 12, *for* $\left(\frac{T}{T^1}\right)$, *read* $\left(\frac{T}{T^1}\right)^2$.

Also in the Volumes for 1876 and 1877, Introduction, page xxxvi, line 26, make a similar correction.

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GREENWICH MAGNETICAL AND METEOROLOGICAL OBSERVATIONS, 1878.

INTRODUCTION.

§ I. *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 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 (original) magnet is in a position about 10 inches north of its former position; 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, procured in the year 1864, is in nearly the same vertical with the upper magnet; it 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 slit 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 pulleys of the lower magnet; the skein of silk, which supports the lower magnet, passes through a hole in one of the slates. Upon the slates on the brick piers rest the feet of the original wooden stand carrying the suspension of the upper magnet. As, from time to time, the wooden stand has been shifted slightly to the west, with change of the magnetic meridian, its western support had, in course of time, reached such a position that it became necessary in 1876 to place, on the top of the original slate, another slate, bound by brass cramps to the brick pier, but projecting further west. On this the support of the wooden stand now rests.

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 slit 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 slit 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 § 12 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 and other clocks in the Astronomical Department 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 wire to the electrometers; the electrometers formerly planted in the window-seat at the north-end of the ante-room have been now removed (see § 23).

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 resumed.

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. Nos. 2, 3, and 4 are now used as Photographic Offices in connection with the Photoheliograph placed in a dome adjoining No. 3 on the south side.

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

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

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

The theodolite, with which the meridional magnet is observed, is by Simms: the radius of its horizontal circle is 8·3 inches: it is divided to 5′; and 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 slates covering 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 a brass frame supporting two 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 pulleys, whose axes are E. and W., project one on the north side of the moveable upright, the other on the south side, and are adapted to carry a flat leather strap. Formerly this strap was attached directly to the suspension skein, but at the beginning of the year 1877 this manner of attachment was changed. The end of the strap depending from the north pulley is now connected to a square wooden rod sliding in the corresponding squared hole of a fixed wooden bracket. The suspension skein is attached to the lower end of the wooden rod, so that in raising or lowering the magnet carrier (necessary in some operations) no alteration is made in the free length of the suspension skein. The strap passes from the north pulley 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. 4 in., and the height of the magnet is about 2 ft. 11 in.; the length of the rod, carrying at its upper end the torsion circle, and at its lower end the cradle supporting the magnet, is 1 ft. 4 in.; and the length of strap and rod below the north pulley is about 1 ft. 3 in.; so that the length of the free suspending skein is about 5 feet 10 inches.

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

to the upper part is fixed the vernier for reading the circle. 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 several 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.)

The upper magnet carries two sliding 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 at night, and by a reflector during 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 encircle 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 carrier was connected with a horizontal 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.

1875, August 31. The theodolite was clamped, so that the transit-axis was at right angles to the 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 several 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 $1''\cdot5$. Other determinations made 1875, September 21, and 1876, December 1, gave respectively $1''\cdot3$ and $1''\cdot1$. The value applied during the year 1878 to the mean level reading is $1^{\text{div}}\cdot3$ as before, equivalent to $1''\cdot4$.

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

On 1870, December 29, 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 several comparisons of theodolite-readings with large values and with small values of the micrometer-reading was, that one revolution $= 1'.\,34''\cdot2$. Similar experiments made 1875, September 1, and December 28, gave respectively $1'.\,34''\cdot1$, and $1'.\,34''\cdot2$. The value used throughout the year 1878 is $1'.\,34''\cdot2$.

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

1877, December 18. 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 $100^{\text{r}}\cdot108$. On 1878, June 11, the mean of 10 double measures gave $100^{\text{r}}\cdot095$. The value $100^{\text{r}}\cdot108$ was used throughout 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 $9''\cdot41$ to every reading of the theodolite. The clock was removed to the basement in 1864, having now nearly the same relative position to the lower declination-magnet which formerly it had to the upper. No correction is now applied to the upper declination-magnet.

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

The details applying to the effect of the horizontal-force-magnet and first vertical-force-magnet will be found in the volumes for 1840, 1841, 1844, and 1845. It appeared that it was necessary to subtract 55″·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 on 1864, May 26, after removal of the horizontal and vertical force magnets to the basement, seemed to show that the theodolite readings required a subtractive correction of 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.

1877, December 18. The magnet was made to rest 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 10 double observations was, that in the ordinary position of the glass 14″·9 is to be added to all readings. This value was used throughout the year 1878.

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

1877, December 18. 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. The observation was repeated several times. The mean half excess of reading with collimator above (its usual position), over that with collimator below, was 26′. 42″·5. Observations made 1878, December 10, gave 26′. 13″·6. The mean of these values, or 26′. 28″·0, has been used during the year 1878.

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	$23^s \cdot 888$
Mean of times with damper reversed end for end	$24^s \cdot 508$
Mean of times when damper was removed	$23^s \cdot 153$

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 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.

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

DAMPER REVERSED END FOR END.

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

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

From 1865, July 25 to August 9, observations were made to ascertain whether the effect of an external deflecting cause is the same with the damper present and the damper removed. The observation was extremely difficult, as the magnet was perpetually in vibration when the damper was removed. A small magnet on the east side of the N. end of the magnetometer, with its north end pointing towards the East (and therefore diminishing the western declination of the magnetometer), was moved to the distance (about five feet) at which it produced a deviation of 5′ nearly. The apparent western declination was observed, damper present, and damper removed. It appeared to be less with damper present than with damper removed, by 0′. 53″. The separate results are very discordant. If the conclusion has any validity, it tends to show 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 throughout the year 1878 in the reduction of the observations of the upper declination-magnet, the micrometer-head of the theodolite-telescope being East.

Reading for line of collimation - - - - - -	100r·108
	° ′ ″
Micrometer equivalent - - - - - - -	−2. 37. 10·2
Correction for the plane glass in front of the box, in its usual position -	+ 14·9
The collimator above the magnet. Correction for error of collimation -	− 26. 28·0
Constant to be used in the reduction of the observations - - -	−3. 3. 23·3

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 31s·40; on 1874, December 31, 31s·33; on 1875, December 31, 31s·25; on 1877, January 10, 31s·21; and on 1879, January 28, 31s·22.

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

By the same process which is described in the Magnetical Observations 1847, but with the system of suspension and silk skein at present in use, the proportion was found, on 1877, January 10, $\frac{1}{155}$; on 1877, December 18, $\frac{1}{155}$; and on 1879, January 28, also $\frac{1}{155}$.

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 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 usually 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 $A_{\prime\prime}$ = seconds of arc in star's azimuth,

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

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

Then $\log. A_{\prime\prime} = \log. C_s + \log. E + \log (a_{\prime\prime} + F) + \log. \cos. \phi$.

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

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

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

Sometimes, when the star has been observed at larger hour angles, the azimuthal correction has been taken from a manuscript table, having for arguments "Hour Angle" and different values of "North Polar Distance."

Observations for determining the theodolite readings corresponding to the astronomical meridian were made on the following days in 1878:—February 6, 12; March 22; April 2, 20; May 11, 14, 18; June 5, 10; July 8, 16, 29; August 17, 27; September 11; October 14, 22, 23; December 18. 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-nine times at intervals through the year. The concluded mean reading for the south astronomical meridian used, was 27°. 5′. 25″·8 throughout the year.

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

A fine horizontal wire (as stated on page *vii*) 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 diagonally placed cross of the magnetometer is seen, and, during vibration of the magnet, will be observed 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. Then 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 before hand. Chronometer M'Cabe 649 has usually been employed for observation.

If the magnet be 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 pre-arranged time. The times of observation are usually $1^h. 5^m$, $3^h. 5^m$, $9^h. 5^m$, and $21^h. 5^m$ of Greenwich 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, encircled by the copper damper, never exhibits any troublesome vibrations.)

The adopted result is converted into arc, supposing $1^r = 1'.\,34''\cdot2$, 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 (excepting that for the self-recording electrometer, which is of brass), 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 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, and in the case of the electrometer by a pendulum clock. For two of the cylinders, which revolve in 24 hours, and for the thermometer-cylinder which revolves in 52 hours, the axis is placed opposite to 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, and in that of the electrometer, the connection 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; that for the electrometer is about $6\frac{1}{2}$ inches high and 19 inches in circumference.

Each cylinder, excepting that of the electrometer, 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 sensitised paper; the moisture on the paper usually causes the overlapping ends to adhere with sufficient firmness; the glass tube is then slipped over it, and the cylinder thus prepared is placed (if horizontal) with its pivots in bearing upon its two sets of antifriction wheels, or, (if vertical) with its end-brass-plate upon the rotating brass plate, and its central perforation upon the spindle of that plate; care is taken to ensure connection with the clock-work, and the apparatus is ready for action.

The trace for each instrument is produced by a flame of coal gas usually charged with the vapour of coal naphtha. For the magnetometers the light shines through a small aperture about $0^{in}\cdot3$ long, and $0^{in}\cdot01$ 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 carrying the 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, condensed by a vertically placed cylindrical lens, shines through a small horizontal slit 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, the barometer, and the electrometer), 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 revolves. Consequently, when the paper is unwrapped from the cylinder, 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, the barometer, and the electrometer, 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 (§ 16).

Every part of the cylinder apparatus for the magnets, for the earth-currents, and for the electrometer, is covered by cases of blackened zinc or wood, having slits for the moveable spots of light, and holes for the invariable spots; and all parts of the paths of the photographic light are protected as necessary by blackened zinc tubes from the admixture of extraneous light. The cylinder-apparatus for the thermometers is protected in the same manner, the whole, including the stems of the thermometers, and gaslights, being enclosed in a second zinc case, blackened internally.

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 exposed part of the paper corresponds to the known time of revolution of the cylinder. A scale being prepared beforehand, whose value for the time of revolution corresponds in length to the circumference of the cylinder, the scale-readings for the registered times of interruption of light are applied to the ordinates corresponding to the interruptions, and the divisions of hours and minutes 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 chimneys of the registering lamps of the magnetometers, and in the chimneys of other lamps for the earth current galvanometers, the light at each instrument, when not interrupted, falls directly upon the cylindrical lens in front of the revolving cylinder, and, if allowed to act for a short time, produces, when the sheet is developed, a dark line upon the photographic paper. An apparatus of clock-work, specially arranged by Messrs. E. Dent and Co., acting upon small shutters, uncovers simultaneously the chimney-openings in all the lamps about $2\frac{1}{2}$ minutes before each hour, and covers them simultaneously about $2\frac{1}{2}$ minutes after each hour. In this way a good series of hour-lines in the direction of the ordinates is formed. By this arrangement increased accuracy of the time-registers has been obtained, and the labour of the computers much diminished. The system of interrupting the trace by hand is still retained, as giving means of checking the clock indication. No automatic registration of hour-lines has yet been arranged for the Barometer or for the Dry-bulb and Wet-bulb Thermometers.

In some small details the arrangements for the self-recording electrometer (§ 23) are different from what has been here described for the other instruments. For the time-scale the electrometer-clock itself interrupts the register as also explained in § 23.

§ 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 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 paste-board is prepared, (for which a glass scale is in some operations 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 at page *xiv*) at certain registered times, there is no difficulty (by means of these registered times) in defining the points of the photographic trace which

c 2

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

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

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

The telescope is fixed on the east side of the brick pier which supports the stone pier of the declination-theodolite in the upper observing room. The angle between the normal to the scale (which 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 west, but in any westerly direction between north and south), 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 the magnet will therefore take up a different position. 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, but with reversed direction of poles, 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 now be different from what it was at first. 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 1878, January 1:—

1878. Day.	The Marked end of the Magnet.							
	West.				East.			
	Torsion-Circle Reading.	Scale Reading.	Difference of Scale Readings for 1° of Torsion.	Mean of the Times of Vibration.	Torsion-Circle Reading.	Scale Reading.	Difference of Scale Readings for 1° of Torsion.	Mean of the Times of Vibration.
	°	div.	div.	s	°	div.	div.	s
Jan. 1	143	28·27		21·22	226	25·78		20·24
			8·18				7·88	
	144	36·45		21·00	227	33·66		20·50
			8·64				8·04	
	145	45·09		20·90	228	41·70		20·56
			7·54				7·45	
	146	52·63		20·70	229	49·15		20·64
			8·40				8·57	
	147	61·03		20·60	230	57·72		20·78
			8·75				8·24	
	148	69·78		20·46	231	65·96		20·92

The times of vibration and scale readings were sensibly the same, when the torsion-circle read 146°. 0′, marked end West, and 229°. 26′, marked end East, differing 83°. 26′. Half this difference, or 41°. 43′, 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°. 42′·0. Another set of observations taken 1879, January 1, gave 41°. 41′·6.

The value adopted in the reduction of observations through the year 1878 was 41°. 42′·0.

The reading adopted for the torsion-circle, marked end of magnet west, was 146°. 0′ through the year.

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

It was found by accurate measurements, on 1864, November 3, that the distance from $51^{\text{div.}}$ on the scale to the center of the face of the plane mirror is 90·838 inches, and that the length of $30^{\text{div.}}\cdot85$ 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 0·002403 through the year 1878.

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

4. Effect of the damper.

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

DAMPER IN USUAL POSITION.

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

DAMPER REVERSED END FOR END.

			div.
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 $1^{\text{div.}}$ of the scale, and the scale-readings were observed with the damper in its usual place and the damper away. Three experiments were made, containing twenty-four observations of position. Not the smallest difference of position of the horizontal-force-magnet was produced by the presence or absence of the damper. The observations were very easy, and the result is certain.

No experiments on the damper have been made since 1865.

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

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

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

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

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

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

The mean, or

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

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

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

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

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

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

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

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

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

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

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

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

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

7 observations with marked end E 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—

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

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

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

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

Returning now to the temperature-correction of the Horizontal Force Magnet. The unsatisfactory character of the comparisons just given induced me at the beginning of 1868 to try the method of heating the air of the Magnetic Basement generally (by means of the gas-stove), leaving the magnets in all respects in their ordinary state, and comparing their indications as recorded in the ordinary way, but at different temperatures.* Experiments were at first made at intervals of a few hours in the course of one day, but it was soon found that the magnet did not acquire the proper temperature; moreover, the result was evidently affected by

* 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.

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 Horizontal Force corresponding to a change of 1° of Temperature (in Parts of the whole H.F.).
	°	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				
13	59·5	61·26	5·6	0·16	·000389	·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 Horizontal Force corresponding to a change of 1° of Temperature (in Parts of the whole H.F.).
	°	div.	°	div.		
January 21	60·2	60·73	9·7	1·42	0·003449	0·000355
22	50·5	59·31				
24	58·6	62·56	7·3	1·02	·002477	·000339
24	51·3	61·54	8·0	0·32	·000777	·000097
27	59·3	61·86	10·3	0·35	·000850	·000083
29	49·0	61·51	11·9	0·30	·000729	·000061
31	60·9	61·81				
Mean . .	..	...	..	..	....	0·000187

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

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

A fine vertical wire is fixed in the field of view of the telescope, which is directed to the plane mirror carried by the magnet. On looking into the telescope, the graduations of the fixed scale, mentioned in page *xxi*, 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 5 minutes later than that for the observation of declination. The first observation is made by the observer applying his eye to the telescope 40^s before the arranged 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 times of observation are usually 1^h, 3^h, 9^h, and 21^h of Greenwich mean time.

The number of instances when the magnet was observed in a state of vibration during the year 1878 is very small.

Outside the double box is suspended a thermometer which is read on every week day, at 0^h, 1^h, 2^h, 3^h, 9^h, 21^h, 22^h, and 23^h. On 1878, July 25, this thermometer was superseded by another having stem reaching considerably below the attached scale, so that, when placed in a nearly upright position on the outer magnet box, the bulb projects into the interior of the inner box, that actually contains the magnet. 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 about $0^{in}\cdot3$ high, and $0^{in}\cdot01$ 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 1878 the adopted value of variation of horizontal force for one degree of angular motion of the magnet $=$ sin. 1° $\times$ cotan. 41°. 42′·0 $=$ 0·019590; and the movement of the spot of light for 0·01 part of the whole horizontal force is 2·395 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 east. The axis of vibration is as nearly as possible north and south. 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 $2^{\text{ft.}}\ 10^{\text{in.}}\cdot6$. 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 vibrates 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 reflected 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 1878, vibrations of the vertical-force-magnet were observed on 94 different days, and with readings of various divisions of the scale. The mean times of vibration adopted were, from January 2 to September 23, $15^{s}\cdot426$; from September 24 to 30, $14^{s}\cdot743$; and from October 1 to December 29, $14^{s}\cdot323$.

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

1877, January 2–3. The magnet with all its apparatus was suspended from a tripod in Magnetic Office, No. 6, 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 1,000 vibrations, the mean time of one vibration $=16^{s}\cdot959$. This number is used through the year 1878.

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

The distance from the scale to the mirror is 186·07 inches, and each division of the scale $=\frac{12}{30 \cdot 85}$ inches. Hence the angle which one division subtends, as seen from the mirror, is 7'. 11"·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"·60.

But the angular movement of the normal to the mirror is not the same as the angular movement of the magnet; but is less in the proportion of unity to the cosine of the angle which the normal to the mirror makes with the magnet, or in the proportion of unity to the sine of the angle which the plane of the mirror makes with the magnet. This angle has been found to be $52\frac{3}{4}°$; therefore, dividing the result just obtained by sine $52\frac{3}{4}°$, we have, for the angular motion of the magnet corresponding to a change of one division of the scale, 4'. 30"·85.

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

The value of T' was assumed = 16s·959 throughout. From January 2 to September 23, T = 15s·426, dip = 67°. 38'. 20"; from September 24 to 30, T = 14s·743, dip = 67°. 37'. 30"; and from October 1 to December 29, T = 14s·323, dip = 67°. 37'. 40". Consequently, the change of the vertical force, in terms of the whole vertical force, corresponding to one division of the scale, was, from January 2 to September 23, 0·0006529; from September 24 to 30, 0·0007153; and from October 1 to December 29, 0·0007577. These numbers have been used in the reduction of the observations.

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 *xxvi* and *xxvii*. Observations made on 1864, February 20, 25, March 3, 9, gave, for the tangents of the angles of deflection,—

16 observations with marked end E	} at mean temperature	36°·6	Fahrenheit,	gave	0·172352
18 ,, ,, W					
33 ,, marked end E	} ,,	62·2	,,		0·171657
29 ,, ,, W					
26 ,, marked end E	} ,,	93·3	,,		0·171389
27 ,, ,, W					

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

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

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

The factor of variation for 1° of Fahrenheit, when $t = 62°$, is $-$ 0·0001097.

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

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

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

1868. Month and Day.		Temperature.	Scale Reading.	Change of Temperature.	Change of Scale Reading.	Change of Scale Reading reduced to Parts of the whole Vertical Force.	Change of Vertical Force 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 connection 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 sensible change in the space intervening between the grasping point and the center of gravity may be produced by a small change of temperature, and a disturbance of equilibrium and a great change of apparent magnetic position will follow. 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 1878. 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 horizontal force magnet. 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 place 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 times of observation are usually 1^h, 3^h, 9^h, and 21^h of Greenwich mean time.

The number of instances in 1878 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 0^h, 1^h, 2^h, 3^h, 9^h, 21^h, 22^h, and 23^h. On 1878, July 25, this thermometer was superseded by another having stem reaching considerably below the attached scale, so that, when placed in a nearly upright position on the magnet box, the bulb projects into the interior of the box. 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 $0^{in}{\cdot}3$ in length and $0^{in}{\cdot}01$ 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; and by a system of prisms and a small cylindrical lens, a photographic base-line is traced upon the cylinder of paper, similar to that on the cylinder of the declination and horizontal-force magnets.

The scale for the ordinates of the photographic curve of the vertical force is thus computed. Remarking that the radius which determines the range of the motion of the spot of light is double the distance 100·18 inches, and is therefore = 200·36 inches, the formula used in the last section, when applied to $\frac{\text{disturbing force}}{\text{whole vertical force}} = 0{\cdot}01$, gives value of division $= 200{\cdot}36 \times \tan.\ \text{dip} \times \left(\frac{\text{T}}{\text{T}'}\right)^2 \times 0{\cdot}01$. Using the values of T, T′, and of dip, given on page *xxxiii*, the value of the ordinate of the photographic curve for $\frac{\text{disturbing force}}{\text{whole vertical force}} = 0{\cdot}01$, thus obtained, is, from January 2 to September 23, 4·030 inches; from September 24 to 30, 3·678 inches; and from October 1 to December 29, 3·472 inches. With these values, 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 1878 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 instruments. 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 needles 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, each of which, turning on its axis, can be adjusted so as to throw the reflected light in the required direction.

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

The needles adapted for use with this instrument are—

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

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

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

The 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 year 1875, these observed readings have been regularly employed to correct the apparent value of dip for the small outstanding error of level. The instrument is maintained so nearly level that 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. Dover.

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

In the spring of 1861, a Unifilar Instrument, similar 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 of its magnetic moment ought to be used in computing the Absolute Force:—

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

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

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

A_1 is $\frac{1}{2}$ (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; P is $\frac{A_1-A_2}{A_1-\frac{A_2}{(1·3)^2}}$; but this is not convenient for logarithmic calculation, especially as the values of the logarithms of A_1 and A_2 are, in the calculation, first obtained. The difference between A_1 and A_2 being small, (Log. A_1 − Log. A_2) $\frac{A_1}{\text{modulus}}$ may be written in the numerator in place of $A_1 - A_2$, and in the denominator A_1 may be put for A_2. Making these changes, P = (Log. A_1 − Log. A_2) $\frac{1·69}{(1·69-1)\ \text{modulus}}$ = (Log. A_1 − Log. A_2) × 5·64. A mean value of P is adopted from various observations; then m being the magnetic moment of the deflecting magnet, and X the Horizontal component of the Earth's magnetic force, we have $\frac{m}{X}=A_1\times\left(1-\frac{P}{1}\right)$ for smaller distance, or $=A_2\times\left(1-\frac{P}{1·69}\right)$ for larger distance. The mean of these is 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. In the year 1878, a new and entirely independent determination of the value of K was made. It very satisfactorily confirmed the adopted value.

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 was, to the year 1857, 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 $= 9{\cdot}6637805$, and the factor for reducing the English values of X to Metric values will be 0·46108 or $\frac{1}{2{\cdot}1689}$. The values of X in Metric measure thus derived from those in English measure are given in the proper table. The value of X is sometimes required in terms of the centimètre and gramme, commonly known as the C. G. S. unit (centimètre-gramme-second unit), and values in terms of this unit are obtained by dividing those referred to the millimètre and milligramme by 10.

§ 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, and refer to the astronomical day.

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 usually taken is 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 1878 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.:—

June 3 (including a few hours of June 2).

This day being separated, the photographic sheets for the remaining tranquil days (including June 2) 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. These measures being entered in a form having double argument, the vertical argument ranging through the 24 hours of the astronomical day, and the horizontal argument through the days of a calendar month, the means of the numbers standing in the vertical columns give the mean daily value of the element, and the means of the numbers in the horizontal columns the mean monthly value at each hour of the day.

The temperature of the magnetometers was maintained in so great uniformity through each day that the final determination of the diurnal inequalities of horizontal and vertical force should possess great exactitude, although, in regard to vertical force, the magnitude of the temperature co-efficient introduces an element of some uncertainty. It was, however, impossible to maintain similar uniformity of temperature through all the seasons. Following the general principle adopted in recent years, the results are given uncorrected for temperature; corresponding tables of mean temperature being now in all cases added. It is deemed best that, in the yearly volumes, the results should be thus given, as more easily admitting of independent examination. When, as is done from time to time, the results for series of years are collected for general discussion, the temperature corrections are duly taken into account.

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, 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 since the year 1872 an addition has been made, carrying out the principle suggested by C. Chambers, Esq., Superintendent of the Bombay Observatory, that all the variable inequalities should be expressed in terms of Gauss's Magnetic Unit. In applying this principle, I have adopted the reference to metrical units of measure and weight instead of British units; a change from the first proposal, which, I believe, has received the assent of Mr. Chambers. The formulæ for converting the original numbers into the new numbers are the following:—

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

from which,

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

The mean value, for the year, of $\frac{\text{H. F. metrical}}{\text{Former H. F.}} = 1{\cdot}801$; 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 × tan. dip. The factor is therefore 1·801 × tan. 67°. 38′. 7″ = 4·3772.

The values given in Tables VIII. and XIII. 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 0·8600 and 0·9600 (the adopted zeros in the former expressions) by these factors respectively.

For Variation of Declination, expressed in minutes, the metrical factor is 1·801 × sin. 1′ = 0·0005239.

The measures as referred to the metrical unit (millimètre-milligramme-second), are converted into measures on the centimètre-gramme-second (C. G. S.) system by dividing by 10.

In preceding years, allusion has been made to the occasional dislocations of the curve of Vertical Force. No such dislocation has occurred during the year 1878.

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 far 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; its determination 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 in the year 1862; 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 courses 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 coils of the galvanometers of the photographic self-registering apparatus (to be shortly described). They were then led up the electrometer mast to a height exceeding 50 feet, and thence swung across the grounds to a chimney above the Octagon Room. They descended thence, and were led to a terminal board in the Astronomical Computing Room, to which an intermediate galvanometer could be attached for eye-observation of the currents. From this point they were led to the "Battery Basement," and, with other wires, passed under the Park to the Greenwich Railway Station, and thence upon the telegraph poles of the South Eastern Railway. One wire branched off at the junction with the North Kent Railway to Dartford, the other at the junction with the main line of railway to Croydon. At both places from 1865, November 20, their connexion with earth was made by soldering to water-pipes, as at the Royal Observatory. Previously the Dartford and Croydon earth-connexions had been different.

These wires remained in the places described till the end of 1867. It had been discovered in experience that a much smaller separation of the extreme points of earth-connexion would suffice, and it was conjectured that advantage might arise from making the two earth-connexions of each wire on opposite sides of the Observatory and nearly equidistant from it, instead of making one earth-connexion of each within the Observatory grounds. In 1868, therefore, the following wire-courses were substituted. One wire is connected with earth, by a copper plate, at the Lady Well station of the Mid-Kent Railway; it is thence led to the North Kent Junction with the Greenwich Railway, to the Royal Observatory (for communication with the self-registering apparatus), back to the North Kent Junction, then by North Kent Railway and Angerstein Branch to the Angerstein Wharf, where it is connected with earth by a copper plate. The other wire is connected with earth by a copper plate at the North Kent Junction, then passes to the Royal Observatory and back to the Junction, and then along the North Kent Railway to the Morden College end of the Blackheath Tunnel, where it is connected with earth in the same manner. The straight lines connecting the extreme points of the wires cross each other near the middle of their lengths and near the Royal Observatory; the length of the first line is nearly 3 miles, and its azimuth 56° N. to E. (magnetic); that of the second line is nearly $2\frac{1}{2}$ miles, and its azimuth 136°. But, in the circuitous courses above described, the length of the first wire is about $10\frac{3}{8}$ miles, and that of the second $6\frac{1}{4}$ miles. These wires were established and brought into use on 1868, August 20. On 1877, September 19, the route of two of the branches was changed. The Angerstein Wharf and Blackheath branches, instead of passing from Greenwich viâ North Kent Junction, now pass along the new railway line through Greenwich, and thence respectively to Angerstein's Wharf and Blackheath. The length of the section "Lady Well—Angerstein Wharf" is now about $7\frac{1}{2}$ miles, and that of the section "North Kent Junction—Blackheath" about 5 miles. 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; 1875, May 6; and 1877, May 15. These were again identified on 1877, October 29, in consequence of the change of route made on 1877, September 19.

The apparatus for receiving the effects of the galvanic currents consists essentially of two magnetic needles (one for each wire), each suspended by a hair so as to vibrate horizontally within a double galvanic coil, exactly as in an ordinary galvanometer (supposed to be laid horizontally); these coils being respectively in the courses of the two long wires. The number of folds of the wire in each coil was 150 (or 300 in the double coil of each instrument) 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 zero-line for either record is obtained at any time by simply breaking the galvanic communication.

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

The records with the earth connexions 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 $0^{in}\cdot565$ 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 $0^{in}\cdot05$.

The vernier subdivides the scale divisions to $0^{in}\cdot002$; it is moved by a slow-motion screw, and in observation is adjusted so that the ray of light, passing under the back and front of the semi-cylindrical plate carried by the vernier, is a tangent to the highest part of the convex surface of the mercury in the tube.

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

The readings of this barometer, until 1866, August 20^d. 0^h, are considered to be coincident with those of the Royal Society's flint-glass standard barometer. On that day a change was made in the barometer. It had been remarked that the slow-motion-screw at the bottom of the sliding rod (for adjusting the ivory point to the surface of the mercury in the cistern) was partly worn away: and on August 20 the sliding rod was removed from the barometer by Mr. Zambra to remedy this defect. It was restored on 1866, August 30^d. 3^h. Before the removal of the sliding rod, barometric comparisons had been made with a standard barometer the property of Messrs. Murray and Heath, and with two barometers, Negretti and Zambra, Nos. 646 and 647. While the sliding rod of the Greenwich standard was removed, Negretti and Zambra 647 was used for daily observations. After the new equipment of the standard barometer, another series of comparisons with the same barometers was made: from which it was found (the three auxiliaries giving accordant results) that the readings of the barometer, in its new state, required a correction of $-0^{in}\cdot006$. This correction has been applied to every observation commencing with that at 1866, August 30^d. 9^h.

In the spring of the year 1877 an elaborate comparison of the Standard Barometers of the Greenwich and Kew Observatories was made under the direction of the Kew Committee. (See *Proceedings of the Royal Society*, vol. 27, page 76.) Mr. Whipple, Superintendent of the Kew Observatory, brought four barometers to Greenwich on three separate occasions. The result of a large number of comparisons showed that the difference between the Greenwich and Kew standards does not exceed 0·001 inch. In this is of course included the above-mentioned correction of $-0^{in}\cdot006$.

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 *Philosophical Transactions*, 1831; the elevation of the cistern above the brass piece inserted in a stone in the transit-room, now the Astronomer Royal's official 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 corrected for expansion of the brass 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. For immediate use 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 Table XIV. of the "Reduction of Greenwich Meteorological Observations, 1847–1873." These results do not appear in the present volume, but results deduced from the photographic records, as will be further on mentioned (in § 26).

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 having a small horizontal slit, 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 slit the light of a lamp, collected by a cylindrical lens, shines upon the photographic paper. The barometer being supported at its lower end, the height of the column of mercury in its lower tube on which the record depends is very slightly influenced by changes of temperature.

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 discussion of the photographic records of the Barometer from 1854 to 1873 is published in the "Reduction of Greenwich Meteorological Observations, 1847–1873."

§ 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 (astronomical) of the S.W. angle of the south arm of the Magnetic Observatory; in 1863 it was moved to its present position, about 35 feet south (astronomical) of the S.W. 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. In September of the year 1878 some small additions were made, mainly with the object of better protecting the thermometers from the influence of radiation.

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 year 1875.

By the kindness of the Kew Committee of the Royal Society, a new Kew Standard Thermometer, No. 515, was, in the year 1875, supplied to the Royal Observatory; and, commencing with the month of July of that year, all thermometers have been compared with the new 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, in the year 1875, had been recently referred to both standards, were collected for comparison. The details of this comparison will be found in the Introduction to the Magnetical and Meteorological Observations for 1875, page *xlviii.* The result arrived at was that the standards were practically identical.

The Dry-Bulb and Wet-Bulb thermometers are by Horne and Thornthwaite. The readings of the dry-bulb thermometer required corrections as follows :—

	°		°
Below	65	subtract	1·1
Above	65		1·2

For the wet-bulb thermometer the corrections were :—

	° °		°
Below	55	subtract	1·0
Between	55 and 70		0·9
„	70 and 80		0·7
Above	80		0·6

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, at the bent part (near the bulb), through which the piece of glass cannot pass down. The column of mercury in rising is forced through the contraction produced by the piece of glass; but in falling it is unable to pass the glass, and the lower mass of mercury descends into the bulb, leaving a vacant space below the glass, and a portion of the mercury above it. The piece of glass operates as an efficient valve. The thermometer used for maximum temperature of the air was No. 8527; it required a subtractive correction of 0°·9.

The maximum wet-bulb thermometer was No. 1575. Its corrections were as follows :—

	°		°
Below	55	subtract	0·3
Above	55		0·4

The minimum self-registering thermometers by Negretti and Zambra 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°·3. The minimum wet-bulb, No. 3627, required an additive correction of 0°·9.

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 corrections already given. For immediate use the means of the corrected readings of the dry-bulb and wet-bulb thermometers have been taken and converted into mean daily readings, by the application of a correction inferred from Table LI. of the "Reduction of Greenwich Meteorological Observations, 1847–73," but the results do not appear in this volume, the photographic records being now employed, as will be further on explained (in § 26).

§ 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 an open 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 the thermometer employed as wet-bulb 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; those at the decades of degrees, and also those at 32°, 52°, and 72°, being coarser than the others. 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. In consequence of a want of complete uniformity in different parts of the photographed scales, owing to inequality in the bore of the tube in both thermometers, new thermometers were prepared by Messrs. Negretti and Zambra, and mounted on 1878, November 1. By this means the scales on the paper were rendered quite uniform.

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. In March of the year 1878 the time of revolution was further increased to 52 hours.

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. They are published in the "Reduction of Greenwich Meteorological Observations, 1847–1873."

§ 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 21^h, 0^h, 3^h, and 9^h daily; 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 21^h, and, except in summer, also at 9^h.

§ 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 (magnetic) 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 about 1·9 inch, 1·1 inch, 0·9 inch, and 0·5 inch; and the ranges of the scales, as first mounted, were, 43°·0 to 52°·7, 42°·0 to 56°·8, 39°·0 to 57°·5, and 34°·2 to 64°·5.

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

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

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

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

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

In 1877, May, new porcelain scales were applied to these thermometers, by which the facility of reading is much increased.

The ranges of the scales are now,—for No. 1, 46°·0 to 55°·5; for No. 2, 43°·0 to 58°·0; for No. 3, 44°·0 to 62°·0; and for No. 4, 37°·0 to 68°·0.

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 published in the "Reduction of Greenwich Meteorological Observations 1847–1873."

§ 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, inclosed in a wooden trunk, 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 last-mentioned position were taken 1874, May 5.

The wooden trunk, about 5 feet in height, and closed at the bottom, is firmly fixed to the side of the "Royalist;" 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. Sir Edmund Y. W. Henderson, R.E., K.C.B., Commissioner of Metropolitan Police.

The thermometer used 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 require an additive correction of $0^{\circ}\cdot3$.

§ 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. In 1866 the vane-shaft was made to bear upon anti-friction-rollers running in a cup of oil. The 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. The adjustment for azimuth was further verified by observation of stars in the year 1878.

For the pressure of the wind the 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, for explanation of which 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 pencil-spring has since been removed and weight applied as necessary.

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 § 22.

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 $17^{ft.}\ 8^{in.}\cdot 7$. The reading of the dial was taken, and then the arm was made to revolve in the horizontal plane 50 or 100 times, an attendant counting the number of revolutions, and the reading of the dial was again taken. In this manner 1,000 revolutions were made in the direction N.E.S.W.N., and 1,000 revolutions in the direction N.W.S.E.N. In some of the experiments the air was sensibly quiet, and in others there was a little wind; the result was,

For a movement of the instrument through one mile,

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

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

This may be considered as 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 accumulates, 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 at the same time shorten and raise the receiver. The descent and ascent 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 motion of the pencil sensibly straight.

The scale on the printed paper was adjusted by repeatedly filling the water-vessel until it emptied itself. The weight of the quantity necessary to cause one discharge being thus accurately determined, its bulk was ascertained, and this bulk being divided by the area of the surface of the rain receiver gave the corresponding measure of the scale.

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 inches above the ground, and 193 feet 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 slow 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 gauges are sunk about 8 inches in the ground.

Another gauge (the ninth) was established at the end of the year 1875 at the Police ship "Royalist," moored in Blackwall Reach. Its receiving surface is 17 feet above the level of the river. It was brought into use on 1876, January 1.

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

§ 23. *Electrometer.*

Until the year 1877 the electricity of the atmosphere was collected by means of an insulated exploring wire suspended from the top of the Octagon Room to the top of a pole 80 feet high situated close to the north arm of the Magnetic Observatory; thence the wire was led down the pole and brought into connexion with an insulated receiving bar within the Magnetic Observatory, with which various electrometers and other apparatus could be brought into communication at pleasure. The several annual volumes, until the year 1877, contain detailed descriptions of all these arrangements. The action of this apparatus was frequently unsatisfactory, and its use was altogether discontinued in August of the year 1877, in view of the establishment of a Thomson's self-recording electrometer, received from Mr. White, of Glasgow, in the same year. For a very full description of this instrument reference may be made to Sir W. Thomson's "Report on Electrometers and Electrostatic Measurements," contained in the *British Association Report* for the year 1867.

It will be sufficient here to give a general description of the instrument which has been planted in the Upper Magnet Room on the slate slab which carries the suspension piece of the Horizontal Force Magnet. A thin flat needle of aluminium, carrying immediately above it a small light mirror, is suspended, on the bifilar principle, by two wires from an insulated support within a large Leyden jar. A little strong sulphuric acid is placed in the bottom of the jar, and from the lower side of the needle depends a platinum wire, kept stretched by a weight, which connects the needle with the sulphuric acid, that is with the inner coating of the jar. A positive charge of electricity being given to the needle and jar, this charge is easily maintained at a constant potential by means of a small electric machine or replenisher forming part of the instrument, and by which the charge can be either increased or decreased at pleasure. A gauge is provided for the purpose of indicating at any moment the amount of charge. The needle hangs within four insulated quadrants, which may be supposed to be formed by cutting a circular flat brass box into quarters, and then slightly separating them. The opposite quadrants are placed in metallic connexion.

The electricity of the atmosphere is collected by means of a water-dropping apparatus. For this purpose a rectangular cistern of copper, capable of holding above 30 gallons of water, is placed near the ceiling on the west side of the south arm of the Upper Magnet Room. The cistern was in the first instance insulated by means of plain ebonite pillars, but this was found not to be sufficiently satisfactory, and in the beginning of the year 1879 pillars of glass, each one encircled and nearly completely inclosed by a glass vessel containing sulphuric acid, were substituted with excellent effect. A pipe passes out from the cistern through the south face of the building, and extends about six feet into the atmosphere, the nozzle from which the water flows being about ten feet above the ground. The water in the cistern is filled up two or three times each day, so that a good and nearly constant water pressure is maintained: it passes from the end of the pipe into the atmosphere through a very small hole, and immediately breaks into drops. A wire leads from the cistern to one of the pairs of electrometer-quadrants already described, the other pair of quadrants being placed in connexion with earth. The water breaking into drops brings the cistern into the same electrical potential as that point of the atmosphere, and this potential is communicated to the pair of quadrants in connexion therewith. The varying potential of the atmosphere thus influences the motions of the within-contained needle, causing it to be deflected from zero in one direction or the other, according as the atmospheric potential is greater or less than that of the earth, that is according as it is positive or negative as respects that of the earth.

The small mirror carried by the needle, as before described, is used for the purpose of obtaining photographic record of the motions of the needle. The light of a gas-lamp falling through a slit upon the mirror is thence reflected, and by means of a plano-convex cylindrical lens is brought to a focus at the surface of a cylinder turned by clock-work, and on which is placed a properly sensitized sheet of paper. One sheet contains the record for 48 hours (this was changed in the year 1879, as will be explained in the succeeding volume). The motion of the beam of light being horizontal, the axis of the registering cylinder is also horizontal. A second fixed mirror, by means of the same gas-lamp, causes an invariable reference line to be traced round the cylinder. The actual zero is frequently determined by cutting off communication with the cistern and placing the pairs of quadrants in metallic connexion by means of a small commutator. At each hour the driving-clock shuts off the light from the cylindrical lens for a few minutes, thereby interrupting the trace and giving a time scale. An assistant also occasionally interrupts the light at arbitrary times, as described at page *xvii*, for the other photographic registers.

The instrument was brought into a state in which eye observations could be regularly made on 1878, July 12, and the arrangements for photographic registration were complete in August 1878. On September 16 the insulation of the electrometer failed, but on October 4 (after cleaning the instrument) insulation was restored. On October 14 the insulation of the cistern failed, and no further useful observations were made until early in the year 1879, on establishment of the sulphuric acid insulators, as before mentioned. The records of 1878 can only be considered as experimental, and although indications of the character of the electricity have been given as far as possible in the column "Electricity" in the "Daily Results of Meteorological Observations," the records are probably not worth further attention.

§ 24. *Instrument for the Registration of Sunshine.*

The instrument with which the record of duration of sunshine is obtained is one contrived by J. F. Campbell, Esq., and kindly placed by him at the service of the Royal Observatory. It consists of a very accurately formed sphere of glass, nearly 4 inches in diameter, supported concentrically within a well turned hemispherical metal bowl in such a manner that the image of the sun, formed when the sun shines, falls always on the concave surface of the bowl. A strip of some suitable material being fixed in the bowl, the sun, when shining, burns away the material at the points at which the image successively falls, by which means the record of periods of sunshine is obtained. The strip is removed after sunset, and a new one fixed ready for the following day. The material used is blackened millboard. The register is frequently much interrupted, continuous sunshine through a whole day being a comparatively rare circumstance. The place of the meridian is marked on the strip before removing it from the bowl. A series of time scales, suitable for different periods of the year, having been prepared, the proper scale is selected and placed against the record, which is then easily transferred to a sheet of paper specially ruled with equal vertical spaces to represent hours, each sheet containing the record for one calendar month. The daily sums and sums during each hour (reckoning from apparent noon) through the month are thus readily formed. The instrument gives fairly the duration of sunshine, but (usually) no register is obtained at altitudes of less than 5°. Indeed, on fine days the register, which usually has a certain breadth, tapers off in the early morning and late evening hours to a fine point, thus showing the extent to which registration under the best circumstances is effective. The recorded durations are to be understood as indicating the amount of *bright* sunshine, no register being obtained when the sun shines faintly through fog or cloud. In January of the year 1878 degrees of azimuth and altitude were engraved on the metal bowl to facilitate adjustment of the recording strip. The instrument is placed on the platform above the Magnetic House.

§ 25. *Ozonometer.*

The Ozonometer (furnished by Messrs. Horne and Thornthwaite) is fixed on the south-west corner of the roof of the Photographic Thermometer shed, at a height of about 10 feet from the ground. The box in which the papers are exposed is of wood: it is about 8 inches square, and blackened inside, and so constructed that there is free circulation of air through the box, without exposure of the paper to light. The papers are exposed and collected at 21^h, 3^h, and 9^h, and the degree of tint produced is compared with a scale of graduated tints, numbered from 0 to 10. The value of ozone for the civil day is determined by taking the degree of tint obtained at each hour of collection as proportional to the period of exposure. Thus to form the values for any given civil day, three-fourths of the value registered at 21^h, the values registered at 3^h and 9^h, and one-fourth of that registered at the following 21^h, are added together, the resulting sum (which appears in the tables of "Daily Results") being taken as the value referring to the civil day. The mean of the 21^h, 3^h, and 9^h values, as observed, are also given for each month in the foot notes.

§ 26. *Explanation of the Tables of Results of the Meteorological Observations.*

The results contained in this section refer generally to the civil day commencing at midnight.

All results throughout the section, so far as relates to the Barometer, and the Temperature of the Air and Evaporation, and to deductions made therefrom (excepting observations of maximum and minimum temperature), are founded upon the photographic records. The form into which the readings from the photographic sheets were first entered is one having a double argument, the horizontal argument ranging through the 24 hours of the civil day, and the vertical argument through the days of a calendar month. The means of the numbers standing in the vertical columns being then taken, we obtain the mean monthly photographic values of the particular element at each hour of the day, the means of the numbers in the horizontal columns giving the mean daily value. To correct the values for instrumental error it is to be remarked that the standard barometer and the standard dry-bulb and wet-bulb thermometers of the Observatory are read by eye at 21^h, 0^h, 3^h, and 9^h of every day, except on Sundays and a few other days. The comparison of these readings (corrected for temperature in the case of the barometer) with the corresponding readings from the photographs, gives the correction applicable to the photographic readings at those hours. The mean correction at each of these hours being taken through a month, corrections are interpolated for the intermediate hours, which being applied to the corresponding means of the photographic readings, the true value at each hour is obtained. The mean of the twenty-four hourly corrections in each month is adopted as the correction applicable to each mean daily value in the month. Thus mean hourly and mean daily values for the several elements are in each month obtained.

Considering the construction of the photographic barometer (already described), and having regard to the circumstance that the basement temperature is maintained so nearly uniform, the effect produced on the photographic record by changes of temperature is very small, so that the corrections can, without sensible error, be grouped by months in the way described. As regards the dry-bulb and wet-bulb thermometers, the process of correction is equivalent to giving the photographic indications in terms of the standard dry-bulb and wet-bulb thermometers exposed on the free stand.

The mean daily values of the barometer, and of the dry-bulb and wet-bulb thermometers, giving air and evaporation temperatures, found in the way described, are those inserted in the "Daily Results of the Meteorological Observations." The mean hourly values are given in following tables (pages (lvi) and (lvii)).

From the mean daily temperatures of the air and of evaporation are deduced, by use of Glaisher's Hygrometrical Tables, the mean daily temperature of the dew-point and degree of humidity. The factors used for calculating the dew-point given in these tables were 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.

The following table exhibits the result of the entire comparison.

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		

In the same way the mean hourly values of the dew-point and degree of humidity in each month (pages (lvii) and (lviii)) have been calculated from the corresponding mean hourly values of air and evaporation temperatures (pages (lvi) and (lvii)).

The excess of the mean temperature of the air on each day above the average of 20 years, given in the "Daily Results," is found by comparing the numbers contained in column 6 with a table of average daily temperatures found by smoothing the numbers given in Table LXXVII. of the lately published "Reduction of Greenwich Meteorological Observations, 1847–1873," which are similarly deduced from photographic records. The smoothed numbers are given in the following table.

SMOOTHED TABLE of the MEAN TEMPERATURE of the AIR as deduced from TWENTY-FOUR HOURLY READINGS on each Day for every Day of the Year as obtained from the PHOTOGRAPHIC RECORDS for the Period 1849–1868.

Day of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	°	°	°	°	°	°	°	°	°	°	°	°
1	38.1	40.5	40.3	45.3	48.7	57.5	61.6	62.6	60.1	54.7	47.0	41.5
2	37.9	40.6	40.4	45.7	48.9	57.7	61.5	62.7	60.0	54.4	46.7	41.8
3	37.8	40.7	40.5	46.1	49.1	57.9	61.4	62.7	59.8	54.0	46.4	42.1
4	37.7	40.7	40.5	46.4	49.4	58.1	61.4	62.7	59.7	53.7	46.0	42.4
5	37.6	40.6	40.5	46.6	49.7	58.2	61.5	62.7	59.5	53.4	45.6	42.6
6	37.6	40.4	40.5	46.7	50.0	58.3	61.7	62.7	59.3	53.0	45.2	42.7
7	37.6	40.2	40.6	46.8	50.3	58.4	61.9	62.7	59.0	52.7	44.7	42.8
8	37.7	39.9	40.6	46.8	50.6	58.5	62.2	62.7	58.8	52.5	44.3	42.8
9	37.7	39.6	40.7	46.9	50.8	58.5	62.5	62.7	58.5	52.3	43.8	42.8
10	37.8	39.3	40.7	46.9	51.1	58.6	62.7	62.7	58.3	52.1	43.4	42.7
11	37.9	39.1	40.8	47.0	51.4	58.7	62.9	62.7	58.1	51.9	43.0	42.5
12	38.1	38.9	40.8	47.1	51.8	58.8	63.1	62.6	58.0	51.7	42.6	42.2
13	38.2	38.8	40.9	47.2	52.1	58.9	63.3	62.5	57.8	51.6	42.3	41.8
14	38.3	38.7	41.0	47.4	52.5	59.1	63.4	62.4	57.6	51.4	42.0	41.5
15	38.4	38.7	41.1	47.5	52.9	59.3	63.4	62.3	57.4	51.3	41.8	41.1
16	38.5	38.8	41.2	47.6	53.3	59.5	63.5	62.1	57.3	51.2	41.6	40.8
17	38.6	38.9	41.3	47.8	53.7	59.7	63.5	61.9	57.1	51.1	41.5	40.5
18	38.8	39.0	41.4	47.9	54.1	59.9	63.4	61.8	56.9	51.0	41.5	40.2
19	38.9	39.2	41.4	48.0	54.4	60.2	63.3	61.6	56.8	50.8	41.4	40.0
20	39.1	39.3	41.5	48.1	54.7	60.5	63.2	61.4	56.6	50.6	41.3	39.8
21	39.3	39.5	41.6	48.2	55.0	60.8	63.0	61.3	56.4	50.4	41.2	39.6
22	39.5	39.6	41.7	48.2	55.3	61.1	62.9	61.3	56.2	50.1	41.1	39.4
23	39.6	39.7	41.8	48.3	55.5	61.4	62.8	61.2	56.1	49.7	41.0	39.3
24	39.7	39.8	42.0	48.3	55.7	61.7	62.7	61.1	55.9	49.4	41.0	39.3
25	39.8	39.9	42.3	48.4	55.9	61.9	62.7	61.0	55.8	49.1	40.9	39.2
26	39.9	40.0	42.6	48.4	56.1	62.0	62.7	60.9	55.7	48.8	40.8	39.1
27	40.0	40.1	43.0	48.4	56.3	62.0	62.6	60.8	55.5	48.5	40.8	39.0
28	40.1	40.2	43.4	48.5	56.5	61.9	62.6	60.7	55.4	48.2	40.9	38.8
29	40.2	..	43.8	48.5	56.8	61.8	62.6	60.6	55.2	47.9	41.0	38.7
30	40.3	..	44.3	48.6	57.0	61.7	62.6	60.4	54.9	47.6	41.2	38.5
31	40.4	..	44.8	..	57.3	..	62.6	60.3	..	47.3	..	38.3
Means	38.7	39.7	41.5	47.5	53.1	59.8	62.6	61.9	57.5	51.0	42.7	40.8

The mean of the twelve monthly values is 49°·7.

The daily register of rain contained in column 20 is that recorded by the gauge No. 7, whose receiving surface is 5 inches above the ground. This gauge is usually read at 21^h and 9^h. The continuous record of Osler's self-registering gauge shows whether the amounts measured at 21^h are to be placed to the same, or to the preceding civil day; and in cases in which rain fell both before and after midnight, also gives the means of ascertaining the proper proportion of the 21^h amount which should be placed to each civil day. The number of days of rain given in the foot notes and in the abstract tables, pages (lv) and (lxvii), is formed from the records of this gauge. In this numeration only those days are counted on which the fall amounted to or exceeded $0^{in}\cdot005$.

For understanding the divisions of time under the heads of Electricity and Clouds 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 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 observations of Electricity during the year 1878 made with Thomson's Electrometer (described in § 23) are few and imperfect, and the indications have been included in one column; in this case the colons subdivide the whole period of 24 hours (midnight to midnight).

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:—

N	denotes	*negative*	w	denotes	*weak*
P	...	*positive*	s	...	*strong*
m	...	*moderate*	v	...	*variable*

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*	tk-f	denotes	*thick fog*
ci	...	*cirrus*	fr	...	*frost*
ci-cu	...	*cirro-cumulus*	ho-fr	...	*hoar frost*
ci-s	...	*cirro-stratus*	g	...	*gale*
cu	...	*cumulus*	hy-g	...	*heavy gale*
cu-s	...	*cumulo-stratus*	glm	...	*gloom*
d	...	*dew*	gt-glm	...	*great gloom*
hy-d	...	*heavy dew*	h	...	*haze*
f	...	*fog*	slt-h	...	*slight haze*
slt-f	...	*slight fog*	hl	...	*hail*

l	denotes	*lightning*	fq-shs	denotes	*frequent showers*
li-cl	...	*light clouds*	hy-shs	...	*heavy showers*
lu-co	...	*lunar corona*	fq-hy-shs	...	*frequent heavy showers*
lu-ha	...	*lunar halo*	oc-hy-shs	...	*occasional heavy showers*
m	...	*mist*	li-shs	...	*light showers*
slt-m	...	*slight mist*	oc-shs	...	*occasional showers*
n	...	*nimbus*	s	...	*stratus*
p-cl	...	*partially cloudy*	sc	...	*scud*
r	...	*rain*	li-sc	...	*light scud*
c-r	...	*continued rain*	sl	...	*sleet*
fr-r	...	*frozen rain*	sn	...	*snow*
fq-r	...	*frequent rain*	oc-sn	...	*occasional snow*
hy-r	...	*heavy rain*	slt-sn	...	*slight snow*
c-hy-r	...	*continued heavy rain*	so-ha	...	*solar halo*
m-r	...	*misty rain*	sq	...	*squall*
fq-m-r	...	*frequent misty rain*	sqs	...	*squalls*
oc-m-r	...	*occasional misty rain*	fq-sqs	...	*frequent squalls*
oc-r	...	*occasional rain*	hy-sqs	...	*heavy squalls*
sh-r	...	*shower of rain*	fq-hy-sqs	...	*frequent heavy squalls*
shs-r	...	*showers of rain*	oc-sqs	...	*occasional squalls*
slt-r	...	*slight rain*	t	...	*thunder*
oc-slt-r	...	*occasional slight rain*	t-sm	...	*thunder storm*
th-r	...	*thin rain*	th-cl	...	*thin clouds*
fq-th-r	...	*frequent thin rain*	v	...	*variable*
oc-th-r	...	*occasional thin rain*	vv	...	*very variable*
hy-sh	...	*heavy shower*	w	...	*wind*
slt-sh	...	*slight shower*	st-w	...	*strong wind*

No particular explanation of the anemometric results seems necessary. It may be understood generally that the greatest pressures usually occur in gusts of short duration.

The remaining columns in the tables of "Daily Results" seem to require no special remark; all necessary explanation regarding the results therein contained will be found in the notes at the foot of the left-hand page, or in the descriptions of the several instruments given in preceding sections.

In regard to the comparisons of the extremes and means, &c. of meteorological elements with average values contained in the foot notes, it may be mentioned that the photographic barometric results are compared with the corresponding barometric results, 1854–1873, and the photographic thermometric results and deductions therefrom with the corresponding thermometric results, 1849–1868 (see "Reduction of Greenwich Meteorological Observations 1847–1873"). Other deductions, from eye observations, are compared with averages for the period 1841–1877.

The tables of Meteorological Abstracts, following the Tables of "Daily Results," require in general no special explanation. The mean amount of cloud, page (lv), is the mean found from observations made at 21^h, 0^h, 3^h, and 9^h of each civil day.

It may be pointed out that the monthly means for Barometer, and Temperature of Air and Evaporation, contained in the tables referring to diurnal inequality, pages (lvi) and (lvii), do not, in some cases, agree with the true monthly means given in the "Daily Results," pages (xxviii) to (l), and in the table on page (lv), in consequence of occasional failure or interruption of the photographic process. They are, however, the proper means to be used in connexion with the numbers standing in each case immediately above them, for formation of the actual diurnal inequality. The "Number of Days employed" indicates the months in which any days are thus deficient.

§ 27. *Observations of Luminous Meteors.*

In arranging for the observations of meteors, the directions circulated by the Committee of the British Association have received careful attention. On the nights specially mentioned in the directions systematic watch has been kept whenever the weather was sufficiently favourable. 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 and November periods for observing through the night, two observers being usually charged with the observations at these times, so that observations of all meteors that should present themselves might be secured.

The observers in the year 1878 were Mr. Ellis, Mr. Nash, Mr. Greengrass, Mr. Hugo, Mr. Simmons, and Mr. A. Pead. Their observations are distinguished by the initials E., N., G., H., S., and P., respectively.

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

The paper used in 1878 was that known as Whatman's royal, a paper not specially prepared 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 bromo-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 bromo-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 minims 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 or more 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 devoloped, 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 either ironed, or placed between sheets of blotting-paper and pressed.

§ 29. *Personal Establishment.*

The personal establishment during the year 1878 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.
1880, June 7.

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

MAGNETICAL OBSERVATIONS.

1878.

ROYAL OBSERVATORY, GREENWICH.

REDUCTION

OF THE

MAGNETIC OBSERVATIONS.

1878.

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.

1878.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	18°	18°	18°	18°	18°	18°	18°	18°	18°	18°	18°	18°
d	′	′	′	′	′	′	′	′	′	′	′	′
1	54·8	54·0	51·5	51·5	51·1	50·4	48·0	48·5	47·6	46·3	45·5	45·8
2	54·7	53·4	52·2	53·8	50·5	51·8	48·8	49·0	47·0	46·2	45·5	44·2
3	54·2	53·4	51·8	53·2	51·3	..	49·3	47·7	47·4	46·1	45·9	..
4	54·2	53·6	51·7	51·8	51·1	49·5	49·7	48·2	47·0	46·5	46·2	44·5
5	54·7	54·0	52·4	52·3	51·3	49·8	48·5	47·7	46·4	46·0	45·9	44·8
6	54·1	53·8	52·1	51·2	50·3	50·2	48·6	47·5	46·9	45·0	45·6	45·2
7	54·1	54·1	52·3	51·9	50·2	50·5	49·3	47·9	46·5	46·3	45·7	44·8
8	..	53·4	52·2	51·5	50·6	49·9	48·8	49·0	47·4	45·9	46·0	45·3
9	54·7	53·4	52·5	51·6	49·9	50·3	48·6	48·2	46·6	45·8	45·4	45·5
10	54·6	53·4	52·1	51·6	49·9	50·3	49·3	47·4	47·1	46·6	45·5	45·1
11	54·0	53·6	52·8	51·7	50·5	50·7	48·8	47·2	47·0	47·1	45·5	45·2
12	54·1	53·6	52·7	51·4	49·8	50·1	48·6	47·2	46·7	46·8	45·6	46·0
13	53·8	53·0	52·5	51·3	50·4	49·5	49·0	47·8	47·4	46·7	45·8	45·6
14	53·3	53·0	52·5	51·1	47·4	50·0	48·6	48·3	47·3	46·9	45·2	44·9
15	53·5	53·3	52·7	51·3	50·3	50·2	48·8	47·6	47·1	46·1	45·7	45·0
16	53·3	53·1	52·8	50·4	49·3	49·9	48·3	48·0	48·2	46·1	45·4	45·1
17	53·4	53·3	52·2	50·5	49·8	50·0	48·4	48·2	47·0	46·0	45·7	45·1
18	53·4	53·5	51·7	50·9	49·5	50·4	48·4	47·6	46·4	47·4	45·5	45·0
19	54·1	52·2	51·1	49·8	49·8	49·8	47·9	47·6	46·9	45·8	45·1	44·8
20	53·9	52·6	51·4	51·4	51·2	50·0	47·8	48·5	46·7	45·7	45·1	45·0
21	53·2	52·9	51·7	51·6	51·6	50·5	47·7	48·1	46·8	45·5	45·3	45·1
22	53·5	53·0	51·4	51·6	50·3	50·0	47·5	47·8	46·8	46·6	46·0	45·3
23	53·5	52·8	51·8	51·0	49·7	50·4	48·1	47·0	47·2	45·4	45·6	45·0
24	54·2	53·1	51·7	50·7	51·9	50·4	47·7	47·9	46·8	46·0	44·7	45·5
25	54·3	53·3	50·8	51·2	52·2	50·6	48·0	47·6	47·1	46·2	45·1	44·8
26	54·6	52·7	51·9	51·1	51·5	50·0	47·5	48·6	47·4	46·4	45·1	43·9
27	54·2	53·0	51·4	50·8	50·7	50·1	48·0	48·0	46·6	46·3	44·9	43·8
28	53·8	52·3	51·2	51·2	50·5	51·2	..	47·7	47·1	46·9	45·2	44·2
29	53·6		51·4	51·0	50·8	50·2	47·7	47·7	46·5	46·9	45·7	43·5
30	53·2		51·2	50·8	51·2	49·4	47·5	47·5	46·8	46·4	47·2	44·2
31	53·3		51·1		50·4		48·6	46·8		46·6		41·4

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.

1878.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
	18°	18°	18°	18°	18°	18°	18°	18°	18°	18°	18°	18°
h	′	′	′	′	′	′	′	′	′	′	′	′
0	56·2	56·2	55·6	55·3	54·1	54·3	52·3	53·0	52·3	49·8	47·7	46·9
1	56·3	56·7	56·6	56·8	54·8	55·2	53·5	53·7	52·4	49·9	47·6	46·9
2	55·4	56·1	56·1	56·9	54·8	55·6	53·3	53·0	51·3	49·4	47·0	46·0
3	54·3	54·8	54·7	55·5	53·9	54·9	52·3	51·7	49·4	48·0	46·4	45·4
4	54·3	53·7	52·9	54·2	52·9	53·3	51·1	50·0	48·4	46·8	46·3	45·2
5	54·2	53·2	51·9	53·0	52·0	51·7	49·8	48·6	47·7	46·5	46·1	44·8
6	53·9	53·0	51·6	51·7	51·3	50·7	49·3	47·7	47·4	46·2	45·4	44·5
7	53·5	52·7	51·3	50·8	50·6	50·2	48·8	47·6	46·9	45·7	45·0	43·8
8	53·1	51·9	51·0	50·6	50·1	49·9	48·5	47·3	46·1	45·5	44·6	43·2
9	52·7	51·7	51·0	50·5	49·7	49·9	48·1	46·9	45·6	45·2	44·4	43·1
10	52·9	51·8	50·8	50·0	49·5	49·7	47·9	46·8	45·3	45·0	44·0	43·1
11	52·9	52·0	50·7	49·9	49·5	49·5	47·7	46·7	45·6	44·9	43·8	43·4
12	53·1	52·3	50·8	50·4	49·8	49·6	47·5	46·7	45·7	45·1	44·2	43·8
13	53·1	52·7	51·1	50·7	49·5	49·4	47·3	46·5	45·7	45·5	44·6	44·2
14	53·5	52·9	51·1	50·5	49·5	49·2	47·4	46·3	45·8	45·5	45·1	44·6
15	53·6	52·7	51·2	50·3	49·3	48·9	47·1	46·1	45·4	45·4	45·2	44·8
16	53·5	52·7	51·2	49·9	49·0	48·3	46·5	46·0	45·5	45·5	45·4	44·7
17	53·2	52·6	51·0	49·7	48·2	47·1	45·6	45·4	45·4	45·6	45·5	44·6
18	53·3	52·5	50·7	49·1	47·5	46·1	45·3	44·8	44·9	45·3	45·4	44·7
19	53·5	52·4	50·2	48·3	47·2	45·9	44·9	44·4	44·4	45·1	45·4	44·7
20	53·6	52·3	49·4	47·6	47·3	46·1	44·8	44·6	44·2	44·7	45·3	44·7
21	54·0	52·6	49·5	48·3	48·1	47·5	45·3	45·9	45·3	45·1	45·3	45·3
22	54·7	53·5	51·2	50·3	50·1	49·7	47·1	48·2	47·3	46·6	46·2	46·0
23	55·5	54·9	53·5	52·9	52·6	52·4	49·9	50·8	49·9	48·5	47·5	46·5

TABLE III.

1878. 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 Diurnal Ranges of the Western Declination, as deduced from the Twenty-four Hourly Measures of each day.
	° ′		′
January	18. 53·9	0·02824	5·1
February	18. 53·2	·02787	6·3
March	18. 51·9	·02719	8·2
April	18. 51·4	·02693	10·0
May	18. 50·5	·02646	8·8
June	18. 50·2	·02630	10·4
July	18. 48·4	·02536	9·4
August	18. 47·9	·02509	9·9
September	18. 47·0	·02462	9·2
October	18. 46·3	·02426	6·5
November	18. 45·6	·02389	5·2
December	18. 44·8	·02347	5·1
Mean	18. 49·3	0·02581	7·8

The unit adopted in column 3 is the Millimètre-Milligramme-Second Unit. To express the forces on the Centimètre-Gramme-Second (C.G.S.) system, the numbers must be divided by 10, equivalent to shifting the decimal point one step towards the left.

TABLE IV.—MEAN HORIZONTAL MAGNETIC FORCE, expressed in terms of the Mean Horizontal Force for the Year, and diminished by a Constant (0·86000 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.

1878.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d												
1	0·12646	0·12632	0·12695	0·12658	0·12625	0·12630	0·12549	0·12540	0·12527	0·12523	0·12567	0·12589
2	·12674	·12672	·12635	·12567	·12601	·12610	·12575	·12488	·12515	·12600	·12553	·12620
3	·12730	·12677	·12671	·12588	·12585	..	·12579	·12571	·12568	·12555	·12561	..
4	·12700	·12710	·12630	·12626	·12613	·12441	·12552	·12509	·12528	·12518	·12419	·12744
5	·12633	·12669	·12658	·12614	·12574	·12545	·12598	·12494	·12567	·12540	·12477	·12674
6	·12650	·12668	·12647	·12622	·12600	·12528	·12618	·12470	·12553	·12558	·12492	·12659
7	·12675	·12607	·12643	·12650	·12683	·12598	·12514	·12461	·12545	·12534	·12497	·12674
8	..	·12677	·12610	·12673	·12662	·12615	·12509	·12414	·12535	·12529	·12476	·12695
9	·12652	·12657	·12648	·12682	·12677	·12611	·12530	·12399	·12536	·12568	·12508	·12700
10	·12633	·12646	·12648	·12665	·12689	·12600	·12511	·12509	·12544	·12548	·12520	·12707
11	·12635	·12688	·12628	·12703	·12680	·12600	·12528	·12505	·12595	·12525	·12525	·12720
12	·12629	·12668	·12627	·12692	·12650	·12613	·12547	·12536	·12534	·12567	·12522	·12635
13	·12625	·12676	·12575	·12708	·12668	·12625	·12485	·12548	·12556	·12560	·12552	·12657
14	·12645	·12665	·12573	·12710	·12515	·12603	·12489	·12512	·12536	·12552	·12612	·12712
15	·12718	·12660	·12560	·12741	·12545	·12607	·12521	·12513	·12557	·12561	·12698	·12725
16	·12752	·12706	·12580	·12610	·12658	·12655	·12563	·12537	·12543	·12567	·12676	·12734
17	·12725	·12705	·12577	·12572	·12643	·12671	·12470	·12515	·12619	·12602	·12685	·12755
18	·12693	·12627	·12636	·12558	·12596	·12667	·12492	·12552	·12543	·12504	·12695	·12725
19	·12696	·12614	·12692	·12570	·12584	·12589	·12453	·12508	·12564	·12504	·12646	·12728
20	·12695	·12606	·12658	·12605	·12610	·12523	·12464	·12473	·12568	·12515	·12668	·12718
21	·12786	·12645	·12622	·12578	·12601	·12533	·12562	·12470	·12567	·12547	·12682	·12732
22	·12773	·12651	·12650	·12600	·12604	·12525	·12561	·12503	·12606	·12524	·12659	·12767
23	·12668	·12614	·12665	·12603	·12603	·12498	·12574	·12555	·12547	·12518	·12673	·12756
24	·12526	·12620	·12665	·12595	·12581	·12452	·12564	·12536	·12610	·12575	·12733	·12764
25	·12594	·12602	·12636	·12547	·12560	·12453	·12580	·12540	·12592	·12574	·12715	·12798
26	·12618	·12553	·12608	·12555	·12602	·12487	·12572	·12543	·12494	·12582	·12729	·12817
27	·12642	·12655	·12582	·12536	·12584	·12516	·12537	·12543	·12562	·12589	·12747	·12777
28	·12655	·12649	·12643	·12537	·12614	·12462	..	·12535	·12579	·12575	·12791	·12759
29	·12635		·12641	·12584	·12648	·12512	·12522	·12557	·12595	·12612	·12695	·12760
30	·12643		·12634	·12574	·12622	·12578	·12532	·12558	·12516	·12655	·12693	·12777
31	·12660		·12619		·12592		·12528	·12529		·12595		·12652

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.

1878.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	62·3	61·8	63·2	61·3	66·3	61·8	66·4	67·4	66·9	64·4	62·4	61·1
2	62·7	62·5	62·6	62·4	65·8	63·5	64·5	68·4	66·4	63·9	62·0	61·4
3	62·0	61·9	62·1	62·3	64·6	..	64·3	67·8	66·8	65·3	62·0	..
4	61·8	61·0	62·6	62·4	64·3	65·6	65·9	69·8	68·5	65·7	62·2	57·3
5	63·4	61·0	62·2	61·9	64·8	63·8	67·5	70·8	69·5	67·2	62·4	60·6
6	61·7	61·1	62·7	62·7	66·2	65·0	68·5	71·3	68·6	68·0	62·3	60·5
7	60·8	59·9	62·3	61·5	65·2	66·6	69·2	70·9	68·9	68·0	62·8	60·6
8	..	59·6	61·1	61·0	63·1	67·1	68·6	70·6	68·8	67·2	62·4	60·0
9	61·2	60·4	61·5	62·0	64·2	65·2	68·2	70·9	67·8	66·9	62·4	59·8
10	60·5	62·2	61·5	62·7	65·2	64·5	67·2	69·9	66·3	66·0	63·3	59·4
11	59·4	61·3	62·2	62·6	65·0	64·3	66·6	69·2	66·8	63·2	61·9	59·9
12	60·0	60·9	62·1	62·7	65·2	65·0	66·9	68·7	65·8	62·4	61·5	59·9
13	62·1	62·6	61·5	63·3	64·4	64·4	67·6	68·8	64·6	62·9	62·6	58·8
14	63·0	62·8	60·9	63·1	64·0	63·0	67·6	69·8	65·4	63·8	63·0	57·2
15	62·5	61·5	60·6	63·3	64·4	63·0	67·9	69·2	65·5	65·1	62·8	58·1
16	61·3	62·1	60·5	63·3	64·9	63·4	69·1	67·9	64·6	65·4	62·0	58·4
17	60·8	62·9	60·9	62·6	66·1	64·1	70·6	67·5	66·4	65·2	63·0	57·6
18	60·9	61·8	62·2	63·6	66·1	64·5	72·5	68·8	65·3	64·8	63·2	58·2
19	61·1	61·5	62·7	64·0	64·3	64·4	72·6	68·7	63·1	65·3	63·0	58·5
20	62·9	61·8	62·3	64·1	62·8	65·4	72·3	67·2	62·9	65·6	62·4	58·5
21	63·1	62·7	61·9	63·7	62·3	66·7	72·1	67·6	62·3	66·4	62·2	58·0
22	62·3	63·0	61·0	63·3	63·1	68·1	71·4	68·9	62·7	64·2	62·3	57·5
23	60·6	63·1	60·2	63·8	64·0	69·6	71·0	69·3	62·6	62·8	61·9	56·4
24	61·0	61·9	59·7	64·0	63·9	71·2	70·2	68·6	62·4	62·8	62·9	55·2
25	59·9	62·3	60·8	63·5	64·0	72·5	68·5	68·2	63·6	62·4	63·8	55·4
26	60·3	62·0	61·6	63·2	64·6	73·1	69·3	68·8	63·6	62·3	62·5	58·2
27	60·7	62·4	61·9	63·4	64·9	73·5	69·0	69·1	64·8	60·9	62·2	59·8
28	60·7	63·3	61·0	63·1	65·2	72·3	..	69·3	65·9	61·1	61·6	61·1
29	61·3		60·2	64·7	64·3	69·8	65·9	69·2	65·4	60·0	61·4	61·5
30	61·5		60·8	65·8	63·9	68·1	66·9	68·4	65·5	58·5	61·1	62·3
31	61·2		61·6		64·5		67·2	67.7		62·0		62·1

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 (0·86000 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.

1878.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h												
0	0·12669	0·12632	0·12594	0·12541	0·12562	0·12490	0·12465	0·12475	0·12501	0·12534	0·12610	0·12740
1	·12688	·12660	·12616	·12579	·12577	·12514	·12488	·12495	·12527	·12557	·12629	·12750
2	·12699	·12667	·12631	·12610	·12609	·12557	·12504	·12502	·12554	·12566	·12627	·12743
3	·12694	·12666	·12637	·12626	·12625	·12564	·12527	·12506	·12568	·12558	·12622	·12736
4	·12683	·12659	·12638	·12638	·12644	·12569	·12529	·12499	·12568	·12559	·12617	·12722
5	·12674	·12645	·12639	·12649	·12650	·12588	·12536	·12502	·12560	·12565	·12625	·12724
6	·12669	·12642	·12644	·12661	·12658	·12609	·12548	·12522	·12572	·12575	·12634	·12711
7	·12666	·12650	·12648	·12656	·12662	·12627	·12565	·12535	·12577	·12572	·12626	·12704
8	·12657	·12651	·12653	·12656	·12653	·12626	·12571	·12544	·12586	·12575	·12625	·12699
9	·12658	·12650	·12653	·12657	·12648	·12609	·12569	·12552	·12591	·12577	·12617	·12696
10	·12654	·12646	·12652	·12658	·12638	·12601	·12572	·12549	·12591	·12578	·12616	·12697
11	·12655	·12649	·12657	·12654	·12635	·12592	·12573	·12548	·12599	·12578	·12618	·12703
12	·12660	·12650	·12649	·12650	·12637	·12584	·12568	·12551	·12597	·12571	·12611	·12698
13	·12654	·12651	·12642	·12644	·12625	·12582	·12563	·12548	·12591	·12570	·12604	·12690
14	·12655	·12653	·12642	·12637	·12625	·12584	·12563	·12546	·12591	·12567	·12607	·12701
15	·12655	·12650	·12644	·12631	·12626	·12587	·12562	·12545	·12586	·12566	·12615	·12709
16	·12667	·12656	·12648	·12626	·12622	·12593	·12561	·12546	·12576	·12569	·12624	·12720
17	·12681	·12666	·12648	·12628	·12614	·12592	·12565	·12537	·12577	·12571	·12635	·12735
18	·12685	·12671	·12650	·12629	·12606	·12576	·12565	·12527	·12571	·12578	·12635	·12738
19	·12679	·12668	·12642	·12615	·12598	·12541	·12544	·12505	·12554	·12567	·12626	·12735
20	·12663	·12658	·12619	·12592	·12580	·12498	·12508	·12471	·12522	·12535	·12608	·12730
21	·12653	·12638	·12579	·12551	·12566	·12482	·12467	·12442	·12481	·12501	·12583	·12717
22	·12641	·12620	·12554	·12519	·12553	·12475	·12452	·12436	·12455	·12487	·12571	·12710
23	·12645	·12615	·12562	·12513	·12553	·12487	·12451	·12443	·12466	·12497	·12585	·12717

TABLE VII.—MONTHLY MEANS of READINGS of the THERMOMETER placed on the box inclosing the HORIZONTAL FORCE MAGNETOMETER, at each of the ordinary Hours of Observation.

1878.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h	°	°	°	°	°	°	°	°	°	°	°	°
0	61·7	62·0	61·8	63·2	64·8	66·7	68·7	68·9	65·5	64·1	62·3	58·9
1	61·5	62·0	61·7	63·1	65·0	66·8	68·8	69·2	65·7	64·3	62·4	59·0
2	61·7	62·0	61·7	63·3	65·0	66·8	69·0	69·5	66·1	64·4	62·5	59·1
3	61·8	62·0	61·8	63·3	65·1	66·9	69·2	69·8	66·3	64·5	62·5	59·2
9	61·4	61·9	61·7	63·3	64·5	66·5	68·7	69·7	66·4	64·6	62·7	59·5
21	61·1	61·7	61·2	62·6	63·9	65·9	67·7	68·0	64·7	63·9	62·3	59·1
22	61·1	61·6	61·3	62·7	64·0	66·3	67·9	68·4	64·9	63·9	62·2	59·1
23	61·2	61·6	61·3	62·9	64·2	66·4	68·1	68·5	65·1	63·9	62·2	59·1

TABLE VIII.

1878.

Month.	MEAN HORIZONTAL MAGNETIC FORCE in EACH MONTH, uncorrected for TEMPERATURE. Expressed in terms of the MEAN HORIZONTAL FORCE for the Year, and diminished by a Constant (0·86000 nearly).	Expressed in terms of GAUSS'S UNIT measured on the METRICAL SYSTEM, and diminished by a Constant (1·54886 nearly).	Mean Temperature.
			°
January	0·12667	0·22813	61·4
February	·12651	·22784	61·8
March	·12631	·22748	61·6
April	·12617	·22723	63·1
May	·12615	·22720	64·6
June	·12564	·22628	66·5
July	·12534	·22574	68·5
August	·12514	·22538	69·0
September	·12557	·22615	65·6
October	·12557	·22615	64·2
November	·12615	·22720	62·4
December	·12718	·22905	59·1

The unit adopted in column 3 is the Millimètre-Milligramme-Second Unit. To express the forces on the Centimètre-Gramme-Second (C.G.S.) system, the numbers must be divided by 10, equivalent to shifting the decimal point one step towards the left.

The value 0·86000 of Horizontal Force corresponds to 1·54886 of Gauss's Unit on the Metrical (Millimètre-Milligramme-Second) system, and to 0·15489 on the C.G.S. system.

TABLE IX.—MEAN VERTICAL MAGNETIC FORCE, expressed in terms of the Mean Vertical Force for the Year, and diminished by a Constant (0·96000 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.

1878.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d												
1	..	0·03671	0·03655	0·03464	0·03675	0·03472	0·03659	0·03606	0·03462	0·03388	0·03172	0·03124
2	0·03800	·03692	·03640	·03564	·03662	·03496	·03541	·03650	·03441	·03340	·03165	·03074
3	·03715	·03641	·03610	·03572	·03627	..	·03515	·03615	·03462	·03419	·03141	..
4	·03755	·03625	·03642	·03550	·03573	·03642	·03598	·03680	·03560	·03434	·03169	·02907
5	·03819	·03642	·03571	·03560	·03586	·03524	·03680	·03753	·03608	·03485	·03171	·03025
6	·03773	·03631	·03616	·03564	·03667	·03570	·03700	·03778	·03546	·03514	·03164	·03007
7	·03689	·03601	·03610	·03517	·03634	·03610	·03717	·03745	·03564	·03497	·03161	·03018
8	·03702	·03553	·03541	·03508	·03535	·03627	·03680	·03747	·03555	·03452	·03096	·03003
9	·03705	·03583	·03558	·03552	·03547	·03553	·03677	·03767	·03532	·03431	·03142	·02961
10	·03668	·03669	·03565	·03581	·03604	·03537	·03614	·03698	·03443	·03398	·03170	·03028

TABLE IX.—MEAN VERTICAL MAGNETIC FORCE, expressed in terms of the Mean Vertical Force for the Year, &c.—*continued.*

1878.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d												
11	0·03602	0·03612	0·03611	0·03571	0·03585	0·03523	0·03585	0·03669	0·03440	0·03262	0·03098	0·03033
12	·03615	·03599	·03582	·03550	·03635	·03551	·03590	·03614	·03373	·03234	·03103	·02996
13	·03716	·03695	·03557	·03591	·03545	·03540	·03620	·03629	·03335	·03247	·03149	·02921
14	·03761	·03699	·03550	·03598	·03565	·03467	·03615	·03694	·03401	·03296	·03118	·02846
15	·03713	·03664	·03525	·03572	·03613	·03469	·03641	·03633	·03377	·03346	·03087	·02932
16	·03678	·03671	·03521	·03582	·03616	·03506	·03695	·03579	·03285	·03362	·03092	·02932
17	·03678	·03713	·03538	·03555	·03692	·03511	·03790	·03564	·03425	·03327	·03180	·02872
18	·03639	·03662	·03590	·03573	·03630	·03521	·03871	·03621	·03301	·03335	·03177	·02913
19	·03678	·03612	·03608	·03622	·03570	·03510	·03869	·03612	·03251	·03379	·03173	·02931
20	·03743	·03633	·03586	·03585	·03487	·03550	·03848	·03527	·03207	·03384	·03122	·02924
21	·03713	·03660	·03578	·03570	·03487	·03607	·03850	·03553	·03152	·03418	·03126	·02890
22	·03690	·03664	·03517	·03544	·03531	·03690	·03847	·03609	·03182	·03291	·03185	·02879
23	·03573	·03679	·03477	·03602	·03553	·03750	·03819	·03597	·03177	·03211	·03127	·02812
24	·03652	·03614	·03434	·03602	·03545	·03831	·03766	·03573	·03141	·03209	·03189	·02737
25	·03560	·03622	·03489	·03575	·03549	·03837	·03713	·03548	·03340	·03212	·03144	·02779
26	·03599	·03632	·03507	·03554	·03590	·03905	·03738	·03590	·03353	·03204	·03066	·02912
27	·03608	·03643	·03505	·03549	·03584	·03911	·03709	·03590	·03397	·03142	·03048	
28	·03595	·03705	·03468	·03534	·03597	·03840	·03630	·03614	·03434	·03140	·03046	..
29	·03631		·03435	·03593	·03534	·03760	·03540	·03589	·03415	·03090	·03074	..
30	·03633		·03473	·03692	·03515	·03677	·03606	·03547	·03414	·02979	·03089	..
31	·03628		·03521		·03581		·03606	·03521		·03139		..

TABLE X.—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.

1878.

Days of the Month.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	..	61·7	63·2	60·8	66·2	63·2	66·5	67·8	66·9	64·4	62·2	62·1
2	63·1	62·4	62·3	62·4	65·5	63·8	63·9	68·4	66·6	64·0	61·7	61·5
3	61·6	61·7	61·6	62·7	64·6	..	64·1	68·0	67·1	65·2	61·9	..
4	62·0	61·1	62·9	62·0	64·6	65·4	65·9	69·6	68·7	65·4	61·9	57·6
5	63·5	61·6	61·8	62·4	64·8	63·6	67·4	70·9	69·5	67·1	62·2	60·7
6	62·2	61·4	62·4	62·8	65·8	65·2	68·4	71·4	68·8	67·8	62·0	60·2
7	60·8	59·8	62·2	61·6	65·0	66·5	69·0	71·0	69·1	67·6	62·3	60·5
8	61·4	59·5	60·9	61·8	63·0	67·1	68·6	71·0	69·0	66·8	61·4	60·3
9	61·4	60·2	61·5	62·3	64·3	65·3	67·8	71·3	68·2	66·2	61·9	60·1
10	60·5	62·1	61·3	62·7	65·5	64·6	66·4	70·2	67·0	65·6	62·5	60·1
11	59·3	61·2	62·0	63·0	65·0	64·1	66·1	69·5	67·2	62·8	61·3	60·7
12	59·8	61·1	61·5	62·6	65·7	64·8	66·6	68·8	66·3	62·0	61·2	60·5
13	62·0	62·8	61·6	63·4	64·2	64·9	67·5	68·9	65·1	62·4	62·1	59·0
14	63·1	62·5	61·2	63·7	64·1	63·4	67·4	69·8	65·8	63·2	61·9	57·3
15	62·0	61·4	60·6	63·1	64·5	63·1	67·8	69·3	65·6	64·3	61·6	58·7
16	61·4	61·9	60·6	62·9	64·8	63·5	69·4	68·1	64·6	64·9	60·8	58·9
17	61·3	63·0	61·1	62·7	66·1	64·3	71·5	67·8	66·4	64·6	62·6	58·2
18	61·2	61·4	62·4	63·9	66·2	64·7	73·2	68·9	65·5	64·5	62·8	58·9
19	61·6	61·4	62·7	64·7	64·5	64·7	73·2	68·9	63·4	65·1	63·1	59·1
20	63·2	61·8	62·1	64·0	62·6	66·2	72·3	67·3	62·8	65·5	61·9	58·8
21	63·0	62·3	61·9	63·3	62·3	67·6	72·3	67·7	62·3	66·0	61·8	58·5
22	61·6	62·5	60·8	63·0	63·5	69·2	71·9	68·8	62·4	63·9	62·6	58·1
23	60·1	63·1	60·0	63·9	63·9	70·3	71·1	69·2	62·1	62·3	62·2	57·1
24	60·7	61·9	59·6	64·0	63·7	70·9	70·0	68·7	62·0	62·4	62·9	55·6
25	59·5	62·2	60·7	63·5	64·1	71·7	68·0	68·4	63·4	62·4	62·5	56·5
26	60·2	61·9	61·0	63·0	64·8	72·3	69·5	68·9	63·4	62·1	60·9	58·8
27	60·9	62·4	61·4	63·5	65·1	72·9	69·3	69·1	64·5	60·5	60·9	..
28	60·4	63·5	60·6	62·8	65·2	71·7	67·6	69·3	65·7	60·4	60·6	..
29	60·9		59·7	64·6	64·0	69·5	66·7	69·3	65·4	59·3	60·8	..
30	61·2		60·3	66·3	63·5	67·7	67·2	68·3	65·2	57·4	61·4	..
31	60·9		61·3		65·1		67·5	67·7		61·2		..

TABLE XI.—MEAN MONTHLY DETERMINATION of the VERTICAL MAGNETIC FORCE, expressed in terms of the Mean Vertical Force for the Year, and diminished by a Constant (0·96000 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.

1878.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h												
0	0·03662	0·03615	0·03512	0·03513	0·03537	0·03592	0·03661	0·03600	0·03349	0·03286	0·03118	0·02919
1	·03679	·03630	·03533	·03532	·03570	·03618	·03685	·03625	·03384	·03310	·03138	·02932
2	·03691	·03644	·03549	·03556	·03593	·03640	·03710	·03654	·03412	·03326	·03146	·02942
3	·03693	·03654	·03561	·03573	·03607	·03656	·03731	·03679	·03429	·03334	·03149	·02946
4	·03695	·03659	·03574	·03587	·03623	·03674	·03751	·03696	·03441	·03337	·03152	·02952
5	·03700	·03665	·03577	·03604	·03636	·03687	·03763	·03702	·03443	·03339	·03156	·02961
6	·03704	·03674	·03579	·03613	·03642	·03689	·03769	·03701	·03442	·03344	·03155	·02969
7	·03704	·03675	·03584	·03616	·03640	·03688	·03765	·03696	·03443	·03343	·03153	·02969
8	·03700	·03672	·03584	·03618	·03633	·03682	·03763	·03695	·03441	·03339	·03151	·02969
9	·03694	·03664	·03575	·03612	·03624	·03674	·03757	·03686	·03434	·03328	·03143	·02960
10	·03688	·03660	·03570	·03601	·03614	·03658	·03733	·03665	·03424	·03326	·03135	·02952
11	·03685	·03658	·03570	·03599	·03608	·03641	·03708	·03649	·03414	·03325	·03134	·02943
12	·03682	·03655	·03568	·03592	·03597	·03624	·03692	·03632	·03400	·03319	·03133	·02938
13	·03680	·03654	·03565	·03584	·03589	·03610	·03678	·03617	·03388	·03315	·03135	·02938
14	·03678	·03651	·03561	·03576	·03581	·03595	·03662	·03604	·03376	·03307	·03133	·02938
15	·03674	·03647	·03554	·03567	·03573	·03585	·03647	·03592	·03364	·03304	·03130	·02934
16	·03669	·03644	·03549	·03562	·03570	·03578	·03638	·03587	·03354	·03298	·03125	·02930
17	·03664	·03639	·03543	·03555	·03565	·03571	·03628	·03581	·03345	·03292	·03122	·02926
18	·03661	·03634	·03537	·03549	·03556	·03564	·03618	·03574	·03340	·03285	·03117	·02924
19	·03658	·03631	·03536	·03543	·03547	·03562	·03614	·03570	·03335	·03282	·03113	·02924
20	·03654	·03627	·03528	·03535	·03540	·03569	·03621	·03571	·03327	·03276	·03112	·02916
21	·03651	·03623	·03515	·03524	·03532	·03573	·03630	·03572	·03322	·03270	·03107	·02911
22	·03650	·03617	·03503	·03515	·03525	·03578	·03641	·03576	·03322	·03263	·03100	·02911
23	·03650	·03611	·03496	·03510	·03519	·03578	·03644	·03582	·03326	·03260	·03096	·02913.

TABLE XII.—MONTHLY MEANS of READINGS of the THERMOMETER placed on the box inclosing the VERTICAL FORCE MAGNETOMETER, at each of the ordinary Hours of Observation.

1878.

Hour, Greenwich Mean Solar Time.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
h	°	°	°	°	°	°	°	°	°	°	°	°
0	61·6	61·8	61·6	63·2	64·8	67·0	68·8	69·1	65·7	63·8	61·9	58·9
1	61·6	61·9	61·7	63·3	65·1	67·1	68·9	69·4	66·0	64·0	62·0	59·1
2	61·7	62·0	61·8	63·5	65·1	67·0	69·1	69·6	66·2	64·1	62·0	59·2
3	61·7	62·0	61·8	63·4	65·2	67·1	69·2	69·7	66·3	64·1	62·1	59·3
9	61·5	62·0	61·7	63·6	64·8	66·6	68·8	69·6	66·3	64·1	62·0	59·5
21	60·8	61·5	60·8	62·4	63·7	65·6	67·5	68·3	64·8	63·3	61·6	58·9
22	60·9	61·5	60·9	62·6	63·9	66·1	67·8	68·5	65·0	63·4	61·7	59·0
23	61·1	61·5	60·9	62·8	64·1	66·4	68·2	68·7	65·2	63·4	61·6	59·0

TABLE XIII.

1878.

Month.	Mean Vertical Magnetic Force in each Month, uncorrected for Temperature. Expressed in terms of the Mean Vertical Force for the Year, and diminished by a Constant (0·96000 nearly).	Mean Vertical Magnetic Force in each Month, uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System, and diminished by a Constant (4·20211 nearly).	Mean Temperature.
			°
January	0·03678	0·16099	61·4
February	·03646	·15959	61·8
March	·03551	·15543	61·4
April	·03568	·15618	63·1
May	·03584	·15688	64·6
June	·03620	·15845	66·6
July	·03688	·16143	68·5
August	·03629	·15885	69·1
September	·03386	·14821	65·7
October	·03309	·14484	63·8
November	·03131	·13705	61·9
December	·02938	·12860	59·1

The unit adopted in column 3 is the Millimètre-Milligramme-Second Unit. To express the forces on the Centimètre-Gramme-Second (C.G.S.) system, the numbers must be divided by 10, equivalent to shifting the decimal point one step towards the left.

The value 0·96000 of Vertical Force corresponds to 4·20211 of Gauss's Unit on the Metrical (Millimètre-Milligramme-Second) system, and to 0·42021 on the C.G.S. system.

TABLE XIV.—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 1878.

(The Results for Horizontal Force and Vertical Force are not corrected for Temperature.)

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	+ 3·55	+ 0·00186	− 0·00036	− 0·00065	− 0·00030	− 0·00131
1	+ 4·11	+ 215	− 13	− 23	− 8	− 35
2	+ 3·65	+ 191	+ 2	+ 4	+ 11	+ 48
3	+ 2·52	+ 132	+ 7	+ 13	+ 24	+ 105
4	+ 1·50	+ 79	+ 7	+ 13	+ 34	+ 149
5	+ 0·70	+ 37	+ 10	+ 18	+ 42	+ 184
6	+ 0·13	+ 7	+ 17	+ 31	+ 46	+ 201
7	− 0·35	− 18	+ 21	+ 38	+ 46	+ 201
8	− 0·77	− 40	+ 21	+ 38	+ 43	+ 188
9	− 1·03	− 54	+ 20	+ 36	+ 35	+ 153
10	− 1·19	− 62	+ 18	+ 32	+ 25	+ 109
11	− 1·21	− 63	+ 18	+ 32	+ 17	+ 74
12	− 1·01	− 53	+ 16	+ 29	+ 9	+ 39
13	− 0·90	− 47	+ 10	+ 18	+ 2	+ 9
14	− 0·81	− 42	+ 11	+ 20	− 5	− 22
15	− 0·93	− 49	+ 11	+ 20	− 13	− 57
16	− 1·07	− 56	+ 14	+ 25	− 19	− 83
17	− 1·43	− 75	+ 17	+ 31	− 25	− 109
18	− 1·79	− 94	+ 16	+ 29	− 31	− 136
19	− 2·06	− 108	+ 3	+ 5	− 34	− 149
20	− 2·21	− 116	− 21	− 38	− 38	− 166
21	− 1·57	− 82	− 48	− 86	− 42	− 184
22	− 0·02	− 1	− 64	− 115	− 44	− 193
23	+ 1·98	+ 104	− 59	− 106	− 45	− 197

Hour, Greenwich Mean Solar Time.	Mean Readings of Thermometers. Horizontal Force.	Mean Readings of Thermometers. Vertical Force.
h	°	°
0	64·05	64·02
1	64·12	64·18
2	64·26	64·27
3	64·37	64·33
9	64·24	64·21
21	63·51	63·27
22	63·62	63·44
23	63·71	63·57

The unit adopted in columns 3, 5, and 7 is the Millimètre-Milligramme-Second Unit. To express the inequalities on the Centimètre-Gramme-Second (C.G.S.) system, the numbers must be divided by 10, equivalent to shifting the decimal point one step towards the left.

ROYAL OBSERVATORY, GREENWICH.

INDICATIONS

OF

MAGNETOMETERS

DURING A MAGNETIC DISTURBANCE.

1878.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.
June 2		
h m	° ′ ″	
18. 2	18. 44. 35	·0234
18. 10	48. 0	·0251
18. 18	45. 50	·0240
18. 25	47. 15	·0247
18. 32	45. 40	·0239
18. 35	47. 10	·0247
18. 42	45. 40	·0239
18. 55	48. 30	·0254
19. 8	49. 40	·0260
19. 18	48. 0	·0251
19. 27	48. 50	·0255
19. 30	46. 20	·0243
19. 35	50. 20	·0264
19. 43	45. 30	·0239
19. 52	42. 0	·0220
20. 2	44. 25	·0233
20. 6	42. 0	·0220
20. 20	50. 15	·0263
20. 22	47. 40	·0249
20. 40	52. 30	·0275
20. 53	57. 30	·0302
21. 10	53. 0	·0278
21. 25	56. 15	·0294
21. 32	55. 0	·0288
21. 42	56. 40	·0296
21. 55	51. 55	·0272
22. 2	54. 0	·0283
22. 3	50. 15	·0263
22. 10	54. 0	·0283
22. 18	50. 15	·0263
22. 30	52. 0	·0272
22. 44	55. 0	·0288
22. 48	51. 15	·0268
22. 57	55. 0	·0288
23. 2	51. 55	·0272
23. 8	55. 0	·0288
23. 12	52. 30	·0275
23. 30	54. 30	·0286
June 3		
0. 0	18. 55. 55	·0293
0. 8	18. 57. 20	·0301
0. 20	19. 0. 5	·0314
0. 26	2. 10	·0326
0. 32	5. 55	·0346
0. 40	19. 4. 0	·0335
0. 53	18. 59. 50	·0313
1. 1	19. 2. 0	·0325
1. 7	18. 59. 10	·0310

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.
June 2		
h m		
18. 6	·1260	·2269
18. 22	·1264	·2276
18. 35	·1258	·2265
18. 42	·1253	·2256
18. 50	·1256	·2262
19. 0	·1253	·2256
19. 10	·1258	·2265
19. 30	·1259	·2267
19. 32	·1264	·2276
19. 34	·1252	·2255
19. 38	·1260	·2269
19. 55	·1216	·2190
20. 5	·1188	·2139
20. 17	·1190	·2143
20. 26	·1189	·2141
20. 32	·1205	·2170
20. 40	·1195	·2152
20. 55	·1239	·2231
21. 8	·1228	·2211
21. 20	·1240	·2233
21. 32	·1238	·2229
21. 35	·1245	·2242
21. 42	·1242	·2237
21. 45	·1250	·2251
21. 56	·1242	·2237
22. 0	·1253	·2256
22. 6	·1250	·2251
22. 10	·1279	·2303
22. 18	·1256	·2262
22. 22	·1272	·2291
22. 30	·1263	·2274
22. 35	·1269	·2285
22. 37	·1267	·2282
22. 41	·1283	·2310
22. 43	·1272	·2291
22. 54	·1283	·2310
22. 56	·1265	·2278
23. 15	·1258	·2265
23. 25	·1255	·2260
23. 55	·1254	·2258
June 3		
0. 0	·1263	·2274
0. 6	·1268	·2283
0. 12	·1259	·2267
0. 14	·1274	·2294
0. 18	·1274	·2294
0. 22	·1263	·2274
0. 25	·1270	·2287
0. 30	·1255	·2260
0. 33	·1272	·2291

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.
June 2		
h m		
18. 0	·0350	·1532
18. 30	·0351	·1536
19. 0	·0351	·1536
19. 20	·0350	·1532
19. 35	·0349	·1527
19. 50	·0346	·1514
20. 0	·0345	·1510
20. 10	·0346	·1514
20. 30	·0350	·1532
20. 50	·0352	·1541
21. 0	·0350	·1532
21. 10	·0349	·1527
21. 40	·0351	·1536
22. 0	·0350	·1532
22. 20	·0347	·1519
22. 45	·0348	·1523
23. 0	·0345	·1510
23. 30	·0347	·1519
23. 50	·0350	·1532
June 3		
0. 10	·0352	·1541
0. 25	·0352	·1541
0. 30	·0354	·1550
0. 40	·0350	·1532
0. 45	·0353	·1545
0. 53	·0350	·1532
1. 0	·0356	·1558
1. 25	·0359	·1571
1. 30	·0361	·1580

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.
June 3		
h m	° ′ ″	
1. 16	18. 58. 0	·0304
1. 20	58. 40	·0307
1. 22	58. 0	·0304
1. 28	59. 0	·0309
1. 35	58. 0	·0304
1. 40	59. 25	·0311
1. 48	59. 15	·0310
2. 0	58. 55	·0309
2. 7	58. 10	·0305
2. 20	57. 35	·0302
2. 28	18. 57. 10	·0300
2. 41	19. 3. 30	·0333
3. 2	7. 5	·0351
3. 8	4. 30	·0338
3. 12	8. 10	·0357
3. 20	5. 20	·0343
3. 36	11. 15	·0373
3. 45	5. 10	·0342
3. 50	3. 50	·0334
3. 58	5. 5	·0341
4. 3	19. 3. 30	·0333
4. 10	18. 48. 40	·0254
4. 18	47. 30	·0249
4. 27	48. 20	·0253
4. 32	47. 50	·0250
4. 35	49. 0	·0257
4. 43	51. 10	·0268
4. 50	51. 0	·0267
5. 0	53. 5	·0278
5. 8	55. 0	·0288
5. 20	53. 45	·0282
5. 24	51. 55	·0272
5. 30	48. 35	·0254
5. 39	51. 0	·0267
5. 42	50. 10	·0263
5. 50	53. 45	·0282
6. 8	54. 45	·0287
6. 20	48. 30	·0254
6. 37	37. 55	·0199
6. 42	40. 10	·0211
6. 58	38. 40	·0202
7. 3	41. 25	·0217
7. 11	40. 35	·0213
7. 20	42. 0	·0220
7. 33	44. 15	·0232
7. 41	46. 20	·0243
7. 48	49. 0	·0257
7. 58	20. 30	·0108
8. 4	30. 35	·0160
8. 12	27. 55	·0146
8. 20	30. 0	·0157
8. 32	41. 30	·0218

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.
June 3		
h m		
0. 35	·1277	·2300
0. 45	·1204	·2168
0. 50	·1219	·2195
0. 53	·1185	·2134
1. 0	·1247	·2246
1. 7	·1236	·2226
1. 10	·1247	·2246
1. 12	·1235	·2224
1. 20	·1253	·2256
1. 24	·1244	·2240
1. 30	·1274	·2294
1. 34	·1253	·2256
1. 38	·1272	·2291
1. 40	·1255	·2260
1. 46	·1273	·2292
1. 56	·1255	·2260
1. 57	·1274	·2294
1. 59	·1260	·2269
2. 2	·1274	·2294
2. 3	·1254	·2258
2. 8	·1266	·2280
2. 16	·1247	·2246
2. 20	·1252	·2255
2. 28	·1248	·2247
2. 47	·1298	·2337
2. 50	·1286	·2316
2. 56	·1296	·2334
2. 59	·1282	·2309
3. 1	·1295	·2332
3. 4	·1282	·2309
3. 6	·1288	·2319
3. 7	·1272	·2291
3. 9	·1293	·2328
3. 12	·1278	·2301
3. 17	·1288	·2319
3. 19	·1273	·2292
3. 24	·1271	·2289
3. 37	·1291	·2325
3. 45	·1226	·2208
3. 50	·1238	·2229
3. 55	·1221	·2199
4. 4	·1259	·2267
4. 10	·1252	·2255
4. 18	·1270	·2287
4. 25	·1291	·2325
4. 28	·1286	·2316
4. 30	·1296	·2334
4. 32	·1288	·2319
4. 35	·1295	·2332
4. 40	·1278	·2301
4. 47	·1294	·2330
4. 49	·1276	·2298

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.
June 3		
h m		
1. 40	·0360	·1576
2. 0	·0360	·1576
2. 25	·0360	·1576
2. 45	·0364	·1594
3. 20	·0365	·1598
3. 32	·0371	·1624
3. 42	·0367	·1607
4. 5	·0384	·1681
4. 30	·0385	·1685
4. 45	·0385	·1685
5. 15	·0389	·1702
5. 22	·0388	·1698
5. 30	·0390	·1707
5. 45	·0388	·1698
6. 0	·0385	·1685
6. 25	·0386	·1689
6. 40	·0383	·1676
7. 0	·0381	·1667
7. 20	·0381	·1667
7. 40	·0377	·1651
7. 56	·0361	·1580
8. 5	·0366	·1602
8. 25	·0367	·1607
8. 42	·0366	·1602
8. 55	·0366	·1602
9. 8	·0361	·1580
9. 50	·0363	·1589
10. 20	·0364	·1594
11. 5	·0353	·1545
11. 20	·0352	·1541
11. 33	·0359	·1571
11. 47	·0351	·1536
12. 20	·0345	·1510
12. 40	·0350	·1532
12. 55	·0350	·1532
13. 15	·0349	·1527
13. 40	·0351	·1536
14. 20	·0350	·1532
14. 50	·0351	·1536
15. 45	·0352	·1541
16. 10	·0354	·1550
16. 45	·0354	·1550
18. 0	·0355	·1554
19. 0	·0355	·1554
20. 0	·0356	·1558
21. 0	·0357	·1563
23. 0	·0357	·1563
23. 50	·0358	·1567

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 1·5489 in terms of Gauss's Unit measured on the Metrical System. The corresponding constant for Vertical Force is 0·9600 nearly, equivalent to 4·2021 in terms of Gauss's Unit.

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
June 3			June 3					
h m	° ′ ″		h m			h m		
8. 40	18. 33. 45	·0177	4. 54	·1294	·2330			
8. 48	43. 10	·0226	4. 57	·1285	·2314			
8. 55	39. 0	·0204	5. 1	·1294	·2330			
9. 2	43. 10	·0226	5. 3	·1282	·2309			
9. 9	40. 55	·0215	5. 8	·1287	·2318			
9. 20	34. 10	·0179	5. 10	·1275	·2296			
9. 27	36. 35	·0192	5. 17	·1291	·2325			
9. 35	35. 55	·0188	5. 18	·1280	·2305			
9. 48	38. 20	·0201	5. 20	·1286	·2316			
9. 58	40. 50	·0214	5. 23	·1277	·2300			
10. 8	41. 35	·0218	5. 27	·1286	·2316			
10. 17	41. 0	·0215	5. 32	·1279	·2303			
10. 28	45. 40	·0239	5. 36	·1288	·2319			
10. 37	40. 40	·0213	5. 39	·1278	·2301			
10. 50	42. 55	·0225	5. 44	·1284	·2312			
10. 58	43. 50	·0229	5. 50	·1269	·2285			
11. 7	40. 0	·0210	5. 56	·1281	·2307			
11. 18	37. 0	·0194	5. 58	·1273	·2292			
11. 22	38. 55	·0204	6. 5	·1270	·2287			
11. 36	46. 10	·0242	6. 9	·1275	·2296			
11. 48	41. 0	·0215	6. 15	·1253	·2256			
12. 0	39. 15	·0205	6. 20	·1258	·2265			
12. 18	40. 35	·0213	6. 24	·1245	·2242			
12. 28	38. 25	·0201	6. 31	·1259	·2267			
12. 48	45. 0	·0236	6. 37	·1260	·2269			
12. 52	44. 30	·0234	6. 47	·1246	·2244			
13. 2	50. 55	·0267	7. 0	·1252	·2255			
13. 12	50. 5	·0262	7. 19	·1233	·2220			
13. 29	54. 55	·0288	7. 22	·1243	·2238			
13. 40	57. 0	·0299	7. 24	·1237	·2228			
13. 48	57. 5	·0299	7. 30	·1243	·2238			
13. 59	55. 30	·0291	7. 34	·1236	·2226			
14. 7	57. 0	·0299	7. 37	·1243	·2238			
14. 18	54. 5	·0283	7. 38	·1235	·2224			
14. 30	53. 20	·0280	7. 46	·1250	·2251			
14. 50	56. 25	·0295	7. 59	·1187	·2138			
15. 0	54. 30	·0286	8. 9	·1236	·2226			
15. 10	53. 20	·0280	8. 12	·1222	·2201			
15. 29	52. 0	·0272	8. 28	·1270	·2287			
15. 52	49. 40	·0260	8. 36	·1210	·2179			
16. 3	51. 40	·0270	8. 44	·1236	·2226			
16. 18	54. 5	·0283	8. 53	·1211	·2181			
16. 40	50. 30	·0265	9. 0	·1226	·2208			
16. 51	49. 35	·0260	9. 3	·1207	·2174			
17. 17	47. 0	·0246	9. 8	·1211	·2181			
17. 32	46. 25	·0243	9. 14	·1196	·2154			
17. 40	47. 15	·0247	9. 23	·1210	·2179			
18. 0	46. 0	·0241	9. 33	·1198	·2157			
18. 22	47. 35	·0249	9. 40	·1206	·2172			
18. 37	46. 10	·0242	9. 48	·1198	·2157			
18. 47	46. 30	·0244	9. 59	·1214	·2186			
19. 2	44. 30	·0234	10. 0	·1207	·2174			

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Horizontal Force.	Horizontal Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in parts of the whole Vertical Force.	Vertical Force (diminished by a Constant) uncorrected for Temperature. Expressed in terms of Gauss's Unit measured on the Metrical System.
June 3			June 3					
h m	° ′ ″		h m			h m		
19. 13	18. 43. 55	·0230	10. 7	·1216	·2190			
19. 37	45. 0	·0236	10. 12	·1210	·2179			
19. 50	47. 0	·0246	10. 35	·1230	·2215			
20. 4	46. 25	·0243	10. 57	·1247	·2246			
20. 20	46. 45	·0245	11. 0	·1247	·2246			
20. 34	45. 50	·0240	11. 11	·1214	·2186			
20. 40	46. 0	·0241	11. 19	·1213	·2184			
20. 48	45. 45	·0240	11. 22	·1210	·2179			
21. 10	46. 40	·0244	11. 30	·1214	·2186			
21. 30	47. 20	·0248	11. 45	·1254	·2258			
21. 48	48. 20	·0253	11. 59	·1256	·2262			
22. 0	48. 15	·0252	12. 7	·1256	·2262			
22. 20	48. 15	·0252	12. 30	·1225	·2206			
22. 38	49. 0	·0257	12. 37	·1227	·2210			
22. 48	49. 15	·0258	12. 49	·1247	·2246			
23. 2	50. 0	·0262	13. 0	·1240	·2233			
23. 25	50. 10	·0263	13. 7	·1251	·2253			
23. 58	51. 0	·0267	13. 28	·1227	·2210			
			13. 50	·1249	·2249			
			13. 55	·1250	·2251			
			14. 11	·1248	·2247			
			14. 30	·1242	·2237			
			14. 39	·1247	·2246			
			14. 47	·1255	·2260			
			15. 9	·1256	·2262			
			15. 29	·1254	·2258			
			15. 40	·1247	·2246			
			16. 0	·1240	·2233			
			16. 22	·1245	·2242			
			16. 26	·1253	·2256			
			16. 43	·1249	·2249			
			17. 0	·1246	·2244			
			17. 13	·1246	·2244			
			17. 35	·1248	·2247			
			17. 53	·1247	·2246			
			18. 0	·1245	·2242			
			18. 20	·1249	·2249			
			18. 40	·1245	·2242			
			18. 56	·1247	·2246			
			19. 9	·1244	·2240			
			19. 23	·1244	·2240			
			19. 35	·1247	·2246			
			19. 59	·1248	·2247			
			20. 20	·1246	·2244			
			20. 42	·1248	·2247			
			21. 3	·1247	·2246			
			21. 12	·1249	·2249			
			21. 20	·1252	·2255			
			21. 36	·1248	·2247			
			21. 45	·1248	·2247			
			22. 0	·1246	·2244			
			22. 22	·1246	·2244			

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

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature.		Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature.	
				Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.		Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
h m	° ′ ″		June 3 h m			h m		
			22. 40	·1243	·2238			
			22. 58	·1241	·2235			
			23. 10	·1239	·2231			

Greenwich Mean Solar Time.	Western Declination.	Excess of Western Declination above 18°, converted into Westerly Force, and expressed in terms of Gauss's Unit measured on the Metrical System.	Greenwich Mean Solar Time.	Horizontal Force (diminished by a Constant) uncorrected for Temperature.		Greenwich Mean Solar Time.	Vertical Force (diminished by a Constant) uncorrected for Temperature.	
				Expressed in parts of the whole Horizontal Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.		Expressed in parts of the whole Vertical Force.	Expressed in terms of Gauss's Unit measured on the Metrical System.
h m	° ′ ″		June 3 h m			h m		
			23. 28	·1239	·2231			
			23. 34	·1236	·2226			
			23. 58	·1236	·2226			

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 1·5489 in terms of Gauss's Unit measured on the Metrical System. The corresponding constant for Vertical Force is 0·9600 nearly, equivalent to 4·2021 in terms of Gauss's Unit.

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

OBSERVATIONS

OF THE

MAGNETIC DIP.

1878.

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

Day and Approximate Hour, 1878.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″	
January 8. 2	B 1	9 inches	67. 36. 19	N
9. 2	B 2	9 ,,	67. 37. 8	N
16. 2	C 1	6 ,,	67. 37. 19	N
23. 0	D 2	3 ,,	67. 42. 4	N
23. 23	B 1	9 ,,	67. 39. 23	N
24. 1	B 2	9 ,,	67. 40. 30	N
29. 0	C 2	6 ,,	67. 40. 27	N
29. 2	C 1	6 ,,	67. 38. 41	N
31. 2	D 2	3 ,,	67. 42. 11	N
February 8. 2	C 1	6 ,,	67. 40. 18	N
12. 2	C 2	6 ,,	67. 40. 23	N
15. 0	D 1	3 ,,	67. 38. 48	N
15. 1	D 2	3 ,,	67. 39. 25	N
15. 2	C 2	6 ,,	67. 38. 35	N
21. 2	B 1	9 ,,	67. 37. 11	N
22. 0	D 2	3 ,,	67. 40. 27	N
22. 2	C 1	6 ,,	67. 37. 35	N
26. 0	B 2	9 ,,	67. 39. 18	N
26. 23	B 1	9 ,,	67. 38. 33	N
28. 2	D 1	3 ,,	67. 36. 59	N
March 7. 2	C 2	6 ,,	67. 37. 30	N
13. 0	D 1	3 ,,	67. 38. 19	N
13. 1	D 2	3 ,,	67. 39. 32	N
18. 22	B 1	9 ,,	67. 38. 18	N
19. 2	D 1	3 ,,	67. 37. 50	N
21. 0	B 2	9 ,,	67. 38. 59	N
27. 1	C 1	6 ,,	67. 40. 32	N
27. 2	D 1	3 ,,	67. 41. 11	N
29. 22	C 2	6 ,,	67. 40. 26	N
30. 0	D 1	3 ,,	67. 39. 47	N
30. 2	C 1	6 ,,	67. 38. 56	N
April 8. 2	C 1	6 ,,	67. 39. 29	N
13. 1	B 2	9 ,,	67. 36. 38	N
17. 2	D 2	3 ,,	67. 40. 13	N
18. 0	B 1	9 ,,	67. 37. 40	N
18. 2	C 2	6 ,,	67. 38. 1	N
24. 23	C 2	6 ,,	67. 40. 19	N
25. 1	D 1	3 ,,	67. 40. 22	N
25. 2	D 2	3 ,,	67. 40. 15	N
29. 2	C 1	6 ,,	67. 39. 39	N
30. 1	B 2	9 ,,	67. 36. 57	N
30. 2	B 1	9 ,,	67. 37. 48	N
May 7. 2	C 2	6 ,,	67. 36. 22	N
9. 1	B 2	9 ,,	67. 37. 53	N
9. 2	C 2	6 ,,	67. 38. 53	N
15. 1	D 1	3 ,,	67. 40. 22	N
16. 1	D 2	3 ,,	67. 41. 15	N
22. 0	B 1	9 ,,	67. 38. 10	N
22. 2	C 1	6 ,,	67. 38. 26	N
23. 23	C 2	6 ,,	67. 38. 6	N
24. 0	D 1	3 ,,	67. 39. 11	N
24. 1	D 2	3 ,,	67. 39. 59	N
31. 4	D 1	3 ,,	67. 38. 48	N
d h			° ′ ″	
June 6. 3	D 2	3 inches	67. 36. 30	N
7. 2	B 1	9 ,,	67. 36. 29	N
8. 1	B 2	9 ,,	67. 37. 2	N
14. 2	C 1	6 ,,	67. 37. 20	N
18. 0	C 2	6 ,,	67. 37. 58	N
18. 1	D 2	3 ,,	67. 38. 20	N
21. 3	B 2	9 ,,	67. 37. 9	N
25. 1	B 1	9 ,,	67. 37. 45	N
25. 23	D 1	3 ,,	67. 38. 3	N
26. 1	D 2	3 ,,	67. 39. 55	N
28. 1	C 1	6 ,,	67. 36. 42	N
29. 1	C 2	6 ,,	67. 37. 42	N
July 6. 1	B 1	9 ,,	67. 37. 34	N
9. 0	C 1	6 ,,	67. 37. 36	N
9. 2	C 2	6 ,,	67. 37. 50	N
13. 1	D 1	3 ,,	67. 38. 0	N
17. 2	D 2	3 ,,	67. 38. 25	N
24. 2	C 2	6 ,,	67. 38. 38	N
25. 23	B 2	9 ,,	67. 36. 53	N
26. 0	B 1	9 ,,	67. 36. 57	N
26. 2	C 1	6 ,,	67. 37. 16	N
31. 0	B 2	9 ,,	67. 35. 44	N
31. 3	D 2	3 ,,	67. 39. 35	N
August 2. 3	D 1	3 ,,	67. 37. 56	N
6. 23	C 1	6 ,,	67. 38. 5	E
8. 0	C 2	6 ,,	67. 38. 27	E
15. 2	D 2	3 ,,	67. 39. 4	N
20. 1	D 1	3 ,,	67. 38. 37	N
21. 1	B 2	9 ,,	67. 36. 0	N
22. 1	C 1	6 ,,	67. 37. 26	N
28. 23	B 1	9 ,,	67. 38. 5	N
31. 0	C 2	6 ,,	67. 37. 38	N
September 7. 1	B 1	9 ,,	67. 35. 19	N
11. 2	D 1	3 ,,	67. 40. 5	N
12. 2	D 2	3 ,,	67. 38. 26	N
13. 0	C 2	6 ,,	67. 37. 43	N
13. 2	D 1	3 ,,	67. 37. 55	N
21. 2	C 1	6 ,,	67. 37. 10	N
24. 0	B 2	9 ,,	67. 35. 19	N
24. 2	C 2	6 ,,	67. 36. 19	N
26. 1	B 1	9 ,,	67. 36. 29	N
26. 23	B 2	9 ,,	67. 36. 40	N
27. 2	C 1	6 ,,	67. 37. 20	N
October 4. 2	B 2	9 ,,	67. 35. 37	N
5. 1	D 2	3 ,,	67. 39. 45	N
12. 1	D 1	3 ,,	67. 37. 27	N
18. 2	C 1	6 ,,	67. 39. 46	N
19. 2	C 1	6 ,,	67. 37. 36	N
22. 1	B 1	9 ,,	67. 36. 30	N
28. 2	C 2	6 ,,	67. 37. 18	N
30. 23	B 2	9 ,,	67. 35. 4	N
31. 0	B 1	9 ,,	67. 36. 31	N
31. 2	D 2	3 ,,	67. 37. 31	N

The initials E and N are those of Mr. Ellis and Mr. Nash respectively.

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

Day and Approximate Hour, 1878.	Needle.	Length of Needle.	Magnetic Dip.	Observer.	Day and Approximate Hour, 1878.	Needle.	Length of Needle.	Magnetic Dip.	Observer.
d h			° ′ ″		d h			° ′ ″	
November 5. 2	D 1	3 inches	67. 37. 12	N	December 6. 2	D 2	3 inches	67. 38. 59	N
9. 2	D 2	3 "	67. 36. 54	N	11. 1	B 1	9 "	67. 37. 52	N
16. 2	C 1	6 "	67. 38. 11	N	11. 2	D 1	3 "	67. 38. 5	N
20. 0	B 1	9 "	67. 36. 30	N	14. 1	C 2	6 "	67. 37. 17	N
20. 2	B 2	9 "	67. 35. 15	N	23. 23	B 2	9 "	67. 37. 26	N
21. 23	B 2	9 "	67. 35. 24	N	26. 23	C 1	6 "	67. 38. 25	N
29. 2	D 1	3 "	67. 36. 37	N	27. 1	D 1	3 "	67. 37. 28	N
30. 0	C 2	6 "	67. 36. 56	N	31. 0	B 1	9 "	67. 36. 45	N
30. 1	C 1	6 "	67. 36. 20	N	31. 2	B 2	9 "	67. 37. 15	N
					31. 3	D 2	3 "	67. 38. 33	N

The initial N is that of Mr. Nash.

MONTHLY MEANS of MAGNETIC DIPS.

Month, 1878.	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. 37. 51	2	67. 38. 49	2	67. 38. 0	2
February	67. 37. 52	2	67. 39. 18	1	67. 38. 57	2
March	67. 38. 18	1	67. 38. 59	1	67. 39. 44	2
April	67. 37. 44	2	67. 36. 48	2	67. 39. 34	2
May	67. 38. 10	1	67. 37. 53	1	67. 38. 26	1
June	67. 37. 7	2	67. 37. 6	2	67. 37. 1	2
July	67. 37. 16	2	67. 36. 18	2	67. 37. 26	2
August	67. 38. 5	1	67. 36. 0	1	67. 37. 45	2
September	67. 35. 54	2	67. 35. 59	2	67. 37. 15	2
October	67. 36. 30	2	67. 35. 20	2	67. 38. 41	2
November	67. 36. 30	1	67. 35. 19	2	67. 37. 15	2
December	67. 37. 18	2	67. 37. 20	2	67. 38. 25	1
Means	67. 37. 18	Sum 20	67. 36. 55	Sum 20	67. 38. 11	Sum 22

Month, 1878.	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. 40. 27	1	....	..	67. 42. 7	2
February	67. 39. 29	2	67. 37. 53	2	67. 39. 56	2
March	67. 38. 58	2	67. 39. 17	4	67. 39. 32	1
April	67. 39. 10	2	67. 40. 22	1	67. 40. 14	2
May	67. 37. 47	3	67. 39. 27	3	67. 40. 37	2
June	67. 37. 50	2	67. 38. 3	1	67. 38. 15	3
July	67. 38. 14	2	67. 38. 0	1	67. 39. 0	2
August	67. 38. 3	2	67. 38. 16	2	67. 39. 4	1
September	67. 37. 1	2	67. 39. 0	2	67. 38. 26	1
October	67. 37. 18	1	67. 37. 27	1	67. 38. 38	2
November	67. 36. 56	1	67. 36. 55	2	67. 36. 54	1
December	67. 37. 17	1	67. 37. 47	2	67. 38. 46	2
Means	67. 38. 14	Sum 21	67. 38. 40	Sum 21	67. 39. 24	Sum 21

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. To the mean for the needle D 1 so formed (67°. 38′. 32″) a correction of + 8″ has been applied in order to reduce the mean for the eleven months (February to December) to the true mean for the year.

YEARLY MEANS of MAGNETIC DIPS for each of the NEEDLES, and GENERAL MEAN for the Year 1878.

Lengths of the several Sets of Needles.	Needles.	Number of Observations with each Needle.	Mean Yearly Dips from Observations with each Needle.	Mean Yearly Dips from each Set of Needles.	Mean Yearly Dip from all the Sets of Needles.
			° ′ ″	° ′ ″	° ′ ″
9-inch Needles	B 1	20	67. 37. 18	67. 37. 7	67. 38. 7
	B 2	20	67. 36. 55		
6-inch Needles	C 1	22	67. 38. 11	67. 38. 12	
	C 2	21	67. 38. 14		
3-inch Needles	D 1	21	67. 38. 40	67. 39. 2	
	D 2	21	67. 39. 24		

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

DEFLEXION OF A MAGNET

FOR

ABSOLUTE MEASURE

OF

HORIZONTAL FORCE.

1878.

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

Month and Day, 1878.	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 30	1·0 1·3	43·7	11. 5. 0 5. 1. 32	5·570 5·578	100 100	44·6 45·1	N
February 27	1·0 1·3	52·0	11. 3. 20 5. 1. 4	5·578 5·578	100 100	53·1 52·3	N
March 28	1·0 1·3	43·4	11. 4. 38 5. 1. 22	5·580 5·568	100 100	42·0 45·9	N
April 26	1·0 1·3	63·0	11. 1. 37 5. 0. 5	5·584 5·582	100 100	64·1 64·8	N
May 30	1·0 1·3	60·0	11. 1. 12 4. 59. 45	5·576 5·583	100 100	58·7 61·7	N
June 28	1·0 1·3	81·7	10. 58. 16 4. 58. 12	5·587 5·584	100 100	81·9 81·8	N
July 27	1·0 1·3	73·7	10. 59. 13 4. 58. 47	5·586 5·588	100 100	73·5 74·8	N
August 30	1·0 1·3	69·1	10. 59. 13 4. 59. 0	5·591 5·596	100 100	68·3 72·6	N
September 27	1·0 1·3	62·8	10. 59. 41 4. 59. 10	5·592 5·592	100 100	63·5 63·6	N
October 30	1·0 1·3	42·5	11. 0. 6 4. 59. 16	5·582 5·588	100 100	41·1 44·3	N
November 22	1·0 1·3	44·4	10. 59. 42 4. 59. 13	5·589 5·589	100 100	44·5 45·1	N
December 24	1·0 1·3	27·9	11. 0. 15 4. 59. 11	5·593 5·585	100 100	26·8 28·9	N

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

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

The initial N is that of Mr. 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 1878.

Month and Day, 1878.		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	30	0·09625	0·09635	−0·00254		8·98443	5·5740	0·16672	3·901	0·3763	1·799
February	27	0·09614	0·09633	−0·00485		8·98416	5·5780	0·16664	3·902	0·3762	1·799
March	28	0·09619	0·09629	−0·00259		8·98417	5·5740	0·16667	3·902	0·3762	1·799
April	26	0·09608	0·09621	−0·00321		8·98374	5·5830	0·16666	3·904	0·3760	1·800
May	30	0·09597	0·09605	−0·00197		8·98313	5·5795	0·16692	3·907	0·3759	1·802
June	28	0·09592	0·09592	−0·00011	−0·00239	8·98274	5·5855	0·16752	3·912	0·3759	1·804
July	27	0·09592	0·09597	−0·00141		8·98284	5·5870	0·16676	3·908	0·3757	1·802
August	30	0·09584	0·09596	−0·00310		8·98264	5·5935	0·16547	3·903	0·3750	1·800
September	27	0·09580	0·09591	−0·00276		8·98243	5·5920	0·16523	3·903	0·3748	1·800
October	30	0·09552	0·09560	−0·00214		8·98112	5·5850	0·16491	3·908	0·3741	1·802
November	22	0·09550	0·09562	−0·00316		8·98109	5·5890	0·16443	3·905	0·3739	1·801
December	24	0·09532	0·09536	−0·00084		8·98010	5·5890	0·16332	3·905	0·3730	1·800
Means		..	..	..	..	..	..	..	3·905	..	1·801

The value of X in column 9 is referred to the unit Foot-Grain-Second, and that in column 11 to the unit Millimètre-Milligramme-Second. To obtain X in the Centimètre-Gramme-Second (C.G.S.) unit, the value given in column 11 must be divided by 10, equivalent to shifting the decimal point one step towards the left.

ROYAL OBSERVATORY, GREENWICH.

RESULTS

OF

METEOROLOGICAL OBSERVATIONS.

1878.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	TEMPERATURE. Of the Air. Lowest.	TEMPERATURE. Of the Air. Daily Range.	TEMPERATURE. Of the Air. Mean of 24 Hourly Values.	TEMPERATURE. Of the Air. Excess of Mean above Average of 20 Years.	TEMPERATURE. Of Evaporation. Mean of 24 Hourly Values.	TEMPERATURE. Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Greatest of 24 Hourly Values.	Difference between the Air Temperature and Dew Point Temperature. Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	TEMPERATURE. Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	TEMPERATURE. Of the Water of the Thames off Greenwich. Highest.	TEMPERATURE. Of the Water of the Thames off Greenwich. Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
Jan. 1	..	30·144	45·2	32·0	13·2	38·9	+ 0·8	37·3	35·2	3·7	6·2	0·6	87	53·6	27·8	41·8	39·3	0·0	7·9	0·000	0·0	..
2	Greatest Declination S.	30·170	48·0	41·5	6·5	44·7	+ 6·8	44·0	43·2	1·5	5·5	0·0	94	48·2	38·5	41·3	39·3	0·0	7·9	0·020	0·0	..
3	New	30·062	47·7	42·0	5·7	45·3	+ 7·5	44·2	42·9	2·4	6·1	0·0	91	73·4	38·3	41·8	39·8	0·7	7·9	0·053	1·8	..
4	..	29·822	47·9	42·0	5·9	45·2	+ 7·5	44·7	44·1	1·1	1·9	0·0	96	55·0	42·0	42·1	40·3	0·0	7·9	0·215	5·2	..
5	..	29·963	45·3	41·7	3·6	43·2	+ 5·6	43·0	42·8	0·4	2·0	0·0	98	50·0	40·8	42·5	40·5	0·0	7·9	0·018	0·0	..
6	..	29·803	47·3	42·7	4·6	44·8	+ 7·2	43·3	41·6	3·2	6·0	0·0	89	51·5	38·2	43·3	41·3	0·0	8·0	0·008	0·5	..
7	..	29·418	43·1	35·0	8·1	39·2	+ 1·6	37·4	35·1	4·1	8·8	1·2	86	68·7	29·5	44·3	42·1	2·5	8·0	0·005	1·5	..
8	Apogee	29·584	42·3	34·0	8·3	37·3	− 0·4	35·9	34·0	3·3	7·8	0·7	88	61·0	30·6	43·8	41·8	0·5	8·0	0·000	0·0	..
9	In Equator	29·982	39·3	33·1	6·2	35·3	− 2·4	33·9	31·7	3·6	7·1	1·7	87	64·0	28·6	43·3	41·3	1·4	8·1	0·000	0·0	..
10	..	30·141	41·4	30·8	10·6	36·3	− 1·5	34·8	32·6	3·7	5·7	0·0	87	65·6	25·8	42·8	40·8	2·0	8·1	0·000	0·0	..
11	First Qr.	30·428	38·3	25·7	12·6	31·4	− 6·5	30·1	26·8	4·6	11·3	0·0	82	53·7	19·5	42·1	39·7	1·7	8·1	0·000	0·0	..
12	..	30·472	36·2	26·5	9·7	32·2	− 5·9	31·0	28·4	3·8	7·6	0·0	85	36·3	22·0	41·1	38·7	0·0	8·2	0·000	0·0	..
13	..	30·404	44·8	36·2	8·6	40·6	+ 2·4	37·9	34·5	6·1	8·8	2·6	80	56·9	32·6	40·5	38·1	0·0	8·2	0·000	0·0	..
14	..	30·217	50·7	42·8	7·9	47·2	+ 8·9	44·9	42·4	4·8	7·4	2·9	84	59·7	40·7	39·3	36·8	0·0	8·2	0·000	6·0	..
15	..	30·113	54·2	43·5	10·7	48·8	+10·4	46·8	44·6	4·2	7·6	2·4	86	65·3	40·5	39·8	37·5	0·0	8·3	0·019	0·0	..
16	Greatest Declination N.	30·076	51·1	41·7	9·4	47·1	+ 8·6	44·4	41·4	5·7	8·8	0·2	81	78·8	38·9	40·7	38·3	1·1	8·3	0·000	0·0	..
17	..	30·218	46·6	35·7	10·9	43·2	+ 4·6	40·1	36·4	6·8	9·2	3·5	77	62·2	29·7	41·3	39·3	2·1	8·3	0·000	0·0	..
18	..	30·325	42·1	28·0	14·1	34·9	− 3·9	33·5	31·2	3·7	9·9	0·0	86	56·3	23·2	42·3	40·3	3·0	8·4	0·000	0·0	..
19	Full	30·300	45·5	29·8	15·7	39·2	+ 0·3	37·4	35·1	4·1	7·5	1·2	86	55·0	24·9	42·5	40·3	0·3	8·4	0·000	2·2	..
20	Perigee	30·182	47·2	40·6	6·6	44·5	+ 5·4	42·6	40·4	4·1	6·2	1·9	86	55·6	37·2	42·7	40·7	0·0	8·5	0·000	6·8	..
21	..	29·938	54·8	43·2	11·6	51·8	+12·5	49·9	48·1	3·7	5·8	1·0	87	61·7	45·1	42·7	40·7	0·0	8·5	0·000	10·2	..
22	In Equator	29·780	54·8	47·3	7·5	52·6	+13·1	50·4	48·2	4·4	8·0	2·0	85	61·0	42·0	44·3	41·8	0·0	8·6	0·000	11·0	..
23	..	29·574	48·4	35·6	12·8	41·9	+ 2·3	38·5	34·4	7·5	13·9	3·2	76	71·9	33·7	45·3	43·1	5·1	8·6	0·062	4·4	..
24	..	29·349	42·6	34·6	8·0	38·6	− 1·1	35·0	30·2	8·4	10·6	5·5	71	60·8	29·4	45·3	42·7	0·7	8·7	0·000	3·9	..
25	Last Qr.	29·301	36·9	29·4	7·5	32·9	− 6·9	30·8	26·6	6·3	16·0	1·6	77	63·1	25·0	44·7	42·3	3·4	8·7	0·049	0·0	..
26	..	29·750	42·0	32·1	9·9	37·7	− 2·2	34·9	31·1	6·6	10·4	3·6	78	65·5	27·4	44·3	41·3	2·4	8·8	0·000	2·0	..
27	..	29·901	39·6	29·9	9·7	35·3	− 4·7	34·0	32·0	3·3	7·5	0·0	88	47·2	25·3	42·5	40·3	0·0	8·8	0·025	1·7	..
28	..	29·628	42·5	33·3	9·2	39·7	− 0·4	38·5	36·9	2·8	6·0	0·7	90	45·9	28·5	42·1	40·1	0·0	8·9	0·394	6·3	..
29	Greatest Declination S.	29·906	40·3	30·7	9·6	35·1	− 5·1	33·5	31·0	4·1	7·6	0·7	84	61·2	25·7	41·7	39·3	2·2	8·9	0·000	0·0	..
30	..	30·099	39·5	29·7	9·8	33·9	− 6·4	32·3	29·5	4·4	10·6	0·0	84	73·2	21·0	40·8	38·8	3·6	9·0	0·000	0·0	..
31	..	30·299	39·4	31·0	8·4	34·6	− 5·8	33·2	30·9	3·7	7·6	0·6	86	61·5	24·9	40·8	38·3	2·3	9·0	0·000	3·0	..
Means	..	29·979	44·7	35·6	9·1	40·4	+ 1·7	38·7	36·2	4·2	7·9	1·2	85·2	59·5	31·5	42·4	40·2	1·1	8·4	Sum 0·868	2·1	..
Number of Column for Reference	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9^h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The results on January 12, 13, 14, and 26, for Air Temperature, and on January 9, 12, 13, 14, 18, 24, and 26, for Evaporation Temperature, depend partly on values inferred from eye-observations, and those on January 15 and 16, for Air and Evaporation Temperatures, are deduced entirely from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The amount of Sunshine from January 18 to 22 and for part of January 23 was estimated, the instrument being under alteration.

The Electrical Apparatus was not in action throughout the month.

The mean reading of the *Barometer* for the month was $29^{\text{in}}\cdot979$, being $0^{\text{in}}\cdot250$ *higher* than the average for the 20 years, 1854–1873.

TEMPERATURE OF THE AIR.

The highest in the month was $54^{\circ}\cdot8$ on January 21 and 22; the lowest in the month was $25^{\circ}\cdot7$ on January 11; and the range was $29^{\circ}\cdot1$.

The mean of all the highest daily readings in the month was $44^{\circ}\cdot7$, being $1^{\circ}\cdot2$ *higher* than the average for the 37 years, 1841–1877.

The mean of all the lowest daily readings in the month was $35^{\circ}\cdot6$, being $1^{\circ}\cdot8$ *higher* than the average for the 37 years, 1841–1877.

The mean daily range was $9^{\circ}\cdot1$, being $0^{\circ}\cdot6$ *less* than the average for the 37 years, 1841–1877.

The mean for the month was $40^{\circ}\cdot4$, being $1^{\circ}\cdot7$ *higher* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	Wind as deduced from Self-registering Anemometers. Osler's. General Direction. A.M.	Osler's. General Direction. P.M.	Osler's. Pressure on the Square Foot. Greatest.	Osler's. Pressure on the Square Foot. Least.	Osler's. Pressure on the Square Foot. Mean of 24 Hourly Measures.	Robinson's. Horizontal Movement of the Air.	Clouds and Weather. A.M.	Clouds and Weather. P.M.
			lbs.	lbs.	lbs.	miles.		
Jan. 1	WSW : SW	SSW : S	0·0	0·0	0·0	189	ho.-fr : 6, cu.-s, ci.-s, ho.-fr	10 : 10
2	SSW: SW: WSW	W : SW : SSW	0·2	0·0	0·0	173	10 : 10, th.-r	10, th.-r, m : 10, f
3	SSW	SW : SSW	2·8	0·0	0·2	297	10 : 6, ci, ci.-s, so.-ha	10 : 10, m.-r : 10, r
4	SSW : S : SSE	SE : E : ENE	1·1	0·0	0·1	230	10, r : 10, r	10, m.-r : 10, th.-r
5	ENE	SE : S : SW	0·0	0·0	0·0	92	10, m.-r : 10	10, slt.-r : 10, slt.-r : 10, fq.-m.-r
6	WSW: W: NW	NW: W: WSW	1·3	0·0	0·1	277	10, r : 10, m	10, li.-cl, glm : 10 : 10
7	WSW	WSW: SW	3·0	0·0	0·3	329	v : 6, cu, ci.-cu, ci	9, cu.-s, ci.-cu, slt.-r : 10 : v
8	NNE: N	N	5·4	0·0	0·9	393	v : 9, cu.-s, cu, ci	10, cu.-s : 10, slt.-r : 10
9	N : NNE	NNE: N	2·3	0·0	0·2	313	10 : 10, slt.-sn	1, ci.-cu : 8, cu.-s, ci.-cu : 10, d
10	N	N : NE	2·8	0·0	0·2	269	10 : 9, h	6, ci.-cu, cu, cu.-s : 8 : 0, ho.-fr
11	NE: N: NW	NE : SW	0·0	0·0	0·0	102	0, ho.-fr : 0, slt.-h, m, f: p.-cl	v, ci.-cu, cu.-s : 0, h : 0, f, ho.-fr
12	WSW	WSW : SW	0·0	0·0	0·0	174	ho.-fr, f : 10, f	10, slt.-f : 10, slt.-f
13	SW	WSW	3·3	0·0	0·7	413	10 : 10	10, slt.-r : 10
14	WSW	WSW	7·5	0·1	2·1	569	10 : 10, slt.-r, w	10, w : 10
15	WSW	W : WSW	1·6	0·0	0·3	373	10 : 10, r	10, r : 10, th.-cl : 10
16	WSW	W: WNW: NNW	9·4	0·0	1·1	491	p.-cl : 5, cu.-s, ci.-cu, ci	10 : v : 4, ci.-cu
17	NNW	NNW : N	2·9	0·0	0·2	242	v : 0, h	2, ci.-cu, cu : 10 : 6, ci.-cu, li.-cl
18	N : NE	Calm	0·0	0·0	0·0	37	ho.-fr : li.-cl, f, ho.-fr	10, f : tk.-f
19	Calm	SW : SSW	0·3	0·0	0·0	140	10, f, ho.-fr : 10, f	10, slt.-f : 10 : 9
20	SSW : SW	SSW	6·4	0·0	1·0	459	v : 10, sh.-r	10 : 10, st.-w
21	SW: WSW	WSW	17·8	0·6	4·3	781	10 : 10, st.-w	10, st.-w : 10, g
22	WSW : SW	WSW	12·5	0·2	2·5	654	10, st.-w : 10, w, th.-r	10, th.-r : 10, w, th.-r : 5, cu, ci.-cu, g
23	WSW : W	WSW : W	17·3	0·3	3·6	739	v, r, st.-w : ci.-cu	8, ci.-s, cu.-s, sc, st.-w : v, ci.-cu, cu, sh.-r, w : 0, w, l
24	W	W : NW	6·5	0·0	1·0	442	v : 10	10 : 10, th.-cl : 10
25	SW : NW	NNW:NW:WSW	11·0	0·0	1·7	485	10 : 10, slt.-sn, th.-r, w	v, st.-w : 1, li.-cl : 10
26	NNW : N	N : NNW	6·8	0·0	0·8	309	v, ho.-fr, w : 3, cu, ci.-cu	3, ci.-cu, cu : 10 : 10
27	SW : SE	SSE	2·6	0·0	0·1	151	10, ho.-fr : 10, m	10, r : 10, r : 10, r
28	S : SSW	NNW : NW	3·7	0·0	0·5	355	10, r : 10, th.-r, slight earthquake	10, glm, hy.-r : 10 : 0, ho.-fr
29	W : WNW	NW : NNW	1·6	0·0	0·1	269	0, ho.-fr : 3, f, ho.-fr	9, ci.-cu, cu.-s, ci, slt.-f : v : 0, ho.-fr
30	NNW: N: NNE	NNE	1·4	0·0	0·1	209	ho.-fr : 8, cu, m, ho.-fr	v, cu, ci.-cu, cu.-s : 0, ho.-fr
31	NNE	N : NNE	2·1	0·0	0·1	265	ho.-fr : 10, slt.-m	v, cu, ci.-cu, ci : 10
Means	...	...	..	..	0·7	330		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was $38^{\circ}\cdot 7$, being $1^{\circ}\cdot 3$ *higher* than
The mean *Temperature of the Dew Point* for the month was $36^{\circ}\cdot 2$, being $0^{\circ}\cdot 8$ *higher* than
The mean *Degree of Humidity* for the month was 85·2, being 2·1 *less* than
The mean *Elastic Force of Vapour* for the month was $0^{\text{in}}\cdot 214$, being $0^{\text{in}}\cdot 007$ *greater* than
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was $2^{\text{grs}}\cdot 5$, being $0^{\text{gr}}\cdot 1$ *greater* than
The mean *Weight of a Cubic Foot of Air* for the month was 555 grains, being 3 grains *greater* than
} the average for the 20 years, 1849-1868.

The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 7·8.
The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·13. The maximum daily amount of *Sunshine* was 5·1 hours on January 23.
The highest reading of the *Solar Radiation Thermometer* was $78^{\circ}\cdot 8$ on January 16; and the lowest reading of the *Terrestrial Radiation Thermometer* was $19^{\circ}\cdot 5$ on January 11.
The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 1·3; for the 6 hours ending 3 p.m., 0·5; and for the 6 hours ending 9 p.m., 0·3.
The *Proportions of Wind* referred to the cardinal points were N. 8, E. 2, S. 8, and W. 12. One day was calm.
The *Greatest Pressure of the Wind* in the month was $17^{\text{lbs}}\cdot 8$ on the square foot on January 21. The mean daily *Horizontal Movement of the Air* for the month was 330 miles; the greatest daily value was 781 miles on January 21; and the least daily value 37 miles on January 18.
Rain fell on 11 days in the month, amounting to $0^{\text{in}}\cdot 868$, as measured in the simple cylinder gauge partly sunk below the ground; being $1^{\text{in}}\cdot 272$ *less* than the average fall for the 37 years, 1841–1877.

MONTH and DAY, 1878.	Phases of the Moon.	Barometer. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Lowest.	Daily Range.	Mean of 24 Hourly Values.	Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	Temperature. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
Feb. 1	..	30·350	41·4	29·9	11·5	35·8	− 4·7	33·1	29·0	6·8	10·8	4·3	75	68·3	26·4	39·3	36·8	3·7	9·1	0·000	0·0	..
2	New	30·213	42·8	32·7	10·1	38·2	− 2·4	37·3	36·0	2·2	3·7	0·7	92	51·3	28·0	39·3	36·8	0·0	9·2	0·005	1·0	..
3	..	30·233	43·1	38·7	4·4	40·9	+ 0·2	39·4	37·5	3·4	5·3	0·7	88	52·8	36·8	38·7	36·3	0·0	9·2	0·004	1·5	..
4	..	30·363	40·6	38·0	2·6	39·4	− 1·3	38·3	36·9	2·5	5·1	0·5	91	50·3	37·7	38·8	36·8	0·0	9·3	0·030	11·9	..
5	Apogee: In Equator.	30·424	38·6	35·7	2·9	37·2	− 3·4	35·5	33·2	4·0	5·5	1·2	85	44·0	35·4	39·3	37·3	0·0	9·3	0·007	11·4	..
6	..	30·396	39·3	30·2	9·1	34·9	− 5·5	33·6	31·5	3·4	6·4	0·0	87	50·2	19·7	39·3	37·3	0·0	9·4	0·000	6·8	..
7	..	30·431	35·1	26·0	9·1	32·8	− 7·4	32·1	30·8	2·0	4·7	0·0	92	43·9	23·8	39·3	37·3	0·0	9·4	0·000	0·0	..
8	..	30·404	38·7	25·1	13·6	30·2	− 9·7	30·1	29·8	0·4	4·1	0·0	99	65·3	22·7	39·3	37·3	3·8	9·5	0·000	0·0	..
9	..	30·149	33·9	29·5	4·4	32·4	− 7·2	31·7	30·2	2·2	4·5	0·0	92	40·8	29·5	39·3	37·3	0·0	9·6	0·007	0·0	..
10	First Qr.	29·810	42·7	32·4	10·3	38·4	− 0·9	38·0	37·5	0·9	4·4	0·0	97	49·5	31·8	38·8	37·3	0·0	9·6	0·165	0·0	..
11	..	29·795	43·3	35·6	7·7	39·1	0·0	37·8	36·1	3·0	7·7	0·0	89	54·7	34·1	39·3	37·8	0·0	9·7	0·000	0·0	..
12	..	30·024	44·8	33·7	11·1	37·7	− 1·2	35·3	32·0	5·7	13·6	0·0	80	93·6	30·2	39·8	38·1	6·1	9·8	0·030	9·5	..
13	Greatest Declination N.	29·806	50·8	34·7	16·1	44·6	+ 5·8	43·1	41·3	3·3	6·4	0·2	88	69·0	32·3	39·8	38·3	0·0	9·8	0·080	8·0	..
14	..	29·705	49·4	41·3	8·1	46·2	+ 7·5	45·4	44·5	1·7	4·4	0·0	94	53·5	36·2	41·1	38·7	0·0	9·9	0·505	6·5	..
15	..	29·893	51·3	36·0	15·3	44·7	+ 6·0	43·9	43·0	1·7	4·6	0·2	94	79·3	32·4	42·1	39·3	0·3	9·9	0·020	5·6	..
16	..	30·102	53·7	41·1	12·6	46·9	+ 8·1	45·5	44·0	2·9	6·8	0·4	90	87·6	37·8	43·3	40·3	1·8	10·0	0·005	3·6	..
17	Full	30·036	60·5	46·4	14·1	52·0	+13·1	48·7	45·3	6·7	12·7	1·0	78	96·3	44·5	44·5	42·3	5·5	10·1	0·000	8·5	..
18	Perigee	29·975	55·0	39·7	15·3	48·9	+ 9·9	45·6	42·1	6·8	16·0	1·9	77	100·1	35·0	45·8	43·1	4·0	10·1	0·032	0·8	..
19	In Equator	30·241	51·7	36·2	15·5	42·0	+ 2·8	40·5	38·7	3·3	10·8	0·0	88	81·7	32·1	46·3	43·8	1·3	10·2	0·000	2·0	..
20	..	30·144	46·8	40·7	6·1	43·5	+ 4·2	42·1	40·4	3·1	4·4	1·1	89	60·0	36·8	46·7	44·1	0·0	10·3	0·000	12·0	..
21	..	30·390	52·7	37·7	15·0	46·4	+ 6·9	44·3	41·9	4·5	12·4	0·7	85	71·0	31·0	46·8	44·3	3·7	10·3	0·000	0·0	..
22	..	30·432	49·4	45·9	3·5	47·7	+ 8·1	46·4	44·9	2·8	4·4	1·3	91	54·2	45·0	46·8	44·3	0·0	10·4	0·000	0·0	..
23	..	30·230	53·1	43·9	9·2	46·9	+ 7·2	44·2	41·1	5·8	11·2	2·4	81	84·4	38·0	47·3	45·3	1·3	10·5	0·000	0·3	..
24	Last Qr.	30·056	48·4	41·1	7·3	44·9	+ 5·1	42·5	39·7	5·2	8·4	2·9	82	60·7	36·3	47·5	45·3	0·0	10·5	0·000	1·3	..
25	Greatest Declination S.	29·954	53·7	41·9	11·8	46·0	+ 6·1	43·0	39·6	6·4	10·0	2·6	79	88·0	37·0	47·5	45·3	1·0	10·6	0·000	1·5	..
26	..	29·932	52·1	41·7	10·4	47·0	+ 7·0	44·5	41·7	5·3	10·4	2·6	83	76·0	37·3	47·5	45·3	0·4	10·7	0·000	1·2	..
27	..	29·722	51·9	43·3	8·6	47·5	+ 7·4	45·6	43·5	4·0	6·7	2·1	87	76·2	41·0	47·7	45·8	0·0	10·7	0·185	8·0	..
28	..	29·706	54·4	47·4	7·0	50·9	+10·7	49·3	47·6	3·3	5·0	2·0	89	66·1	44·0	47·7	45·8	0·0	10·8	0·021	5·5	..
Means	..	30·104	47·1	37·4	9·7	42·3	+ 2·6	40·6	38·6	3·7	7·5	1·0	87·2	66·7	34·0	42·8	40·6	1·2	9·9	Sum 1·096	3·8	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h. a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The results on February 4, 12, and 13 for Air and Evaporation Temperatures depend partly on values inferred from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The Electrical Apparatus was not in action throughout the month.

The mean reading of the *Barometer* for the month was 30in·104, being 0in·272 *higher* than the average for the 20 years, 1854–1873.

Temperature of the Air.

The highest in the month was 60°·5 on February 17; the lowest in the month was 25°·1 on February 8; and the range was 35°·4.
The mean of all the highest daily readings in the month was 47°·1, being 1°·6 *higher* than the average for the 37 years, 1841–1877.
The mean of all the lowest daily readings in the month was 37°·4, being 3°·2 *higher* than the average for the 37 years, 1841–1877.
The mean daily range was 9°·7, being 1°·6 *less* than the average for the 37 years, 1841–1877.
The mean for the month was 42°·3, being 2°·6 *higher* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	Wind as deduced from Self-registering Anemometers. Osler's. General Direction. A.M.	P.M.	Pressure on the Square Foot. Greatest.	Least.	Mean of 24 Hourly Measures.	Robinson's. Horizontal Movement of the Air.	Clouds and Weather. A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
Feb. 1	NNE : N	N : NNW	0·5	0·0	0·0	153	10 : 9	7, th.-cl, h : v, th.-cl, h : 10, m
2	W : N	N	1·3	0·0	0·1	190	10 : 10, m, th.-r	10, th.-r : 10, th.-r, m
3	N : NNW	NNE	0·9	0·0	0·1	239	10 : 10	10 : 10
4	NNE : E	NE : SE	0·0	0·0	0·0	110	10 : 10, m.-r	10 : 10
5	ESE : SE	SE	0·0	0·0	0·0	86	10, th.-r	10 : 10
6	SE	SE : ENE	0·0	0·0	0·0	91	10 : 10	10 : 0 : 0, ho.-fr, f
7	NE : N	S : SW	0·0	0·0	0·0	93	f : f	h, slt.-f : 0, ho.-fr
8	WSW	SW	0·0	0·0	0·0	139	tk.-f, ho.-fr : tk.-f	0 : f, ho.-fr
9	SSE	SSW : SW	0·0	0·0	0·0	110	10 : 10, th.-r	10 : 10
10	SW	SW : NNE	0·0	0·0	0·0	62	10, r : 10, r	10, f, th.-r : 10, f, th.-r
11	NE : ENE	ENE : ESE	0·0	0·0	0·0	109	10 : 10	10 : 10, slt.-m
12	NE : E : SE	SE	2·6	0·0	0·2	229	10 : 4, cu, ci.-cu	v, cu, ci.-cu, ci : 1, li.-cl, lu.-ha : 8,cu,ci.-cu,ci.-s,r
13	SSE : SW	SW : SSW	3·6	0·0	0·5	304	fq.-r : 10, th.-r	10 : lu.-ha
14	ESE : S	SSW : SW	2·9	0·0	0·4	258	r : 10, r	10, th.-r : v : 9, cu.-s, cu
15	S : SSE	S : SW : WSW	2·0	0·0	0·3	288	10 : 10, th.-cl, f	10, th.-r : 10, th.-r : v
16	SW	SW	2·3	0·0	0·2	354	v : cu.-s, ci, ci.-s	so.-ha : 10, th.-r : 10, th.-r
17	SW : SSW	SSW	3·4	0·0	0·3	338	v : 9, th.-cl	1, ci : 4, cu.-s, ci.-cu
18	SW : W	W : WSW	2·4	0·0	0·5	374	r : 10	7,cu.-s,cu,so.-ha: v, cu.-s, cu : 0
19	WSW : SW	SSW : S	1·0	0·0	0·0	193	0 : v : 10, f	th.-cl, so.-ha : v, th.-cl : 9, th.-cl
20	S : SSW	SW : WSW	1·3	0·0	0·1	303	10 : 10, slt.-r	10, slt.-sh : 10
21	WSW : W	NW : WSW	0·5	0·0	0·0	191	f : 1, h, f	4,ci,cu.-s,cu,h,slt.-f: 10, slt.-f : 10, slt.-f
22	W : WSW	SW	0·0	0·0	0·0	101	slt.-f : 10, slt.-f, glm	10, oc.-th.-r : 10, oc.-th.-r
23	WSW : SSW	SW : NNW : N	0·0	0·0	0·0	90	10 : 10, th.-cl, m	v, cu, cu.-s : 10 : 10
24	N : SW	NW : WSW	0·0	0·0	0·0	98	10 : 10, slt.-f	10, tk.-f : 10 : 10
25	WSW	W : WNW : WSW	1·6	0·0	0·2	297	10 : 9, cu.-s, cu, ci.-cu	9, cu.-s, cu, ci.-cu : 0
26	WSW	SW	2·1	0·0	0·5	429	v : 9, cu, ci.-cu, ci.-s, ci	10, slt.-r : 10, slt.-r
27	SSW	SSW : SW : WSW	9·7	0·0	0·7	440	10 : 10	10 : 10, r, w : 10, r, w
28	WSW : SW	WSW	4·4	0·0	0·7	460	10 : 10, th.-r	10, r : 10, oc.-r : 10
Means	...	...	..	..	0·2	219		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 40°·6, being 2°·7 *higher* than
The mean *Temperature of the Dew Point* for the month was 38°·6, being 3°·2 *higher* than
The mean *Degree of Humidity* for the month was 87·2, being 2·4 *greater* than
The mean *Elastic Force of Vapour* for the month was 0in·234, being 0in·027 *greater* than
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was 2grs·7, being 0gr·3 *greater* than
The mean *Weight of a Cubic Foot of Air* for the month was 556 grains, being 2 grains *greater* than
} the average for the 20 years, 1849–1868.

The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 8·4.

The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·12. The maximum daily amount of *Sunshine* was 6·1 hours on February 12.

The highest reading of the *Solar Radiation Thermometer* was 100°·1 on February 18; and the lowest reading of the *Terrestrial Radiation Thermometer* was 19°·7 on February 6.

The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 2·3; for the 6 hours ending 3 p.m., 0·9; and for the 6 hours ending 9 p.m., 0·6.

The *Proportions of Wind* referred to the cardinal points were N. 5, E. 4, S. 10, and W. 9.

The *Greatest Pressure of the Wind* in the month was 9lbs·7 on the square foot on February 27. The mean daily *Horizontal Movement of the Air* for the month was 219 miles; the greatest daily value was 460 miles on February 28; and the least daily value 62 miles on February 10.

Rain fell on 13 days in the month, amounting to 1in·096, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·293 *less* than the average fall for the 37 years, 1841–1877.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Daily Range.	Of the Air. Mean of 24 Hourly Values.	Of the Air. Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Of the Water of the Thames off Greenwich. Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
Mar. 1	..	29·580	56·8	50·2	6·6	52·9	+12·6	51·2	49·5	3·4	5·7	1·4	88	73·6	48·0	48·3	46·7	0·0	10·8	0·110	14·0	..
2	..	29·772	56·4	45·5	10·9	51·9	+11·5	47·8	43·7	8·2	14·4	1·6	73	96·5	41·0	49·3	47·5	2·8	10·9	0·022	5·3	..
3	..	30·231	57·3	39·0	18·3	47·8	+ 7·3	44·3	40·4	7·4	14·6	0·2	76	96·2	33·4	50·1	48·1	6·7	11·0	0·000	0·5	..
4	New: Apogee	30·336	56·9	41·1	15·8	47·5	+ 7·0	45·0	42·2	5·3	12·0	0·0	82	100·9	36·0	49·9	47·9	4·1	11·1	0·000	3·5	..
5	In Equator	30·282	53·0	42·6	10·4	46·6	+ 6·1	41·7	36·3	10·3	16·2	7·0	67	97·7	36·9	50·7	48·3	5·0	11·1	0·000	1·7	..
6	..	29·890	55·2	45·8	9·4	50·6	+10·1	46·5	42·4	8·2	12·4	2·0	73	67·0	41·6	50·3	48·1	0·0	11·2	0·000	5·3	..
7	..	29·831	56·1	46·7	9·4	50·1	+ 9·5	46·5	42·5	7·6	9·3	6·9	75	73·7	43·8	50·7	47·9	0·3	11·2	0·000	0·5	..
8	..	29·845	49·1	40·0	9·1	44·4	+ 3·8	38·8	32·1	12·3	16·0	7·0	62	93·0	35·7	50·7	48·1	1·9	11·3	0·000	2·2	..
9	..	30·005	43·8	34·0	9·8	39·1	− 1·6	35·2	30·1	9·0	14·5	4·9	71	76·7	28·7	49·3	47·1	1·4	11·4	0·000	3·3	..
10	..	29·868	51·0	40·7	10·3	44·8	+ 4·1	43·6	42·2	2·6	9·4	0·0	91	70·2	38·7	49·3	46·8	0·3	11·4	0·081	0·0	..
11	..	30·058	51·9	38·8	13·1	46·0	+ 5·2	43·3	40·3	5·7	10·0	3·9	80	66·9	35·0	48·7	46·7	0·2	11·5	0·000	0·0	..
12	First Quarter: Greatest Dec. N.	30·076	51·3	38·0	13·3	46·0	+ 5·2	42·0	37·4	8·6	15·2	1·0	73	102·9	29·3	48·3	46·3	6·7	11·6	0·012	0·0	..
13	..	30·185	45·4	33·7	11·7	39·4	− 1·5	35·1	29·5	9·9	16·1	5·2	68	91·1	25·0	48·8	45·8	4·2	11·6	0·000	4·0	..
14	..	30·303	49·5	28·6	20·9	38·6	− 2·4	34·3	28·6	10·0	18·0	3·6	67	99·8	18·2	47·5	45·3	4·2	11·7	0·000	0·0	..
15	..	30·262	45·1	28·1	17·0	37·5	− 3·6	33·9	28·8	8·7	14·7	3·0	71	90·9	15·5	47·1	45·3	1·2	11·8	0·000	0·0	..
16	..	30·441	43·6	27·8	15·8	35·8	− 5·4	31·3	24·5	11·3	15·0	4·7	63	95·0	19·0	47·3	45·3	2·3	11·8	0·000	0·0	..
17	..	30·366	49·9	25·1	24·8	37·5	− 3·8	34·7	30·8	6·7	13·4	0·5	77	84·3	16·7	47·3	45·3	1·1	11·9	0·000	2·0	..
18	Perigee: In Equator: Full.	30·151	53·1	39·1	14·0	47·1	+ 5·7	44·2	40·9	6·2	12·4	2·4	79	63·4	32·1	47·3	45·3	0·0	12·0	0·000	0·0	..
19	..	30·122	51·7	46·6	5·1	48·3	+ 6·9	45·9	43·3	5·0	7·2	3·4	83	58·7	43·7	47·3	45·3	0·0	12·0	0·000	0·0	..
20	..	30·229	54·6	44·7	9·9	48·0	+ 6·5	44·5	40·7	7·3	13·4	3·5	76	72·2	41·7	47·1	44·8	0·0	12·1	0·000	0·0	..
21	..	30·096	53·1	43·9	9·2	48·3	+ 6·7	43·7	38·6	9·7	15·2	4·0	69	70·8	40·2	47·3	45·3	0·0	12·2	0·000	0·0	..
22	..	29·808	46·0	33·7	12·3	40·8	− 0·9	36·5	31·0	9·8	14·3	5·9	67	94·0	25·4	47·1	45·3	2·0	12·2	0·000	0·0	..
23	..	29·576	45·3	27·9	17·4	35·2	− 6·6	31·2	24·9	10·3	20·5	3·1	65	92·9	20·9	46·7	44·7	6·8	12·3	0·000	0·0	..
24	Greatest Declination S.	29·392	47·4	24·3	23·1	33·3	− 8·7	30·7	25·7	7·6	19·7	0·0	73	99·5	13·5	46·3	44·3	4·8	12·4	0·015	0·2	..
25	Last Qr.	29·530	46·4	28·5	17·9	35·0	− 7·3	32·5	28·5	6·5	14·5	0·5	76	94·2	21·0	46·3	43·8	3·2	12·4	0·013	0·8	..
26	..	29·874	48·4	26·0	22·4	36·3	− 6·6	32·6	27·1	9·2	19·9	0·0	69	91·8	19·6	45·3	43·5	3·9	12·5	0·000	0·0	..
27	..	29·660	48·5	32·2	16·3	38·3	− 4·7	34·2	28·7	9·6	17·4	3·8	68	94·0	24·0	44·8	42·8	4·1	12·6	0·008	0·0	..
28	..	29·343	44·6	29·3	15·3	35·7	− 7·7	33·6	30·4	5·3	14·1	0·0	80	76·1	23·5	44·8	42·9	0·0	12·6	0·207	3·7	..
29	..	29·065	35·8	32·3	3·5	33·8	−10·0	32·5	30·1	3·7	8·2	0·6	86	44·7	32·0	44·3	42·3	0·0	12·7	0·387	10·3	..
30	..	29·142	40·8	30·8	10·0	35·2	− 9·1	32·9	29·2	6·0	10·6	1·0	78	74·4	28·5	43·5	41·3	2·2	12·8	0·073	2·0	..
31	Apogee	29·255	45·8	29·1	16·7	38·1	− 6·7	35·0	30·8	7·3	16·5	2·1	74	98·7	22·9	42·5	40·3	3·7	12·8	0·130	6·0	..
Means	..	29·889	49·5	35·9	13·5	42·3	+ 0·7	38·9	34·6	7·7	13·9	2·7	74·2	83·9	30·0	47·6	45·4	2·4	11·8	Sum 1·058	2·1	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h. a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The results on March 3, 4, and 13 for Air Temperature, and on March 4, 13, and 16 for Evaporation Temperature, depend partly on values inferred from eye-observations, and those from March 5 to 11 for Air and Evaporation Temperatures are deduced entirely from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The Electrical Apparatus was not in action throughout the month.

The mean reading of the *Barometer* for the month was 29in·889, being 0in·167 *higher* than the average for the 20 years, 1854–1873.

TEMPERATURE OF THE AIR.

The highest in the month was 57°·3 on March 3; the lowest in the month was 24°·3 on March 24; and the range was 33°·0.
The mean of all the highest daily readings in the month was 49°·5, being 0°·3 *lower* than the average for the 37 years, 1841–1877.
The mean of all the lowest daily readings in the month was 35°·9, being 0°·7 *higher* than the average for the 37 years, 1841–1877.
The mean daily range was 13°·5, being 1°·1 *less* than the average for the 37 years, 1841–1877.
The mean for the month was 42°·3, being 0°·7 *higher* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	WIND AS DEDUCED FROM SELF-REGISTERING ANEMOMETERS.						CLOUDS AND WEATHER.	
	OSLER'S.					ROBINSON'S.		
	General Direction.		Pressure on the Square Foot.			Horizontal Movement of the Air.		
	A.M.	P.M.	Greatest.	Least.	Mean of 24 Hourly Measures.		A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
Mar. 1	SW	SW	13·5	0·0	2·8	646	r : 10, r, w	10,oc.-r,st.-w: 10, slt.-r, st.-w : 10, r, w
2	WSW : NNW	NNW : NW	3·3	0·0	0·3	316	r : 10	6, ci.-cu, cu.-s : 8, ci.-cu, cu.-s
3	W : WSW	WSW : SW	0·6	0·0	0·1	233	v : 1, ci, h	3,ci,cu.-s,cu,h: 0 : 0, m
4	WSW	SW : WSW	5·5	0·0	0·5	353	v : 10	6,ci,ci.-s,ci.-cu: v, ci, ci.-s : 10
5	WSW : NW : WNW : W	WSW : SW	5·5	0·0	1·1	438	v : 8, ci, ci.-s	1,ci.-cu,h,w: 9, th.-cl : 10, slt.-r
6	WSW	WSW : WNW : NW	21·8	0·2	3·0	692	st.-w : 10, st.-w	10, st.-w : 10, st.-w : 10, st.-w
7	NW : W	WSW : WNW : W	8·3	0·0	1·8	546	v : 7, ci, cu	10, w : 10, st.-w
8	NNW : NW	NW	17·5	0·1	2·9	614	g : 10, st.-w, slt.-r	v,ci.-cu,cu,cu.-s: 8,cu.-s,ci.-cu: 10
9	N : NE	SW : WSW : SSW	2·1	0·0	0·1	178	v : 10	10, th.-cl : 10, oc.-th.-r : 10
10	SW : WSW	NNW : NW : W	2·0	0·0	0·3	303	10 : 10, glm, r	10, gt.-glm : vv, ci.-cu, lu.-ha : 0
11	WSW : W	W	4·0	0·0	0·7	424	v : 10, th.-cl	10 : 10 : 9, w
12	W : NNE	N : NNE : SW	3·0	0·0	0·3	267	v, w, slt.-r : th.-cl	1, th.-cl : 9, th.-cl : 10, th.-cl, f
13	N	N : NNE	15·7	0·0	1·1	375	v : 2, ci.-cu, w	9, cu.-s, cu : 10,th.-r,st.-w: 0
14	N : W	N	1·6	0·0	0·1	175	0, ho.-fr : 2, li.-cl, tk.-f, ho.-fr	7,ci.-s,ci,ci.-cu: v, so.-ha : 0, m
15	N : NNE	NE : E	2·6	0·0	0·4	260	v : 8, cu.-s, ci.-cu, ci	10 : 0, ho.-fr
16	N : NE	ENE : SE	1·6	0·0	0·1	204	v : 10	8,ci.-cu,ci.-s: v, lu.-co : 0, ho.-fr
17	WSW	N : NW	1·9	0·0	0·1	210	v : 10, tk.-f	8,ci.-cu,cu.-s,f,h: 10 : 10, m
18	WNW : NW	NNW	6·6	0·0	0·5	307	10 : 10, m	10, slt.-f : 10 : 10, slt.-r
19	NNW	N : NNE	0·5	0·0	0·0	188	10, f : 10, slt.-f	10 : 10
20	W : WSW	WSW : NW	0·7	0·0	0·0	172	10 : 10, slt.-f	10, th.-cl, slt.-f : 10 : 10
21	WSW	WNW : W	1·0	0·0	0·1	249	10 : 10, f	9,cu.-s,ci.-cu,cu: 10 : 10
22	NW : NNW : N	N : NNE	1·5	0·0	0·2	243	v : 9, cu.-s, cu	10 : v,cu.-s,ci.-cu,ci.-s: 10
23	N : NNW	NW : W	2·1	0·0	0·3	284	0, ho.-fr : 4, ci.-cu, cu	8,cu.-s,ci.-cu: 1,th.-cl,slt.-f: 1,th.-cl,slt.-f,m
24	WSW : NW	W : NW : N	10·0	0·0	0·3	210	sn, ho.-fr : 10	6, cu.-s, cu, h, sn, hy.-sqs: v, sn
25	N	N : NW	15·0	0·0	1·5	385	sn : 9, cu.-s, ci.-cu, w, slt.-r	9, cu.-s, ci.-cu, w, oc.-r : 0, ho.-fr
26	WNW : WSW	NW : W : WSW	0·7	0·0	0·0	218	f, ho.-fr : 8, th.-cl	6, ci.-cu, ci, h : 5,cu.-s,ci.-cu,so.-ha: 0, ho.-fr, f
27	WSW : NW	N : NE : E : SE	1·6	0·0	0·2	241	v : 10, sn	5, ci.-cu, cu.-s, cu : 0, slt.-m, ho.-fr
28	E	E	8·3	0·0	1·1	372	v : 10	10, sn, r, st.-w : 10, sn, r, st.-w
29	E : NE	NE : N	18·0	0·5	3·4	743	10, sn, r, st.-w : 10, sn, w	10, st.-w : 10, st.-w
30	N	N : NNW	11·0	0·1	2·0	502	v, w, sn : 9, ci.-cu, cu, w	10, sn, r, st.-w : 0
31	NW : W	SW	7·0	0·0	0·9	438	v : 8, ci.-cu, cu	10,oc.-shs,w: 10, oc.-shs : 10, r, sn
Means	...	...	..	..	0·8	348		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 38°·9, being 0°·1 *lower* than the average for the 20 years, 1849–1868.
The mean *Temperature of the Dew Point* for the month was 34°·6, being 1°·4 *lower* than the average for the 20 years, 1849–1868.
The mean *Degree of Humidity* for the month was 74·2, being 6·7 *less* than the average for the 20 years, 1849–1868.
The mean *Elastic Force of Vapour* for the month was $0^{in}\cdot200$, being $0^{in}\cdot012$ *less* than the average for the 20 years, 1849–1868.
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was $2^{grs}\cdot4$, being $0^{gr}\cdot1$ *less* than the average for the 20 years, 1849–1868.
The mean *Weight of a Cubic Foot of Air* for the month was 552 grains, being 2 grains *greater* than the average for the 20 years, 1849–1868.
The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 7·7.
The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·20. The maximum daily amount of *Sunshine* was 6·8 hours on March 23.
The highest reading of the *Solar Radiation Thermometer* was 102°·9 on March 12; and the lowest reading of the *Terrestrial Radiation Thermometer* was 13°·5 on March 24.
The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 1·4; for the 6 hours ending 3 p.m., 0·4; and for the 6 hours ending 9 p.m., 0·3.
The *Proportions of Wind* referred to the cardinal points were N. 12, E. 3, S. 3, and W. 13.
The *Greatest Pressure of the Wind* in the month was $21^{lbs}\cdot8$ on the square foot on March 6. The mean daily *Horizontal Movement of the Air* for the month was 348 miles; the greatest daily value was 743 miles on March 29; and the least daily value 172 miles on March 20.
Rain fell on 11 days in the month, amounting to $1^{in}\cdot058$, as measured in the simple cylinder gauge partly sunk below the ground; being $0^{in}\cdot445$ *less* than the average fall for the 37 years, 1841–1877.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Lowest.	Daily Range.	Mean of 24 Hourly Values.	Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
Apr. 1	In Equator	29.006	47.1	26.9	20.2	37.0	− 8.3	33.9	29.5	7.5	15.8	0.9	74	106.3	23.0	42.1	39.8	4.5	12.9	0.013	2.7	..
2	New	29.148	50.9	33.0	17.9	41.0	− 4.7	37.0	32.0	9.0	15.3	3.8	70	107.5	29.7	41.8	39.8	8.1	13.0	0.009	6.8	..
3	..	29.341	45.2	35.7	9.5	40.4	− 5.7	39.2	37.7	2.7	4.4	1.0	90	62.0	29.7	42.3	40.3	0.4	13.0	0.166	6.5	..
4	..	29.586	54.3	33.0	21.3	42.7	− 3.7	39.6	35.8	6.9	17.0	0.0	77	105.6	28.0	42.3	40.3	5.5	13.1	0.000	0.0	..
5	..	29.714	51.9	34.9	17.0	41.6	− 5.0	39.3	36.4	5.2	10.9	1.0	83	107.3	28.1	42.5	40.3	5.4	13.2	0.062	0.0	..
6	..	29.955	56.7	30.1	26.6	41.8	− 4.9	38.9	35.3	6.5	15.8	0.0	79	112.1	23.9	43.5	41.3	7.0	13.2	0.000	3.2	..
7	..	29.988	50.4	32.1	18.3	41.8	− 5.0	39.4	36.5	5.3	10.9	0.0	82	110.3	24.8	44.1	41.5	10.4	13.3	0.000	3.0	..
8	Greatest Declination N.	29.799	51.1	35.3	15.8	43.8	− 3.0	40.4	36.4	7.4	14.4	0.0	75	112.0	32.6	44.8	42.3	12.3	13.4	0.000	22.5	..
9	..	29.801	52.1	38.4	13.7	43.8	− 3.1	40.8	37.3	6.5	12.8	3.7	77	119.2	33.0	45.3	42.5	7.9	13.4	0.000	13.0	..
10	First Qr.	29.746	51.9	40.9	11.0	45.6	− 1.3	42.6	39.2	6.4	13.2	2.3	79	102.2	39.8	46.1	43.3	0.8	13.5	0.314	16.7	..
11	..	29.833	50.3	43.7	6.6	45.7	− 1.3	44.8	43.8	1.9	4.0	0.9	94	67.6	38.8	47.1	44.1	0.3	13.6	2.510	4.5	..
12	..	29.969	60.4	37.7	22.7	49.1	+ 2.0	45.4	41.4	7.7	17.5	0.2	75	119.7	27.9	47.1	44.3	11.8	13.6	0.000	8.5	..
13	..	29.876	62.6	37.6	25.0	49.7	+ 2.5	45.4	40.8	8.9	23.0	0.0	72	120.3	30.7	47.8	45.3	1.9	13.7	0.028	7.8	..
14	..	29.828	63.9	47.4	16.5	54.5	+ 7.1	50.3	46.3	8.2	17.6	2.7	74	99.5	41.3	48.8	46.3	0.9	13.7	0.000	12.5	..
15	In Equator: Perigee.	29.844	63.1	44.4	18.7	53.0	+ 5.5	49.5	46.0	7.0	13.5	1.3	77	117.0	37.4	49.8	47.3	3.7	13.8	0.000	4.2	..
16	..	29.668	54.8	44.8	10.0	50.3	+ 2.7	49.0	47.6	2.7	4.4	1.3	91	74.4	38.2	51.3	48.3	0.0	13.9	0.116	1.7	..
17	Full	29.567	60.2	45.7	14.5	50.6	+ 2.8	48.3	45.9	4.7	12.0	1.0	84	115.8	44.1	51.3	48.8	3.3	13.9	0.158	5.3	..
18	..	29.589	64.3	41.7	22.6	50.1	+ 2.2	47.3	44.3	5.8	19.8	0.0	81	117.5	34.9	52.8	49.3	4.9	14.0	0.000	6.0	..
19	..	29.523	64.3	41.5	22.8	52.1	+ 4.1	49.6	47.1	5.0	15.8	0.7	83	114.0	35.0	52.3	49.8	4.0	14.1	0.024	14.7	..
20	..	29.368	56.3	45.5	10.8	52.5	+ 4.4	51.0	49.5	3.0	8.6	0.0	90	75.0	39.0	53.3	50.3	1.1	14.1	0.427	5.3	..
21	Greatest Declination S.	29.501	62.3	44.7	17.6	51.9	+ 3.7	48.3	44.7	7.2	14.6	0.8	76	122.7	37.3	53.3	50.3	8.4	14.2	0.093	2.0	..
22	..	29.649	60.3	44.7	15.6	51.0	+ 2.8	48.9	46.7	4.3	12.5	0.0	85	107.3	38.8	54.3	51.3	1.2	14.2	0.000	13.8	..
23	..	29.449	59.1	44.7	14.4	50.9	+ 2.6	49.0	47.0	3.9	9.5	0.0	87	101.2	44.1	54.8	52.3	2.7	14.3	0.000	15.2	..
24	Last Qr.	29.416	60.8	49.0	11.8	52.1	+ 3.8	50.2	48.3	3.8	8.7	0.4	87	96.1	44.6	54.8	52.3	1.2	14.4	0.105	10.0	..
25	..	29.617	62.8	43.8	19.0	50.2	+ 1.8	46.6	42.8	7.4	13.7	2.4	77	121.4	40.9	55.3	53.3	8.0	14.4	0.000	1.5	..
26	..	29.865	60.6	42.3	18.3	48.6	+ 0.2	44.6	40.3	8.3	15.6	4.0	73	122.5	39.0	55.3	53.3	9.0	14.5	0.000	11.5	..
27	..	30.017	65.5	39.1	26.4	49.9	+ 1.5	45.5	40.9	9.0	21.9	1.8	71	125.8	31.3	55.3	52.7	10.1	14.5	0.000	7.3	..
28	Apogee: In Equator.	29.991	60.4	39.6	20.8	49.0	+ 0.5	45.4	41.5	7.5	18.2	0.7	75	125.1	37.1	55.3	52.8	9.7	14.6	0.000	15.8	..
29	..	29.741	64.9	43.8	21.1	52.4	+ 3.9	49.1	45.7	6.7	14.6	1.7	79	123.5	38.2	55.3	53.3	1.6	14.7	0.081	19.0	..
30	..	29.486	69.7	49.4	20.3	57.1	+ 8.5	54.2	51.5	5.6	12.6	0.8	82	123.8	48.0	55.8	53.8	4.3	14.7	0.202	13.0	..
Means	..	29.663	57.9	40.4	17.6	48.0	+ 0.6	45.1	41.9	6.1	13.6	1.1	80.0	107.8	35.3	49.5	47.0	5.0	13.8	Sum 4.308	8.5	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9^h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The results on April 3 and 8 for Air Temperature, and on April 4 and 8 for Evaporation Temperature, depend partly on values inferred from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The Electrical Apparatus was not in action throughout the month.

The mean reading of the *Barometer* for the month was $29^{in}\cdot663$, being $0^{in}\cdot140$ *lower* than the average for the 20 years, 1854–1873.

TEMPERATURE OF THE AIR.

The highest in the month was 69°·7 on April 30; the lowest in the month was 26°·9 on April 1; and the range was 42°·8.
The mean of all the highest daily readings in the month was 57°·9, being 0°·1 *higher* than the average for the 37 years, 1841–1877.
The mean of all the lowest daily readings in the month was 40°·4, being 1°·1 *higher* than the average for the 37 years, 1841–1877.
The mean daily range was 17°·6, being 1°·0 *less* than the average for the 37 years, 1841–1877.
The mean for the month was 48°·0, being 0°·6 *higher* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	Wind as deduced from Self-registering Anemometers. Osler's. General Direction. A.M.	P.M.	Pressure on the Square Foot. Greatest.	Least.	Mean of 24 Hourly Measures.	Robinson's. Horizontal Movement of the Air.	Clouds and Weather. A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
April 1	N: NW	W: WSW	8·5	0·0	0·5	345	10, sn : 2, ci.-cu	4,cu.-s,ci.-cu,slt.-r: vv, oc.-shs, sn, w: 0
2	WSW: W	W	7·4	0·0	1·4	557	0 : 1, cu	8, cu.-s, cu, shs.-r, w: 0
3	WSW: SW	SW: WSW	2·5	0·0	0·1	304	0 : 10, r	10, r : 10, oc.-r : 0
4	WSW	WSW: SSW	0·0	0·0	0·0	191	v : 6, m, slt.-f	7,cu.-s,ci.-cu: 1 : 0
5	SW: WSW	SW: NW	2·7	0·0	0·1	200	v : 10, r	10, r, l, t : 0, f, ho.-fr
6	Variable	SE: ESE	0·5	0·0	0·0	131	ho.-fr : 2, ci, f	6, cu.-s, ci.-cu, cu : 0
7	E	E	6·9	0·0	1·2	381	0 : 2, ci.-cu, w	1, ci.-cu : ci.-s, d, lu.-co, w
8	E	E	24·4	0·2	3·7	575	0 : 2, ci.-cu, ci, st.-w	1, ci, g : 0, g : 0, st.-w
9	E	E	16·5	0·0	1·9	501	0 : 6, cu.-s, cu, st.-w	v, ci.-cu, cu.-s: 10, th.-r, w : 10
10	E	E	12·0	0·1	2·1	464	10 : 10, st.-w	9,cu.-s,ci.-cu,ci.-s,st.-w: 10, r : 10, hy.-r
11	ENE	ESE: ENE	1·6	0·0	0·2	264	10, hy.-r : 10, c.-hy.-r	10, r : 10 : 0
12	ENE: E	E: ESE	1·2	0·0	0·1	207	0 : 2, th.-cl	6,th.-cl,so.-ha : th.-cl : 0, lu.-ha, d
13	ESE: SE: S	SSW	3·5	0·0	0·3	211	lu.-ha : 10, ci.-s, ci.-cu	10, shs.-r : 10
14	S: SW	SW	1·4	0·0	0·1	225	10 : 10	li.-cl, slt.-r : 10, li.-cl : 9, th.-cl
15	SW	SW	0·8	0·0	0·1	211	v : 10	9,cu,ci.-cu,ci.-s,so.-ha: 3,th.-cl, m, d, lu.-ha
16	SSW: Calm	Calm: SW	0·3	0·0	0·0	106	lu.-ha : 10, r	10, r, gt.-glm : 10
17	WSW	SW: WSW	2·0	0·0	0·1	236	10 : 10, oc.-shs	10, r : 10, fq.-r, l, t : 10, fq.-r
18	WSW	SW: S	0·4	0·0	0·0	161	10 : 10, slt.-f	3, h : 5, h : 2, cu.-s, h, d
19	SE: SW	SW: SSE	2·3	0·0	0·2	228	r : 10, th.-r	9,cu.-s,ci.-cu,cu,th.-r: 10, sh.-r
20	S: SSE	W: SSW: S	1·0	0·0	0·1	220	10, r : 10, r	10, c.-r : v : 2, ci.-cu
21	S: SSW	S: SSE	2·6	0·0	0·2	240	v : 9, cu.-s, ci.-cu	4,ci.-cu,cu.-s: 5,ci.-cu,cu.-s: cu.-s, hy.-r
22	ENE: E	E: ESE	0·1	0·0	0·0	164	10 : 10, th.-r	9,cu.-s,ci.-cu,ci: 9, slt.-r : 8
23	ESE: E	E: ENE	1·8	0·0	0·2	288	v : 10, slt.-r	9,cu.-s,ci.-cu,cu: v : 10
24	E	NE	1·4	0·0	0·2	302	r : 10, r	10, r : 4,cu.-s,ci.-cu: 1, ci.-s
25	NNE	NNE	6·4	0·0	1·4	469	v : 4, cu, cu.-s	8, cu.-s, cu : v, cu.-s, cu : 10
26	NNE	NNE	3·5	0·0	1·1	398	v : 9, cu.-s	3,cu,ci.-cu,ci.-s : v, cu, ci.-s, ci: 6,cu.-s,ci.-cu
27	NNE	NE: ESE	0·8	0·0	0·1	202	v : 4, th.-cl	5,ci.-cu,cu.-s,cu: v : 2, ci.-cu, d
28	ESE	E	1·4	0·0	0·1	201	v : 1, ci	1, ci, ci.-cu : 2, ci, ci.-cu, so.-ha
29	E	E	1·4	0·0	0·1	235	v : 9, ci.-s, ci, ci.-cu	9, ci, ci.-s, cu.-s: 10, fq.-th.-r : 10, fq.-r
30	ENE: SE: SW	SW	0·8	0·0	0·1	221	10, fq.-r : 10	7,ci.-cu,cu.-s,cu: v,cu.-s,ci.-cu: 1, cu.-s, l
Means	...	...	..	..	0·5	281		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 45°·1, being 1°·2 *higher* than
The mean *Temperature of the Dew Point* for the month was 41°·9, being 1°·6 *higher* than
The mean *Degree of Humidity* for the month was 80·0, being 3·1 *greater* than
The mean *Elastic Force of Vapour* for the month was 0^{in}·266, being 0^{in}·016 *greater* than
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was 3^{grs}·0, being 0^{gr}·1 *greater* than
The mean *Weight of a Cubic Foot of Air* for the month was 541 grains, being 3 grains *less* than
} the average for the 20 years, 1849–1868.

The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 6·4.

The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·36. The maximum daily amount of *Sunshine* was 12·3 hours on April 8.

The highest reading of the *Solar Radiation Thermometer* was 125°·8 on April 27; and the lowest reading of the *Terrestrial Radiation Thermometer* was 23°·0 on April 1.

The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 4·4; for the 6 hours ending 3 p.m., 2·2; and for the 6 hours ending 9 p.m., 1·9.

The *Proportions of Wind* referred to the cardinal points were N. 4, E. 12, S. 7, and W. 7.

The *Greatest Pressure of the Wind* in the month was 24^{lbs}·4 on the square foot on April 8. The mean daily *Horizontal Movement of the Air* for the month was 281 miles; the greatest daily value was 575 miles on April 8; and the least daily value 106 miles on April 16.

Rain fell on 15 days in the month, amounting to 4^{in}·308, as measured in the simple cylinder gauge partly sunk below the ground; being 2^{in}·743 *greater* than the average fall for the 37 years, 1841–1877.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Daily Range.	Of the Air. Mean of 24 Hourly Values.	Of the Air. Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Of the Water of the Thames off Greenwich. Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
May 1	..	29.469	67.2	52.7	14.5	57.9	+ 9.2	55.2	52.8	5.1	12.2	1.1	84	126.5	48.0	56.5	54.3	3.3	14.8	0.377	19.0	..
2	New	29.711	70.1	48.4	21.7	57.9	+ 9.0	55.3	53.0	4.9	12.6	0.0	84	125.0	42.7	57.3	55.3	5.4	14.8	0.000	0.0	..
3	..	29.845	67.7	49.7	18.0	56.8	+ 7.7	53.6	50.6	6.2	14.1	0.4	80	118.1	43.0	58.3	55.6	2.6	14.9	0.000	5.0	..
4	..	29.911	65.8	45.4	20.4	54.8	+ 5.4	50.2	45.8	9.0	18.0	0.8	71	120.8	40.0	59.1	56.1	8.9	14.9	0.000	3.0	..
5	Greatest Declination N.	29.864	67.7	44.4	23.3	54.8	+ 5.1	50.0	45.4	9.4	18.2	0.0	70	124.4	34.8	59.3	56.3	12.0	15.0	0.000	7.0	..
6	..	29.547	68.4	46.0	22.4	57.3	+ 7.3	54.1	51.2	6.1	12.6	0.4	80	112.9	38.5	59.5	56.5	1.8	15.1	0.026	15.0	..
7	..	29.490	66.9	53.9	13.0	58.8	+ 8.5	55.9	53.3	5.5	13.9	0.6	82	107.8	53.3	59.8	57.3	0.5	15.1	1.518	0.0	..
8	..	29.482	60.1	46.4	13.7	54.0	+ 3.4	51.9	49.8	4.2	10.3	0.2	85	96.8	39.0	59.7	57.7	0.6	15.2	0.300	0.0	..
9	First Qr.	29.669	65.4	44.5	20.9	53.5	+ 2.7	51.1	48.7	4.8	13.9	0.0	84	123.3	39.0	59.5	57.3	5.1	15.2	0.022	12.5	..
10	..	29.633	68.7	49.4	19.3	57.2	+ 6.1	54.6	52.2	5.0	10.6	0.0	84	127.0	47.8	60.3	58.1	8.1	15.3	0.183	6.7	..
11	..	29.478	69.1	53.7	15.4	58.2	+ 6.8	54.8	51.7	6.5	14.0	1.4	79	137.8	48.0	61.3	58.3	5.4	15.3	0.050	19.0	..
12	In Equator	29.501	73.8	49.7	24.1	61.9	+10.1	55.1	49.3	12.6	22.5	2.0	64	139.1	40.3	61.3	58.8	13.4	15.4	0.000	13.0	..
13	..	29.405	65.1	51.0	14.1	56.9	+ 4.8	52.9	49.3	7.6	15.4	1.8	75	129.0	49.0	62.3	59.5	4.6	15.4	0.139	21.7	..
14	Perigee	29.362	64.3	50.5	13.8	55.3	+ 2.8	51.6	48.1	7.2	15.8	2.0	77	120.3	46.8	62.8	59.8	6.4	15.5	0.015	21.5	..
15	..	29.368	63.7	50.7	13.0	55.4	+ 2.5	51.9	48.6	6.8	13.3	1.8	78	109.2	46.0	62.3	59.8	6.6	15.5	0.186	21.7	..
16	Full	29.621	64.2	47.8	16.4	56.0	+ 2.7	52.9	50.0	6.0	14.4	0.9	80	112.8	42.9	62.3	59.8	2.9	15.6	0.030	23.7	..
17	..	29.768	68.6	55.3	13.3	60.8	+ 7.1	57.6	54.8	6.0	11.7	1.9	82	117.6	45.7	61.3	59.5	6.3	15.6	0.004	18.5	..
18	Greatest Declination S.	29.721	73.3	50.0	23.3	60.7	+ 6.6	56.9	53.7	7.0	19.1	1.5	78	132.2	45.0	62.1	60.3	8.1	15.7	0.254	16.0	..
19	..	29.701	63.7	49.8	13.9	55.6	+ 1.2	51.0	46.7	8.9	15.6	3.6	72	128.5	45.0	62.3	60.3	9.7	15.7	0.000	17.7	..
20	..	29.671	60.2	42.7	17.5	51.5	− 3.2	48.5	45.5	6.0	11.8	1.9	80	113.9	36.0	62.3	60.3	0.4	15.8	0.217	12.8	..
21	..	29.725	58.2	38.2	20.0	47.0	− 8.0	43.5	39.5	7.5	17.3	2.0	76	109.2	31.6	61.3	59.3	9.6	15.8	0.057	1.0	..
22	..	29.760	61.0	40.7	20.3	50.3	− 5.0	46.4	42.3	8.0	14.8	0.2	75	111.5	34.9	60.8	58.5	5.3	15.9	0.000	2.3	..
23	..	29.340	64.4	46.2	18.2	53.3	− 2.2	50.8	48.3	5.0	10.6	0.6	83	98.2	46.2	59.5	57.3	0.9	15.9	0.321	13.8	..
24	Last Qr.	29.163	65.5	47.8	17.7	53.6	− 2.1	50.5	47.5	6.1	17.3	0.8	79	136.1	45.0	59.3	57.3	3.0	16.0	0.204	17.0	..
25	In Equator: Apogee.	29.477	62.2	44.2	18.0	51.6	− 4.3	47.5	43.3	8.3	15.6	1.5	74	115.7	41.3	59.3	57.3	7.5	16.0	0.009	7.0	..
26	..	29.629	66.0	44.0	22.0	53.0	− 3.1	49.9	46.8	6.2	12.0	2.3	79	142.6	41.0	58.7	56.5	4.6	16.0	0.070	15.2	..
27	..	29.636	65.6	45.7	19.9	54.1	− 2.2	50.2	46.4	7.7	17.6	1.5	75	130.7	42.0	58.7	56.5	11.1	16.1	0.005	20.8	..
28	..	29.624	64.1	45.9	18.2	55.0	− 1.5	51.9	48.9	6.1	14.4	0.0	80	100.3	40.1	58.9	57.1	0.1	16.1	0.260	10.3	..
29	..	29.784	58.7	49.2	9.5	51.8	− 5.0	50.0	48.2	3.6	6.8	1.8	87	77.3	49.0	59.3	57.3	0.0	16.1	0.040	5.2	..
30	..	29.959	57.8	46.6	11.2	50.4	− 6.6	47.1	43.6	6.8	10.8	2.1	78	92.2	46.6	59.3	57.3	0.1	16.2	0.000	10.5	..
31	..	29.838	65.3	40.2	25.1	53.5	− 3.8	49.3	45.2	8.3	16.4	1.5	74	133.3	32.5	60.7	58.5	11.7	16.2	0.005	12.3	..
Means	..	29.618	65.3	47.4	17.8	55.1	+ 2.0	51.7	48.4	6.7	14.3	1.2	78.4	118.4	42.6	60.2	57.9	5.4	15.6	Sum 4.292	11.9	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The result on May 12 for Air Temperature depends partly on values inferred from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The Electrical Apparatus was not in action throughout the month.

The mean reading of the *Barometer* for the month was 29in·618, being 0in·159 *lower* than the average for the 20 years, 1854–1873.

TEMPERATURE OF THE AIR.

The highest in the month was 73°·8 on May 12; the lowest in the month was 38°·2 on May 21; and the range was 35°·6.
The mean of all the highest daily readings in the month was 65°·3, being 1°·0 *higher* than the average for the 37 years, 1841–1877.
The mean of all the lowest daily readings in the month was 47°·4, being 3°·6 *higher* than the average for the 37 years, 1841–1877.
The mean daily range was 17°·8, being 2°·7 *less* than the average for the 37 years, 1841–1877.
The mean for the month was 55°·1, being 2°·0 *higher* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	Wind as deduced from Self-registering Anemometers. Osler's. General Direction. A.M.	P.M.	Pressure on the Square Foot. Greatest.	Least.	Mean of 24 Hourly Measures.	Robinson's. Horizontal Movement of the Air.	Clouds and Weather. A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
May 1	SW : S : SSE	S : SW	0·4	0·0	0·0	139	v : 10, shs.-r	7, cu.-s, ci.-cu, cu : 10, r, l, t
2	WSW	WSW : W	0·8	0·0	0·0	221	v : 3, th.-cl, h	7, cu.-s, ci.-cu, h : p.-cl
3	SW : WSW	WSW	1·2	0·0	0·1	262	p.-cl : 10	10 : 10
4	WSW	NW : SW	0·9	0·0	0·0	219	v : 3, ci, h	5,cu.-s,ci.-cu : 5, cu, ci.-cu : 6
5	SW : NNE : E	E	2·6	0·0	0·4	222	p.-cl : 0	7, cu.-s, ci.-cu : 0
6	E	ESE : SSE	0·9	0·0	0·1	214	v : 9, th.-cl	10 : 10 : 10, hy.-sh
7	WSW : W : WNW	N : NE : NW	0·1	0·0	0·0	141	10 : 10, m	10, m : 10, hy.-r, t : 10, c.-r
8	WNW : W	WSW : W	0·9	0·0	0·1	236	10, c.-hy.-r : 10, r	10 : 0, slt.-f, d
9	NE : SE : E	E	1·3	0·0	0·1	177	v : 9, ci.-s, ci.-cu, ci	6,ci.-cu,cu.-s : v, hy.-d : 10, hy.-sh
10	ENE : E	E	3·0	0·0	0·3	277	p.-cl : 3, ci.-s, ci, ci.-cu	4, cu.-s, ci.-s, cu, ci : v, lu.-co, m, l, hy.-r
11	E : SE	SW : S : SE	2·3	0·0	0·3	268	v : 10, r	5, ci.-cu, cu.-s : v
12	SSE : SSW	SW : SSE	0·6	0·0	0·0	183	li.-cl : 1, ci.-s	2, cu.-s, ci.-cu : 3, ci.-cu, ci.-s
13	SSE : SSW : SW	SW	2·9	0·0	0·4	316	v : fq.-r : 6,cu.-s,ci.-cu,cu,ci.-s	8, cu.-s, ci.-cu, slt.-r : v, lu.-ha
14	SSW : SW	SW	11·5	0·0	0·9	346	p.-cl : 10, shs.-r	8,ci.-cu,cu.-s,sh.-r,w : p.-cl, lu.-ha
15	SSW : S	SW	17·5	0·0	2·7	499	v : 10, fq.-r, w	7, cu.-s, ci.-cu, st.-w : 8,cu.-s,ci.-cu,hy.-r
16	WSW : SW	SSW	9·7	0·0	1·6	449	slt.-r : 9, cu.-s, ci.-cu, cu	10, w : 10, r, w : 10, r, w
17	SW	WSW : SW : S	12·4	0·0	3·1	547	10, w : 10, st.-w, slt.-r	7, cu.-s, ci.-cu, cu : v, l, slt.-r
18	SE : S : SW	SW	8·5	0·0	1·0	369	10, l, t, fq.-hy.-shs : 10, l, t, shs.-r	2, ci.-cu, cu, w : 3, ci.-s, cu.-s
19	SW	SW : WSW	17·5	0·0	4·4	651	li.-cl : cu, ci.-cu, sh.-r, w	v, oc.-shs, st.-w : 10, oc.-shs
20	WSW	WSW : NNW	8·6	0·0	0·9	397	10 : 10, r, w	10, r : 10, r
21	NW : WNW	W : WNW : WSW	10·0	0·0	0·7	394	10 : 10	9,ci.-s,ci.-cu,cu-s,w,shs.-r : v
22	WSW : WNW : W	W : SW	1·2	0·0	0·1	267	v : 8, cu.-s	9, cu.-s : 10 : 10, slt.-r
23	SSW : SE : S	SW	3·3	0·0	0·6	310	10, hy.-r : 10, oc.-r : 10, th.-r	10 : v : v
24	SW	SW : NNW	6·7	0·0	0·4	322	10 : 10	9,cu.-s,ci.-cu,shs.-r : 10, r : 10, c.-r
25	NNW	W : WSW	2·9	0·0	0·2	238	10 : 7, cu, ci.-cu, m, r	5,cu.-s,ci.-cu,cu : v, oc.-shs : v
26	SW : WSW	SW	4·5	0·0	0·2	285	v : 10, fq.-shs.-r	8,cu.-s,cu,ci.-s,shs.-r : 6, cu.-s, cu, shs.-r
27	SW : SSW	SW : SSW : SSE	3·0	0·0	0·2	262	v : 7,ci.-cu,cu.-s,ci.-s,li.-shs	7,ci.-cu,cu.-s,cu,li.-shs : 4, cu, ci
28	E : NE	E : NNE	0·8	0·0	0·0	133	v : 10, slt.-m, li.-shs	10 : 10, th.-r
29	N : NNE	NNE	7·0	0·0	1·2	428	10, c.-r, w : 10, r, w	10 : 10
30	NNE : NE	NE : SE	1·0	0·0	0·0	136	10 : 10	10 : 10 : 0, m
31	E : NE : SE	E : SE	0·0	0·0	0·0	65	v : 9, cu.-s, cu	5, ci.-cu, cu : v, cu.-s, cu : 6, cu.-s, cu
Means	...	...	..	..	0·6	289		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 51°·7, being 2°·8 *higher* than
The mean *Temperature of the Dew Point* for the month was 48°·4, being 3°·3 *higher* than
The mean *Degree of Humidity* for the month was 78·4, being 3·0 *greater* than
The mean *Elastic Force of Vapour* for the month was 0in·340, being 0in·039 *greater* than
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was 3grs·8, being 0gr·4 *greater* than
The mean *Weight of a Cubic Foot of Air* for the month was 532 grains, being 6 grains *less* than
} the average for the 20 years, 1849–1868.

The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 7·1.
The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·35. The maximum daily amount of *Sunshine* was 13·4 hours on May 12.
The highest reading of the *Solar Radiation Thermometer* was 142°·6 on May 26; and the lowest reading of the *Terrestrial Radiation Thermometer* was 31°·6 on May 21.
The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 5·0; for the 6 hours ending 3 p.m., 3·7; and for the 6 hours ending 9 p.m., 3·2.
The *Proportions of Wind* referred to the cardinal points were N. 3, E. 6, S. 10, and W. 12.
The *Greatest Pressure of the Wind* in the month was 17lbs·5 on the square foot on May 15 and 19. The mean daily *Horizontal Movement of the Air* for the month was 289 miles; the greatest daily value was 651 miles on May 19; and the least daily value 65 miles on May 31.
Rain fell on 22 days in the month, amounting to 4in·292, as measured in the simple cylinder gauge partly sunk below the ground; being 2in·319 *greater* than the average fall for the 37 years, 1841–1877.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Daily Range.	Of the Air. Mean of 24 Hourly Values.	Of the Air. Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Of the Water of the Thames off Greenwich. Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
June 1	New	29·851	59·2	46·7	12·5	51·9	− 5·6	48·8	45·7	6·2	12·5	1·9	79	110·2	42·0	59·8	57·3	1·7	16·2	0·000	9·7	..
2	Greatest Declination N.	29·858	64·9	40·7	24·2	52·1	− 5·6	47·8	43·4	8·7	19·9	2·6	72	122·8	38·0	58·8	56·3	3·7	16·3	0·000	2·2	..
3	..	29·756	69·2	50·7	18·5	58·0	+ 0·1	54·2	50·8	7·2	17·6	2·2	77	109·0	49·6	58·8	56·3	1·9	16·3	0·033	7·3	..
4	..	29·638	70·2	51·8	18·4	58·7	+ 0·6	55·1	51·9	6·8	14·9	2·6	78	132·6	51·2	59·1	56·8	6·1	16·3	0·302	6·0	..
5	..	29·872	59·3	46·9	12·4	53·1	− 5·1	50·5	47·9	5·2	9·5	0·8	82	89·3	45·0	59·5	57·3	0·0	16·4	0·066	1·5	..
6	..	30·039	69·2	44·8	24·4	57·0	− 1·3	53·6	50·4	6·6	15·7	0·6	78	115·6	43·0	59·5	57·3	7·2	16·4	0·000	0·0	..
7	..	29·963	70·9	49·6	21·3	60·0	+ 1·6	56·3	53·1	6·9	10·6	2·4	78	125·8	43·9	60·3	57·8	3·1	16·4	0·000	6·5	..
8	First Quarter: In Equator.	29·601	72·4	52·5	19·9	61·9	+ 3·4	57·6	53·9	8·0	16·6	1·7	76	121·8	47·1	61·3	59·1	3·3	16·4	0·398	8·8	..
9	Perigee	29·439	66·1	51·7	14·4	58·7	+ 0·2	53·7	49·3	9·4	16·7	3·6	71	127·7	46·5	61·8	59·3	10·8	16·4	0·015	15·8	..
10	..	29·577	69·2	50·7	18·5	57·1	− 1·5	52·2	47·7	9·4	19·6	3·0	71	135·2	46·8	62·3	59·7	9·1	16·5	0·069	19·2	..
11	..	29·454	64·1	50·3	13·8	56·1	− 2·6	52·6	49·3	6·8	11·0	2·8	78	94·3	47·1	60·8	59·1	2·2	16·5	0·017	23·8	..
12	..	29·445	66·3	48·4	17·9	56·9	− 1·9	52·8	49·1	7·8	13·5	4·4	75	129·8	42·7	62·3	59·8	8·9	16·5	0·122	13·3	..
13	..	29·658	71·1	49·7	21·4	57·0	− 1·9	53·6	50·4	6·6	14·9	1·6	79	135·6	46·3	61·8	59·8	7·0	16·5	1·051	9·0	..
14	Greatest Dec. S.: Full.	29·710	56·7	48·0	8·7	52·2	− 6·9	49·2	46·1	6·1	10·2	3·1	80	82·1	48·0	61·3	59·3	0·0	16·5	0·010	5·8	..
15	..	29·705	59·0	44·6	14·4	52·1	− 7·2	48·4	44·6	7·5	12·7	2·7	76	101·7	42·0	61·3	59·3	1·8	16·5	0·000	0·7	..
16	..	29·645	64·4	47·7	16·7	53·8	− 5·7	51·3	48·9	4·9	13·3	1·4	83	111·2	43·6	61·1	58·8	0·5	16·5	0·982	4·3	..
17	..	29·677	64·1	47·4	16·7	55·4	− 4·3	52·3	49·3	6·1	14·4	1·5	81	100·3	42·0	60·8	58·3	0·8	16·6	0·012	0·0	..
18	..	29·730	70·9	50·3	20·6	58·2	− 1·7	54·4	51·0	7·2	14·0	2·0	77	132·9	47·1	61·3	58·9	4·0	16·6	0·000	0·0	..
19	..	29·798	66·3	46·7	19·6	57·2	− 3·0	53·6	50·3	6·9	13·1	1·5	77	103·0	42·2	60·8	58·8	4·2	16·6	0·000	0·0	..
20	..	29·896	75·2	45·9	29·3	60·1	+ 0·4	54·5	49·6	10·5	21·1	1·7	68	132·7	40·7	61·3	59·5	10·6	16·6	0·000	4·7	..
21	..	29·957	77·9	47·3	30·6	63·1	+ 2·3	56·0	50·0	13·1	23·5	2·5	63	142·0	41·6	61·8	60·3	12·2	16·6	0·000	2·8	..
22	In Equator: Apogee: L. Qr.	30·000	80·1	51·0	29·1	65·9	+ 4·8	58·7	52·8	13·1	24·0	2·8	63	141·9	46·3	62·3	60·3	10·1	16·6	0·000	1·5	..
23	..	29·922	81·2	54·5	26·7	65·1	+ 3·7	61·0	57·6	7·5	18·4	2·2	78	138·3	48·3	63·5	61·3	6·5	16·6	0·609	2·7	..
24	..	29·928	84·4	55·9	28·5	70·2	+ 8·5	63·0	57·5	12·7	23·5	1·9	64	147·0	51·1	64·7	62·3	12·7	16·6	0·000	2·3	..
25	..	30·003	82·9	63·2	19·7	70·9	+ 9·0	64·2	59·1	11·8	22·9	3·8	66	139·5	52·8	65·3	62·8	4·8	16·6	0·000	5·0	..
26	..	30·005	85·8	56·8	29·0	72·4	+10·4	65·8	60·9	11·5	24·1	2·3	67	141·1	51·0	66·3	63·3	11·2	16·5	0·000	1·5	..
27	..	29·920	85·4	59·6	25·8	72·4	+10·4	65·2	59·8	12·6	26·0	1·9	64	143·2	54·5	67·3	64·3	12·8	16·5	0·000	8·2	..
28	..	29·773	80·9	60·7	20·2	70·0	+ 8·1	63·7	58·9	11·1	22·3	3·6	68	138·8	54·5	68·3	65·8	13·3	16·5	0·000	13·3	..
29	Greatest Declination N.	29·669	79·0	54·5	24·5	66·9	+ 5·1	59·8	54·1	12·8	24·1	3·4	64	140·9	50·5	69·3	66·8	12·6	16·5	0·000	0·0	..
30	New	29·641	73·6	54·0	19·6	60·4	− 1·3	58·8	57·4	3·0	7·9	0·8	90	124·3	46·8	70·3	67·3	0·3	16·5	0·886	0·0	..
Means	..	29·771	71·3	50·8	20·6	60·2	+ 0·4	55·6	51·7	8·5	17·0	2·3	74·1	123·7	46·4	62·4	60·1	6·1	16·5	Sum 4·572	5·9	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The results on June 1 for the Barometer and Air Temperature, and on June 1, 20, and 21 for Evaporation Temperature, depend partly on values inferred from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The Electrical Apparatus was not in action throughout the month.

The mean reading of the *Barometer* for the month was 29in·771, being 0in·057 *lower* than the average for the 20 years, 1854–1873.

TEMPERATURE OF THE AIR.

The highest in the month was 85°·8 on June 26; the lowest in the month was 40°·7 on June 2; and the range was 45°·1.
The mean of all the highest daily readings in the month was 71°·3, being 0°·1 *higher* than the average for the 37 years, 1841–1877.
The mean of all the lowest daily readings in the month was 50°·8, being 0°·9 *higher* than the average for the 37 years, 1841–1877.
The mean daily range was 20°·6, being 0°·7 *less* than the average for the 37 years, 1841–1877.
The mean for the month was 60°·2, being 0°·4 *higher* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	WIND AS DEDUCED FROM SELF-REGISTERING ANEMOMETERS.						CLOUDS AND WEATHER.	
	OSLER'S.					ROBINSON'S.		
	General Direction.		Pressure on the Square Foot.			Horizontal Movement of the Air.		
	A.M.	P.M.	Greatest.	Least.	Mean of 24 Hourly Measures.		A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
June 1	SE : E	ESE : SE	0·7	0·0	0·0	115	v : 10	v : 1, th.-cl
2	E : SE	E : ESE	1·5	0·0	0·1	146	v : 9	10 : 10
3	ESE : E : Calm	WSW : SSW	0·7	0·0	0·0	83	r : 10, slt.-f, m, glm	10, m : 10
4	S : SW : WSW	WSW	6·3	0·0	1·0	338	10, r : 10, slt.-r	8,cu.-s,ci.-cu,cu: 10, shs.-r : 9, cu.-s, shs.-r
5	W : NNW : N	Calm : S	3·7	0·0	0·2	151	10 : 10, shs.-r	10, gt.-glm : 10, oc.-th.-r : 2, ci.-s
6	S : WSW : NW	NW : WSW	0·5	0·0	0·0	120	m : 0, m	2, ci.-cu, cu : 10
7	WSW : SW	SW : SE	0·5	0·0	0·0	139	10 : 8, ci.-s	10 : 8, lu.-co
8	SE	SE : W : SW	0·6	0·0	0·0	157	10 : 10, th.-cl	10, r, l, t : v, ci.-cu, cu.-s
9	SW	SSW : SW	9·3	0·0	1·3	433	v : 9, cu.-s	9 cu.-s,ci,slt.-r,w: shs.-r : 1
10	WSW	SW	11·3	0·0	1·3	439	v : 7, cu.-s, ci.-cu, cu, w	5,ci.-cu,cu,ci.-s,t,shs.-r : 2, cu.-s, cu, shs.-r
11	S : SSW	SW	11·5	0·0	1·9	465	v : 10, th.-r, w	10, shs.-r, st.-w : vv, st.-w
12	SSW	SW	7·2	0·0	1·7	487	0 : 7,ci.-cu,cu.-s,ci.-s,w	8, ci.-cu, cu.-s, w, shs.-r : 10, shs.-r
13	WSW	SW : NE : ENE	1·5	0·0	0·2	267	v : 7, ci.-s, ci.-cu, cu.-s	8,cu.-s,ci.-cu,cu: 10, hy.-r : 10
14	NE	ENE : NE	0·7	0·0	0·1	275	10 : 10	10 : 10
15	NNE : NE	NE : Calm	0·0	0·0	0·0	117	10 : 9, cu.-s, ci.-cu, cu	10 : 10
16	WSW : W	WSW	0·5	0·0	0·0	142	hy.-r : 10, gt.-glm	10, l, t, r : 10, hy.-r : 10
17	ENE : Calm	SW : WSW	0·0	0·0	0·0	92	10, slt.-f : 10, slt.-f	10, m, shs.-r : 10
18	WSW	W : WSW	0·3	0·0	0·0	153	10 : 9, ci.-cu	9, li.-shs : 8, cu.-s, ci.-cu, l, t
19	SW : Calm	Calm	0·0	0·0	0·0	96	10 : 10, f, m	10 : p.-cl : 1, ci.-s
20	Calm	W : SW	0·7	0·0	0·0	136	p.-cl : 4, ci.-cu, cu, h	6, cu.-s, ci.-cu, cu, ci : 1, ci.-cu
21	SSW	SSW	0·7	0·0	0·0	222	0 : 2, ci, ci.-s	4, ci, ci.-cu, cu.-s : 1, th.-cl
22	SW	SW	0·0	0·0	0·0	141	0 : 1, ci	4,ci,ci.-cu,cu: p.-cl : 1, ci
23	S : NE : SE	SE : SSE : S	0·3	0·0	0·0	119	p.-cl : 7, ci.-cu, cu.-s, cu	6,cu.-s,ci.-cu,n,t.-sm,hy.-r: 3, ci.-cu
24	SSE : WSW : SW	SSW : SW	0·0	0·0	0·0	146	0 : 0	5, cu.-s, ci.-cu, cu : p.-cl
25	S : WSW	SW	0·0	0·0	0·0	115	10 : 10, m	8, ci, cu : 1, ci.-s
26	Calm : NE : SE	SE : ESE	0·7	0·0	0·0	124	0 : 1, ci	3, cu, ci.-s, t : 2, ci
27	E : ENE : SE	E	3·6	0·0	0·3	232	0 : 2, ci.-cu, ci	1, ci.-cu : 0
28	E : ENE	E : NE	3·9	0·0	0·4	276	0 : 1, ci.-s	1, ci.-cu : 0
29	NE	E : NE	2·3	0·0	0·1	253	0 : 3, ci, ci.-cu	4, ci.-s, ci.-cu : 4, ci.-s, ci
30	NE : NNE : N	N : NNE	0·8	0·0	0·0	162	p.-cl : 10, r	10, fq.-r, t : 10
Means	...	...	..	..	0·3	205		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 55°·6, being 0°·4 *higher* than the average for the 20 years, 1849–1868.
The mean *Temperature of the Dew Point* for the month was 51°·7, being 0°·5 *higher* than the average for the 20 years, 1849–1868.
The mean *Degree of Humidity* for the month was 74·1, being 0·8 *greater* than the average for the 20 years, 1849–1868.
The mean *Elastic Force of Vapour* for the month was 0in·384, being 0in·007 *greater* than the average for the 20 years, 1849–1868.
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was 4grs·3, being 0gr·1 *greater* than the average for the 20 years, 1849–1868.
The mean *Weight of a Cubic Foot of Air* for the month was 529 grains, being 2 grains *less* than the average for the 20 years, 1849–1868.
The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 6·5.
The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·37. The maximum daily amount of *Sunshine* was 13·3 hours on June 28.
The highest reading of the *Solar Radiation Thermometer* was 147°·0 on June 24; and the lowest reading of the *Terrestrial Radiation Thermometer* was 38°·0 on June 2.
The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 3·1; for the 6 hours ending 3 p.m., 1·6; and for the 6 hours ending 9 p.m., 1·2.
The *Proportions of Wind* referred to the cardinal points were N. 4, E. 7, S. 9, and W. 8. Two days were calm.
The *Greatest Pressure of the Wind* in the month was 11lbs·5 on the square foot on June 11. The mean daily *Horizontal Movement of the Air* for the month was 205 miles; the greatest daily value was 487 miles on June 12; and the least daily value 83 miles on June 3.
Rain fell on 14 days in the month, amounting to 4in·572, as measured in the simple cylinder gauge partly sunk below the ground; being 2in·656 *greater* than the average fall for the 37 years, 1841–1877.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Daily Range.	Of the Air. Mean of 24 Hourly Values.	Of the Air. Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Of the Water of the Thames off Greenwich. Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
July 1	..	29.743	69.9	51.6	18.3	61.1	− 0.5	57.6	54.6	6.5	12.2	0.8	80	126.9	46.7	71.3	68.3	1.6	16.5	0.000	2.5	..
2	..	29.693	61.3	52.2	9.1	55.8	− 5.7	52.8	50.0	5.8	9.3	1.3	82	90.0	52.2	70.8	68.8	0.4	16.5	0.034	1.5	..
3	..	29.787	63.6	50.4	13.2	55.9	− 5.5	51.9	48.1	7.8	14.1	3.6	76	101.3	50.4	69.3	66.8	2.8	16.4	0.024	0.0	..
4	..	29.967	72.1	44.0	28.1	59.8	− 1.6	54.4	49.6	10.2	20.9	0.6	69	134.5	39.0	67.8	65.3	9.8	16.4	0.000	0.5	..
5	Perigee: In Equator.	29.938	74.9	53.2	21.7	63.0	+ 1.5	58.7	55.0	8.0	14.0	2.6	76	134.2	49.0	66.8	65.3	3.3	16.4	0.000	1.8	..
6	..	29.842	76.7	56.2	20.5	65.8	+ 4.1	60.4	56.0	9.8	18.2	1.9	71	126.8	53.0	66.8	65.3	3.4	16.4	0.000	3.5	..
7	First Qr.	29.823	76.1	53.5	22.6	64.7	+ 2.8	58.8	53.9	10.8	20.1	1.7	68	137.8	49.1	67.3	65.3	6.6	16.3	0.000	0.0	..
8	..	29.913	74.1	55.0	19.1	62.9	+ 0.7	57.6	53.1	9.8	18.9	2.3	70	133.5	47.6	67.3	64.3	7.7	16.3	0.000	0.8	..
9	..	29.880	74.6	52.0	22.6	62.4	− 0.1	58.2	54.6	7.8	16.9	1.4	76	132.0	47.4	67.5	65.3	6.0	16.3	0.025	4.2	..
10	..	29.753	69.4	54.5	14.9	60.8	− 1.9	56.1	52.0	8.8	16.4	1.3	73	114.1	48.8	67.5	65.3	1.4	16.3	0.000	0.0	..
11	..	29.722	68.8	54.9	13.9	60.2	− 2.7	55.5	51.4	8.8	13.7	4.0	73	104.3	51.2	67.8	65.7	0.8	16.2	0.000	0.0	..
12	Greatest Declination S.	29.729	67.0	55.0	12.0	60.0	− 3.1	56.0	52.5	7.5	13.9	3.4	76	98.5	50.7	67.3	64.8	0.1	16.2	0.000	0.0	wN, wP
13	..	29.793	72.9	53.1	19.8	62.2	− 1.1	56.4	51.4	10.8	20.2	2.2	68	138.3	52.2	66.3	63.5	10.7	16.2	0.000	3.5	w
14	Full	29.922	71.8	49.2	22.6	60.6	− 2.8	55.8	51.6	9.0	18.7	1.4	72	133.2	42.8	66.3	63.7	5.0	16.1	0.000	5.5	w
15	..	30.025	73.4	52.7	20.7	62.0	− 1.4	58.0	54.6	7.4	12.6	2.2	77	121.9	46.1	66.5	64.8	3.1	16.1	0.000	0.0	wN
16	..	30.095	76.5	50.1	26.4	64.4	+ 0.9	59.7	55.8	8.6	19.5	0.8	74	125.5	41.5	66.5	65.1	7.9	16.1	0.000	0.0	w:wN:w
17	..	30.122	82.2	53.7	28.5	68.9	+ 5.4	63.3	58.9	10.0	19.7	1.1	70	128.5	46.9	66.8	65.1	11.0	16.0	0.000	1.0	w
18	..	30.145	84.4	59.1	25.3	71.7	+ 8.3	65.6	61.0	10.7	19.2	2.7	69	137.2	53.5	67.8	65.8	9.6	16.0	0.000	0.0	w : o
19	In Equator	30.081	84.6	61.0	23.6	71.3	+ 8.0	65.0	60.2	11.1	23.8	0.8	68	146.0	56.6	69.1	66.3	11.4	16.0	0.000	3.0	w
20	Apogee	29.957	79.7	56.7	23.0	68.2	+ 5.0	63.0	58.9	9.3	20.4	0.0	72	148.7	49.8	70.1	67.3	8.4	15.9	0.000	4.3	w
21	..	29.860	79.6	58.9	20.7	69.2	+ 6.2	63.8	59.6	9.6	20.7	0.9	71	142.0	51.9	70.5	67.1	11.9	15.9	0.000	3.7	m
22	Last Qr.	29.835	81.4	58.2	23.2	68.2	+ 5.3	64.3	61.2	7.0	17.8	1.1	78	145.0	52.2	71.3	68.3	5.5	15.8	0.028	3.0	w:vN:m
23	..	29.791	76.0	60.2	15.8	65.7	+ 2.9	62.9	60.7	5.0	10.5	1.3	84	122.0	60.2	71.3	67.8	3.1	15.8	0.000	7.8	w : s : w
24	..	29.567	74.1	59.9	14.2	65.0	+ 2.3	62.3	60.1	4.9	11.5	1.7	85	125.0	55.6	70.5	68.3	3.4	15.7	0.044	11.8	w
25	..	29.538	70.0	58.0	12.0	61.2	− 1.5	58.3	55.8	5.4	12.8	2.3	82	107.1	54.0	71.1	68.3	0.5	15.7	0.065	2.5	wN, wP
26	Greatest Declination N.	29.613	75.8	54.2	21.6	63.5	+ 0.8	58.4	54.1	9.4	16.7	2.5	72	134.9	49.3	70.8	68.8	6.2	15.7	0.073	0.0	w:w:mN
27	..	29.710	75.4	57.2	18.2	63.6	+ 1.0	59.6	56.3	7.3	16.6	1.1	78	127.7	54.7	70.3	67.8	7.0	15.6	0.000	2.0	wN, wP
28	..	29.786	69.3	54.8	14.5	61.4	− 1.2	56.9	53.0	8.4	16.9	1.3	75	118.5	50.3	70.8	68.3	4.5	15.6	0.000	6.0	w
29	New	29.865	72.8	48.8	24.0	58.5	− 4.1	54.9	51.7	6.8	17.1	1.2	78	126.4	43.1	70.3	67.3	1.3	15.5	0.005	0.0	wN: wN: w
30	..	30.003	70.7	47.6	23.1	59.5	− 3.1	55.1	51.2	8.3	16.4	0.6	74	137.7	38.8	70.8	68.3	8.8	15.5	0.008	2.0	w
31	..	30.164	71.2	55.7	15.5	61.6	− 1.0	57.1	53.2	8.4	15.3	3.4	74	113.4	51.9	70.3	67.3	0.7	15.4	0.000	0.7	w
Means	..	29.860	73.9	54.2	19.6	63.2	+ 0.6	58.7	54.8	8.4	16.6	1.7	74.5	126.2	49.6	68.9	66.4	5.3	16.0	Sum 0.306	2.3	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The Electrical Apparatus was not in action from July 1 to 11.

The mean reading of the *Barometer* for the month was 29in·860, being 0in·051 *higher* than the average for the 20 years, 1854–1873.

TEMPERATURE OF THE AIR.

The highest in the month was 84°·6 on July 19; the lowest in the month was 44°·0 on July 4; and the range was 40°·6.

The mean of all the highest daily readings in the month was 73°·9, being 0°·5 *lower* than the average for the 37 years, 1841–1877.

The mean of all the lowest daily readings in the month was 54°·2, being 1°·0 *higher* than the average for the 37 years, 1841–1877.

The mean daily range was 19°·6, being 1°·7 *less* than the average for the 37 years, 1841–1877.

The mean for the month was 63°·2, being 0°·6 *higher* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	Wind as deduced from Self-Registering Anemometers. Osler's. General Direction. A.M.	P.M.	Pressure on the Square Foot. Greatest.	Least.	Mean of 24 Hourly Measures.	Robinson's. Horizontal Movement of the Air.	CLOUDS AND WEATHER. A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
July 1	NE : NNE	NE	0·3	0·0	0·0	153	10 : 10	10, slt.-r : 10, th.-r
2	NE	SW : NE : NNE	0·6	0·0	0·0	186	10 : 10, th.-r	10 : v, cu.-s, cu
3	N : W	N : NNE	0·7	0·0	0·0	163	10 : 9, cu.-s, ci.-cu	9, th.-r, cu.-s : 9
4	SW : WSW	W : WSW	1·8	0·0	0·1	236	p.-cl : 1, th.-cl, h	4, ci.-cu, cu, h : 7, cu, ci.-cu
5	WSW	WSW	2·8	0·0	0·4	359	p.-cl : 9	9, cu.-s, cu : 8, cu.-s, cu
6	WSW	W : WSW	6·2	0·0	0·6	408	10 : 10	7,ci,ci.-s,ci.-cu,cu.-s,sc : 10
7	WSW	WNW : NNW : W	1·3	0·0	0·1	253	p.-cl : 6, ci.-cu, ci, h	9, cu.-s, ci.-cu, ci : p.-cl, cu.-s, ci.-cu
8	NNW : N	NNE : SE : S	1·0	0·0	0·0	191	p.-cl : p.-cl, ci.-cu	10 : p.-cl : 0
9	SW : WSW	SW : WSW	2·0	0·0	0·2	280	0 : 3, th.-cl	8, cu.-s, ci.-cu : p.-cl, cu, r
10	WSW : W : WNW	NW : W	2·1	0·0	0·3	310	p.-cl : 8, cu.-s, ci.-cu, ci	10 : 10, slt.-r : 10
11	W : WSW	WNW : W	2·8	0·0	0·4	356	10 : 10, th.-r	10 : p.-cl,oc.-slt.-r : 8,s,cu.-s,ci.-cu
12	W : NW : WSW	NW : WSW	0·3	0·0	0·0	205	10 : 10	10 : 10, th.-r, : 10
13	NE	NNE : NE : SE	0·8	0·0	0·0	187	p.-cl : 4, cu	5, cu.-s, ci.-cu : v
14	Variable	NE : N : WSW	0·0	0·0	0·0	139	p.-cl : 9, cu.-s, ci.-cu	8,cu.-s,ci.-cu: p.-cl : 2, cu
15	W : NW : NNW	N : NW : S	0·2	0·0	0·0	159	p.-cl : 10	10, t : vv : 6,ci.-cu,ci.-s
16	Variable	N	0·2	0·0	0·0	131	p.-cl : 0, h	7 : 0, h
17	NW	N : NNW	0·0	0·0	0·0	116	0 : 0, h	0 : 0, m
18	N	N : NNE	0·0	0·0	0·0	147	0 : 1, ci.-cu	6, ci.-cu : p.-cl : 0
19	N : NE	E : ESE	0·7	0·0	0·1	168	0 : 3, ci	1, th.-cl : 1, cu : 0
20	E	E	2·8	0·0	0·3	227	0 : 4, ci	5, ci.-cu : 3, ci.-cu
21	NE : ENE	E : ENE : NE	5·0	0·0	0·2	252	li.-cl : 3, ci	3, ci, ci.-s : 3, ci, ci.-s
22	NE : ENE	E : ESE	2·9	0·0	0·1	240	p.-cl : 10, cu.-s, ci.-cu, cu	9, t, hy.-sh : 10
23	E : ENE	NE : SE	0·3	0·0	0·0	158	10 : 10	p.-cl, cu.-s, ci.-s : 10, l, t
24	SW : SE	SW	1·1	0·0	0·0	180	10 : 10, r, t	10, oc.-r, t : fq.-shs, l, t : 1, cu.-s
25	SW : WSW	W	2·0	0·0	0·1	299	p.-cl : 10, r	10, cu.-s, cu, r, t : 10
26	WSW	W : WSW	0·8	0·0	0·0	229	p.-cl : p.-cl, cu, ci	9, cu.-s, ci.-cu : 10, h.-r, l, t
27	Variable	NW : NNE : ENE	2·5	0·0	0·0	172	p.-cl : 8, cu.-s, ci.-cu	6, cu.-s, ci.-cu : 9, cu.-s, ci.-cu
28	E : NE	E : SE	0·3	0·0	0·0	144	p.-cl : 8, cu.-s, ci.-cu	9, cu.-s, ci.-cu : 7, cu.-s, cu, ci
29	Variable	Variable	1·9	0·0	0·0	107	p.-cl : 10, f	7, cu.-s, ci.-cu, shs.-r: 2, cu.-s, ci.-cu
30	W : NW : N	N	7·0	0·0	0·4	329	p.-cl : 7, cu.-s, ci.-cu, sh.-r	8, cu.-s, ci.-cu, shs.-r: 9, cu.-s
31	N : NNE	NE : ENE	1·2	0·0	0·1	271	10 : 10	10 : p.-cl : 3
Means	...	...	..	..	0·1	218		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 58°·7, being 1°·0 *higher* than
The mean *Temperature of the Dew Point* for the month was 54°·8, being 1°·1 *higher* than
The mean *Degree of Humidity* for the month was 74·5, being 1·5 *greater* than
The mean *Elastic Force of Vapour* for the month was 0in·430, being 0in·017 *greater* than
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was 4grs·8, being 0gr·2 *greater* than
The mean *Weight of a Cubic Foot of Air* for the month was 528 grains, being *the same as*
} the average for the 20 years, 1849–1868.

The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 6·9.

The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·33. The maximum daily amount of *Sunshine* was 11·9 hours on July 21.

The highest reading of the *Solar Radiation Thermometer* was 148°·7 on July 20; and the lowest reading of the *Terrestrial Radiation Thermometer* was 38°·8 on July 30.

The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 1·1; for the 6 hours ending 3 p.m., 0·8; and for the 6 hours ending 9 p.m., 0·4.

The *Proportions of Wind* referred to the cardinal points were N. 10, E. 8, S. 3, and W. 10.

The *Greatest Pressure of the Wind* in the month was 7lbs·0 on the square foot on July 30. The mean daily *Horizontal Movement of the Air* for the month was 218 miles; the greatest daily value was 408 miles on July 6; and the least daily value 107 miles on July 29.

Rain fell on 9 days in the month, amounting to 0in·306, as measured in the simple cylinder gauge partly sunk below the ground; being 2in·118 *less* than the average fall for the 37 years, 1841–1877.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Daily Range.	Of the Air. Mean of 24 Hourly Values.	Of the Air. Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Of the Water of the Thames off Greenwich. Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
Aug. 1	Perigee	30·089	73·9	54·1	19·8	60·6	— 2·0	56·2	52·4	8·2	17·5	3·2	74	138·0	46·9	69·8	66·8	5·9	15·3	0·000	6·3	w
2	In Equator	29·804	74·8	52·5	22·3	62·3	— 0·4	56·1	50·8	11·5	24·1	2·5	66	135·7	46·7	69·3	66·3	6·4	15·3	0·000	3·0	o:wN:v
3	..	29·548	68·0	54·5	13·5	61·0	— 1·7	58·4	56·2	4·8	11·7	1·7	84	128·0	54·5	68·7	66·1	3·1	15·2	0·229	6·0	sN,sP:w
4	..	29·598	74·9	55·7	19·2	62·2	— 0·5	59·1	56·4	5·8	15·5	0·2	82	128·1	55·7	68·3	65·3	5·0	15·2	1·233	8·5	v
5	First Qr.	29·693	78·8	56·7	22·1	66·2	+ 3·5	61·6	57·9	8·3	22·4	1·1	75	136·5	56·2	67·1	65·1	8·5	15·1	0·390	16·5	w:w:mN,sP
6	..	29·565	77·9	56·9	21·0	66·1	+ 3·4	62·4	59·4	6·7	16·0	0·2	80	131·1	53·7	67·3	64·8	9·0	15·1	0·137	13·7	s
7	..	29·665	76·5	57·8	18·7	65·7	+ 3·0	61·1	57·3	8·4	16·7	1·7	75	134·8	53·7	68·3	65·3	9·0	15·0	0·000	12·8	v
8	Greatest Declination S.	29·895	78·3	56·7	21·6	66·2	+ 3·5	61·0	56·8	9·4	20·1	1·1	72	140·0	50·3	68·5	65·8	11·4	15·0	0·000	6·0	w:w:m
9	..	29·918	79·3	54·7	24·6	66·6	+ 3·9	60·0	54·7	11·9	22·9	2·1	66	143·4	48·5	68·8	65·8	10·8	14·9	0·000	6·3	m : w
10	..	29·549	68·6	59·5	9·1	64·5	+ 1·8	61·8	59·5	5·0	9·7	1·6	84	83·5	55·2	68·3	65·3	0·8	14·9	0·460	9·3	wN, wP
11	..	29·621	76·6	57·8	18·8	63·1	+ 0·4	58·4	54·4	8·7	19·1	1·5	74	150·0	48·0	69·1	66·3	7·4	14·8	0·000	9·5	w
12	..	29·447	73·4	54·0	19·4	62·5	— 0·1	59·6	57·1	5·4	9·9	1·5	83	133·8	50·0	67·8	65·8	2·8	14·7	0·156	17·2	v:sN:m
13	Full	29·493	69·9	53·6	16·3	61·3	— 1·2	57·9	55·0	6·3	13·0	0·9	80	109·1	49·4	69·1	66·3	0·3	14·7	0·121	18·2	v
14	..	29·262	74·6	58·0	16·6	65·7	+ 3·3	61·6	58·2	7·5	15·8	0·8	77	125·7	57·9	67·8	65·3	8·6	14·6	0·229	8·5	v
15	In Equator	29·433	75·8	55·4	20·4	62·8	+ 0·5	58·8	55·4	7·4	18·2	1·0	77	139·2	52·5	67·8	65·3	6·2	14·6	0·110	6·8	v
16	..	29·283	71·9	54·5	17·4	60·2	— 1·9	57·9	55·9	4·3	12·6	0·0	86	123·7	51·1	68·8	66·3	5·7	14·5	0·446	10·8	sP, sN
17	Apogee	29·698	70·3	50·7	19·6	59·5	— 2·4	54·8	50·6	8·9	18·2	2·4	73	126·8	46·7	67·5	65·3	10·1	14·4	0·005	4·0	w : m :s
18	..	29·860	76·4	53·2	23·2	62·8	+ 1·0	58·8	55·4	7·4	16·7	1·3	77	128·4	48·7	67·3	64·3	7·4	14·4	0·000	5·0	v
19	..	29·711	72·3	54·8	17·5	62·7	+ 1·1	59·1	56·0	6·7	16·4	0·0	79	135·0	47·9	67·3	64·3	6·4	14·3	0·000	0·5	m
20	..	29·782	67·4	51·7	15·7	59·3	— 2·1	55·4	51·9	7·4	15·3	0·8	77	115·3	45·0	67·3	64·8	2·7	14·3	0·000	6·0	v
21	Last Qr.	29·863	69·3	51·7	17·6	59·5	— 1·8	54·9	50·8	8·7	17·1	4·2	73	131·8	48·7	67·3	65·3	1·2	14·2	0·000	8·0	m
22	..	29·749	69·8	55·2	14·6	62·0	+ 0·7	57·8	54·2	7·8	15·3	2·5	76	126·5	50·8	67·3	64·3	3·8	14·1	0·097	16·7	w
23	Greatest Declination N.	29·381	72·1	58·4	13·7	62·4	+ 1·2	60·8	59·4	3·0	7·0	0·0	90	100·9	57·8	66·5	63·3	0·0	14·1	0·330	12·8	w : mP,mN
24	..	29·284	67·1	56·1	11·0	60·3	— 0·8	59·6	59·0	1·3	4·7	0·0	96	83·0	53·4	66·3	64·3	0·0	14·0	0·283	0·0	w: sN,sP: w
25	..	29·339	71·4	54·7	16·7	59·7	— 1·3	58·2	56·9	2·8	9·0	0·0	91	116·8	50·5	66·3	64·3	0·9	13·9	0·005	0·0	w
26	..	29·348	72·1	52·1	20·0	61·6	+ 0·7	58·7	56·3	5·3	15·3	0·0	83	121·9	47·1	66·1	63·8	2·8	13·9	0·000	3·2	w: wN: w
27	..	29·515	73·4	57·7	15·7	63·1	+ 2·3	59·9	57·2	5·9	16·6	0·6	81	127·2	52·3	65·8	63·5	5·7	13·8	0·082	5·0	w
28	New	29·592	72·9	56·6	16·3	63·1	+ 2·4	59·4	56·3	6·8	14·6	2·1	79	138·3	51·8	65·8	63·5	9·4	13·8	0·000	16·0	w
29	Perigee: In Equator.	29·465	73·0	56·8	16·2	62·6	+ 2·0	60·0	57·8	4·8	13·1	0·8	84	118·0	53·9	65·8	63·5	3·9	13·7	0·321	16·7	sN,sP: o
30	..	29·261	70·5	57·4	13·1	61·2	+ 0·8	58·8	56·8	4·4	11·0	1·3	86	123·8	54·2	65·8	63·3	3·6	13·7	0·420	12·5	vP, vN
31	..	29·502	67·3	56·6	10·7	60·2	— 0·1	57·9	55·9	4·3	8·6	1·5	86	114·3	54·0	64·8	62·3	1·2	13·6	0·324	4·5	w:mN,mP: w
Means	..	29·588	72·9	55·4	17·5	62·5	+ 0·6	58·9	55·9	6·6	15·0	1·2	79·5	125·4	51·4	67·5	64·9	5·2	14·5	Sum 5·378	8·7	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The result on August 17 for the Barometer depends partly on values inferred from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The mean reading of the *Barometer* for the month was 29in·588, being 0in·211 *lower* than the average for the 20 years, 1854–1873.

TEMPERATURE OF THE AIR.

The highest in the month was 79°·3 on August 9; the lowest in the month was 50°·7 on August 17; and the range was 28°·6.
The mean of all the highest daily readings in the month was 72°·9, being 0°·2 *lower* than the average for the 37 years, 1841–1877.
The mean of all the lowest daily readings in the month was 55°·4, being 2°·2 *higher* than the average for the 37 years, 1841–1877.
The mean daily range was 17°·5, being 2°·4 *less* than the average for the 37 years, 1841–1877.
The mean for the month was 62°·5, being 0°·6 *higher* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	WIND AS DEDUCED FROM SELF-REGISTERING ANEMOMETERS.						CLOUDS AND WEATHER.	
	OSLER'S.					ROBINSON'S.		
	General Direction.		Pressure on the Square Foot.			Horizontal Movement of the Air.		
	A.M.	P.M.	Greatest.	Least.	Mean of 24 Hourly Measures.		A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
Aug. 1	ENE : NE	ENE : ESE	0·8	0·0	0·0	256	v : 10	8, ci.-cu, cu : v, ci.-cu
2	NE	ENE : NE : NNE	11·0	0·0	0·9	441	p.-cl : 10, th.-r	6,ci.-cu,cu.-s,ci,st.-w: 4, ci, ci.-s : 10
3	NNE : SE	E : NE	2·7	0·0	0·2	272	p.-cl : cu.-s, ci.-cu, l, t, r	9,cu.-s,ci.-cu,cu,hy.-shs,t: 9, cu.-s, cu
4	WSW	S : SSE	0·3	0·0	0·0	145	10, t.-sm, hy.-r : 6, ci.-cu, cu, ci.-s	9,cu.-s,ci.-cu,t.-sm: t.-sm, hy.-r : p.-cl, ci.-cu, l
5	SE	SE : E	0·6	0·0	0·0	198	p.-cl : 1, ci	4, cu, ci : 10, l, r
6	ENE : SE : SW	SW	0·9	0·0	0·0	207	10, r : 8, cu.-s, ci.-cu, ci	6, cu.-s,ci.-cu,cu,ci : 9, r
7	SW	SW	1·8	0·0	0·2	306	p.-cl : 5,cu.-s,ci.-cu,cu,slt.-r	5, cu.-s, ci.-cu : 2, cu
8	SW : WSW	WSW	1·7	0·0	0·1	288	p.-cl : p.-cl, ci.-cu, cu.-s	6,cu.-s,ci.-cu: 0 : 0
9	SW : SSW	SSW : SE	0·0	0·0	0·0	135	li.-cl : 6, th.-cl	5, cu, ci.-cu, ci : 5, cu.-s, ci.-cu, ci
10	SE	SW : W	0·3	0·0	0·0	197	v : 10, r	10, r : p.-cl :p.-cl,cu.-s,sh.-r
11	NW : WNW : W	WSW : SW	1·1	0·0	0·0	283	p.-cl : 2, ci.-cu, h	6, cu.-s, cu : 10 : 10
12	SSW : SW	SW : WSW	2·7	0·0	0·2	365	v : 5, cu, ci, r	9, cu.-s, l, t : vv, shs.-r : v, lu.-ha
13	WSW	SW	5·0	0·0	0·4	389	p.-cl : 9, cu.-s, cu, shs.-r	10, shs.-r : 10, r
14	SSW : WSW : W	W : WSW	7·5	0·0	1·5	536	10, r : 7, cu.-s, cu, w	6, cu.-s, cu, w : v, cu.-s, ci.-cu, r
15	WSW	SW : SSW	1·6	0·0	0·2	257	p.-cl : 9, cu.-s, ci.-cu	8, ci.-cu, cu.-s : 10, r
16	SSE : S : SSW	WSW : W	2·4	0·0	0·1	226	10, r : 10, fq.-r	p.-cl, fq.-shs.-r, t : 9, cu.-s, shs.-r, l
17	W : WSW	WSW : SW	3·1	0·0	0·8	433	p.-cl : 6, ci.-cu, ci.-s	5,cu.-s,ci.-cu: v, sh.-r : 0
18	WSW : W	SW : Calm	1·1	0·0	0·1	182	p.-cl : 8, ci.-cu, cu.-s, n, h	6,cu.-s,ci.-cu,ci.-s,ci: 8, cu.-s, ci.-cu
19	ENE	E : NE	1·3	0·0	0·1	208	p.-cl : 10	6, cu.-s, cu, ci.-cu : v
20	NE	E : SE	0·3	0·0	0·0	153	v : 8, cu.-s, cu, ci	10 : 10
21	E : ENE	E : ESE	0·6	0·0	0·0	188	10 : 10	9, ci.-cu, cu.-s : 9, cu.-s, slt.-r
22	E	E	4·4	0·0	0·5	299	p.-cl : 8, cu.-s, ci.-cu	8,cu.-s,ci.-cu,ci,w: 10, r, w : 10, r
23	E : SE	Variable	1·1	0·0	0·0	193	10, r : 10, t	10, n, r, t : 10, oc.-shs : 0, f
24	Calm : N	NE : WSW	0·0	0·0	0·0	70	f : 10, th.-r, t, f	10, r, f, l, t : v, shs.-r, l, t : 10, f
25	WSW	SW	0·0	0·0	0·0	175	10, f : 10, f	9, cu.-s, ci.-cu, n, shs.-r: 5, cu.-s, ci, ci.-cu
26	SSW : NE	SE : WSW : SW	0·0	0·0	0·0	91	p.-cl : 5, ci.-cu, ci, th.-r	10 : 10, f : 0
27	SW	SW : SSW	3·4	0·0	0·1	284	v : 10, th.-r	6,cu.-s,ci.-cu,sc,w: vv : 3,ci.-cu,h.-d
28	SW	SW : WSW	3·3	0·0	0·3	348	p.-cl : 6, cu.-s, ci.-s	p.-cl, cu.-s, ci.-cu, w: v, cu.-s
29	SW : S : SE	SW : S	1·7	0·0	0·0	208	10 : 10, r, l, t	9, cu.-s, ci.-s: v : 1, ci.-cu, l
30	S : SW : WSW	SW	34·0	0·0	1·2	454	p.-cl, r : 9, cu.-s, ci.-cu, g, r	9,cu.-s,ci.-cu,shs.-r,t: 10, shs.-r, l, t
31	WSW	W	2·7	0·0	0·0	360	10 : 10, r	p.-cl, th.-r : v, shs.-r, t : 10
Means	...	...	..	..	0·2	263		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 58°·9, being 1°·0 *higher* than
The mean *Temperature of the Dew Point* for the month was 55°·9, being 1°·5 *higher* than
The mean *Degree of Humidity* for the month was 79·5, being 3·0 *greater* than
The mean *Elastic Force of Vapour* for the month was 0in·447, being 0in·023 *greater* than
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was 5grs·0, being 0gr·3 *greater* than
The mean *Weight of a Cubic Foot of Air* for the month was 523 grains, being 5 grains *less* than
} the average for the 20 years, 1849–1868.

The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 7·3.

The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·36. The maximum daily amount of *Sunshine* was 11·4 hours on August 8.

The highest reading of the *Solar Radiation Thermometer* was 150°·0 on August 11; and the lowest reading of the *Terrestrial Radiation Thermometer* was 45°·0 on August 20.

The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 4·4; for the 6 hours ending 3 p.m., 2·6; and for the 6 hours ending 9 p.m., 1·7.

The *Proportions of Wind* referred to the cardinal points were N. 2, E. 8, S. 10, and W. 11.

The *Greatest Pressure of the Wind* in the month was 34lbs·0 on the square foot on August 30. The mean daily *Horizontal Movement of the Air* for the month was 263 miles; the greatest daily value was 536 miles on August 14; and the least daily value 70 miles on August 24.

Rain fell on 19 days in the month, amounting to 5in·378, as measured in the simple cylinder gauge partly sunk below the ground; being 3in·036 *greater* than the average fall for the 37 years, 1841–1877.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Lowest.	Daily Range.	Mean of 24 Hourly Values.	Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
Sept. 1	..	29·867	62·2	54·9	7·3	58·7	− 1·4	55·8	53·2	5·5	8·9	2·3	82	74·1	51·3	64·8	62·3	0·0	13·5	0·000	0·0	w
2	..	30·098	70·9	52·2	18·7	59·0	− 1·0	54·2	49·9	9·1	17·6	3·8	72	131·0	51·2	64·3	61·8	3·1	13·4	0·000	0·0	w
3	First Qr.	30·078	72·8	49·7	23·1	60·0	+ 0·2	56·4	53·3	6·7	15·3	1·4	78	136·7	46·4	64·3	60·8	10·1	13·4	0·000	2·0	w
4	Greatest Declination S.	29·968	74·5	50·4	24·1	61·0	+ 1·3	57·8	55·0	6·0	14·0	0·0	81	132·8	47·0	64·3	60·8	2·8	13·3	0·000	8·0	w
5	..	29·834	74·4	57·8	16·6	64·4	+ 4·9	62·3	60·6	3·8	9·5	0·0	88	107·2	53·1	64·8	61·3	0·3	13·2	0·000	0·0	w
6	..	29·925	73·6	53·0	20·6	63·0	+ 3·7	60·4	58·2	4·8	13·9	0·4	84	120·9	51·3	64·8	61·3	5·6	13·2	0·000	0·0	0 : w
7	..	29·956	76·4	51·7	24·7	63·1	+ 4·1	59·8	57·0	6·1	14·2	0·0	81	133·6	47·0	62·8	60·3	9·3	13·1	0·000	0·0	w
8	..	29·859	77·7	55·3	22·4	61·9	+ 3·1	59·2	56·9	5·0	17·2	0·6	84	139·0	49·5	62·8	60·3	2·9	13·0	0·014	0·0	w: wN, wP
9	..	29·882	69·9	53·8	16·1	61·2	+ 2·7	58·5	56·2	5·0	11·9	0·0	84	103·9	46·1	..	..	0·8	13·0	0·000	0·0	wP, wN
10	..	30·037	68·9	50·7	18·2	59·4	+ 1·1	55·3	51·6	7·8	15·8	0·8	76	114·3	43·3	62·8	60·3	6·2	12·9	0·000	3·0	w: wN, wP: w
11	Full: In Equator.	30·078	74·6	45·0	29·6	59·4	+ 1·3	55·8	52·6	6·8	16·8	0·0	79	134·2	40·9	62·3	60·3	9·3	12·9	0·000	3·0	w
12	..	29·949	69·1	50·9	18·2	57·0	− 1·0	53·8	50·8	6·2	12·9	0·4	80	120·2	42·0	62·3	60·3	4·6	12·8	0·010	0·0	w : m
13	Apogee	29·930	66·6	46·7	19·9	55·4	− 2·4	50·7	46·3	9·1	17·6	1·6	72	121·6	38·6	62·8	59·3	9·3	12·7	0·000	2·0	w: wN, wP: w
14	..	29·847	70·3	46·0	24·3	57·3	− 0·3	54·3	51·6	5·7	13·7	0·0	81	120·3	38·3	63·1	61·8	7·0	12·7	0·000	0·3	w : 0
15	..	29·607	68·6	52·7	15·9	59·5	+ 2·1	56·1	53·1	6·4	14·0	0·9	80	117·9	47·2	64·3	62·1	5·0	12·6	0·120	2·5	wN: w
16	..	29·659	64·4	49·7	14·7	55·2	− 2·1	49·3	43·6	11·6	21·3	5·2	66	122·3	44·4	63·8	61·3	8·6	12·6	0·000	8·5	wP, wN
17	..	29·821	67·8	50·1	17·7	58·9	+ 1·8	55·6	52·6	6·3	9·7	3·2	80	91·6	43·2	62·8	60·3	0·3	12·5	0·000	5·2	..
18	..	29·561	62·1	48·6	13·5	58·0	+ 1·1	55·7	53·6	4·4	11·8	1·3	85	76·0	43·5	62·8	60·3	0·7	12·4	0·230	6·2	..
19	Greatest Dec. N.: L. Qr.	29·715	62·9	44·6	18·3	52·4	− 4·4	48·5	44·5	7·9	15·2	1·6	75	117·8	39·1	62·3	59·7	8·5	12·3	0·000	6·2	..
20	..	29·749	61·9	44·9	17·0	51·3	− 5·3	48·6	45·8	5·5	12·9	0·0	82	114·3	36·4	61·3	58·7	4·4	12·3	0·143	1·0	..
21	..	29·995	60·5	38·3	22·2	49·3	− 7·1	45·8	42·0	7·3	16·0	0·4	76	103·3	33·9	60·8	58·3	7·1	12·2	0·000	1·2	..
22	..	29·701	59·1	46·0	13·1	53·3	− 2·9	49·7	46·1	7·2	14·1	2·7	77	76·3	42·5	60·3	58·1	0·1	12·2	0·010	8·2	..
23	..	29·319	58·5	41·5	17·0	50·6	− 5·5	48·5	46·3	4·3	13·7	0·4	86	79·1	35·0	59·7	57·8	0·9	12·1	0·126	4·5	..
24	..	29·479	59·4	38·2	21·2	47·8	− 8·1	45·9	43·8	4·0	11·8	0·0	88	77·2	31·6	59·3	56·8	0·4	12·0	0·000	0·0	..
25	In Equator	29·551	60·5	43·4	17·1	53·1	− 2·7	51·1	49·1	4·0	8·4	0·0	86	90·5	35·9	58·5	55·8	0·3	11·9	0·050	0·0	..
26	New: Perigee.	29·793	59·3	40·7	18·6	49·9	− 5·8	46·6	43·1	6·8	16·5	0·2	78	100·7	35·1	58·3	55·8	5·1	11·9	0·000	0·0	..
27	..	29·917	62·8	43·5	19·3	54·3	− 1·2	51·8	49·4	4·9	12·9	0·6	83	117·8	35·0	58·3	55·3	2·7	11·8	0·000	0·0	..
28	..	29·929	67·3	54·8	12·5	59·5	+ 4·1	57·6	55·9	3·6	8·1	0·8	89	88·8	49·5	58·3	55·3	0·1	11·7	0·000	0·0	..
29	..	29·843	66·6	50·7	15·9	57·0	+ 1·8	55·4	54·0	3·0	10·3	0·0	89	109·5	44·8	58·5	56·1	5·0	11·7	0·000	0·5	..
30	..	29·604	64·2	51·7	12·5	57·1	+ 2·2	53·3	49·8	7·3	17·5	0·8	76	115·0	47·8	58·8	56·3	7·0	11·6	0·117	4·5	..
Means	..	29·818	66·9	48·6	18·3	56·9	− 0·5	53·8	50·9	6·1	13·8	1·0	80·6	109·6	43·0	61·9	59·3	4·2	12·6	Sum 0·820	2·2	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The results on September 22 for Air and Evaporation Temperatures depend partly on values inferred from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The amount of Sunshine on September 20 was estimated on account of an accident which destroyed the recording card.

The Electrical Apparatus was not in action from September 17 to 30.

The mean reading of the *Barometer* for the month was 29in·818, being 0in·031 *higher* than the average for the 20 years, 1854–1873.

TEMPERATURE OF THE AIR.

The highest in the month was 77°·7 on September 8; the lowest in the month was 38°·2 on September 24; and the range was 39°·5.

The mean of all the highest daily readings in the month was 66°·9, being 0°·7 *lower* than the average for the 37 years, 1841–1877.

The mean of all the lowest daily readings in the month was 48°·6, being 0°·5 *lower* than the average for the 37 years, 1841–1877.

The mean daily range was 18°·3, being 0°·2 *less* than the average for the 37 years, 1841–1877.

The mean for the month was 56°·9, being 0°·5 *lower* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	Wind as deduced from Self-registering Anemometers. Osler's. General Direction. A.M.	P.M.	Pressure on the Square Foot. Greatest.	Least.	Mean of 24 Hourly Measures.	Robinson's. Horizontal Movement of the Air.	Clouds and Weather. A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
Sept. 1	WNW	WNW	0·6	0·0	0·0	284	10 : 10	10 : 10
2	WNW : NNW	WSW : SW	0·0	0·0	0·0	173	10 : 10, slt.-f	7, cu.-s, cu : p.-cl : 0
3	SW : WSW	SW : S	0·0	0·0	0·0	194	p.-cl : 7, ci.-cu, cu.-s, ci.-s	3, ci.-cu : 1, lu.-co
4	SE : NE	E : ENE	0·0	0·0	0·0	144	0 : 4, ci	8, ci.-cu : 9, cu.-s, ci.-cu
5	NE : E	SW	0·0	0·0	0·0	103	p.-cl : 6, cu, ci.-cu	10, th.-r : 10, li.-shs : 10
6	WSW	WSW : W	0·0	0·0	0·0	210	10 : 10, f	3, cu, ci.-cu : 0, d
7	WSW	WSW	0·0	0·0	0·0	124	0, h, d : 1, ci, h	5, cu.-s, ci.-cu : p.-cl : 2, ci.-cu
8	SSW : WSW	NW : WSW	0·0	0·0	0·0	137	p.-cl : 9	p.-cl, cu, ci.-cu : 10, r : 10
9	WNW : W : WSW	WSW : WNW	0·0	0·0	0·0	215	p.-cl : 6, ci.-cu	10, slt.-r : 10, slt.-r
10	NNW : NW	N : NNE : ESE	0·0	0·0	0·0	145	p.-cl : 7, ci, ci.-s	6, cu.-s, ci.-cu : 3, ci.-cu, d
11	Calm : SE	S : SW	0·0	0·0	0·0	85	0, hy.-d : 0, h, m	3, ci, ci.-cu : 0 : 0
12	SW : WSW	NNW	7·5	0·0	0·2	304	0 : 4, ci	9, cu.-s, ci.-cu, ci.-s, sq, r : 0
13	N : NNE	N : NW : WSW	0·3	0·0	0·0	206	0 : 1, ci	p.-cl, ci : 0, f
14	WSW : W	WSW	0·0	0·0	0·0	185	p.-cl : 9, ci.-cu, ci	5, ci, ci.-s, so.-ha : 3, ci, ci.-cu
15	SW : WSW	SW : WSW	9·7	0·0	1·2	516	p.-cl : 9, cu.-s, ci.-cu, w	p.-cl, cu.-s, ci-cu, w : 10, w : 10, w
16	WSW : W	WNW : W : WSW	9·1	0·0	1·4	570	p.-cl : 7, cu.-s, cu, st.-w	4, cu.-s, ci.-cu, st.-w : 2, ci.-s
17	WSW	WSW	4·5	0·0	0·5	441	p.-cl : 10	10, sh.-r : v, cu.-s, ci.-cu
18	SW : WSW	WNW : W : WSW	12·4	0·0	0·6	460	p.-cl : 10, r, sq	10, oc.-r : v : 0
19	WSW : W	WSW : SW	3·0	0·0	0·3	406	0 : 0	6, n, cu.-s, cu, r : v : 0, hy.-d
20	WNW : NNW	NNW	1·6	0·0	0·1	228	v, hy.-r : 3, li.-cl, h	9, cu.-s, ci.-cu, sh.-r, hl : 0, hy.-d
21	SW	NNW : WSW : S	0·0	0·0	0·0	168	0 : 0	8, cu.-s, cu, ci.-cu : 8, cu
22	S : SSE	S : SSE	2·3	0·0	0·1	243	p.-cl : 10, sh.-r	10, th.-r : 10, th.-r
23	S : SW : W	W : N	0·0	0·0	0·0	135	10, hy.-r : 6, ci, ci.-cu, cu.-s, h, m	9, cu.-s, ci.-cu, m : 0, m, hy.-d
24	SW	N : NW : SW	0·0	0·0	0·0	135	p.-cl, hy.-d : 10, slt.-f, so.-ha, h	9, th.-cl, h : 10, slt.-r : 10
25	SW : SSW	SW : N	1·8	0·0	0·1	292	10 : 9, slt.-r	10, th.-r : 10, th.-r : 10, r
26	N : NW : W	WNW : WSW	1·0	0·0	0·0	223	0 : 6, ci.-cu, ci, m	5, cu.-s, ci.-cu : 0
27	WSW	SW : WSW	1·6	0·0	0·0	283	0 : 1, ci	10 : 10, shs.-r : v
28	WSW	WSW	0·0	0·0	0·0	184	p.-cl : 10	9, ci.-cu, ci, so.-ha : 4, th.-cl
29	WSW	WSW : SE : SSE	0·0	0·0	0·0	136	0 : 0, tk.-f	4, ci.-cu : 0
30	SSE : SW : W	W	8·0	0·0	1·0	515	p.-cl : 10, r : 6, ci.-cu, cu.-s, w	8, cu.-s, ci.-cu, ci.-s, w : 10, w : 10
Means	...	...	..	..	0·2	248		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 53°·8, being 0°·5 *lower* than the average for the 20 years, 1849–1868.
The mean *Temperature of the Dew Point* for the month was 50°·9, being 0°·5 *lower* than the average for the 20 years, 1849–1868.
The mean *Degree of Humidity* for the month was 80·6, being 0·5 *greater* than the average for the 20 years, 1849–1868.
The mean *Elastic Force of Vapour* for the month was $0^{\text{in}}\cdot373$, being $0^{\text{in}}\cdot006$ *less* than the average for the 20 years, 1849–1868.
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was $4^{\text{grs}}\cdot2$, being *the same as* the average for the 20 years, 1849–1868.
The mean *Weight of a Cubic Foot of Air* for the month was 534 grains, being 2 grains *greater* than the average for the 20 years, 1849–1868.

The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 6·2.

The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·33. The maximum daily amount of *Sunshine* was 10·1 hours on September 3.

The highest reading of the *Solar Radiation Thermometer* was 139°·0 on September 8; and the lowest reading of the *Terrestrial Radiation Thermometer* was 31°·6 on September 24.

The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 1·3; for the 6 hours ending 3 p.m., 0·7; and for the 6 hours ending 9 p.m., 0·2.

The *Proportions of Wind* referred to the cardinal points were N. 4, E. 2, S. 8, and W. 16.

The *Greatest Pressure of the Wind* in the month was $12^{\text{lbs}}\cdot4$ on the square foot on September 18. The mean daily *Horizontal Movement of the Air* for the month was 248 miles; the greatest daily value was 570 miles on September 16; and the least daily value 85 miles on September 11.

Rain fell on 9 days in the month, amounting to $0^{\text{in}}\cdot820$, as measured in the simple cylinder gauge partly sunk below the ground; being $1^{\text{in}}\cdot453$ *less* than the average fall for the 37 years, 1841–1877.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Lowest.	Daily Range.	Mean of 24 Hourly Values.	Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
Oct. 1	Greatest Declination S.	29·874	61·1	48·4	12·7	53·7	− 1·0	51·4	49·2	4·5	11·4	0·4	85	106·3	44·0	59·3	56·5	2·5	11·6	0·015	0·0	..
2	..	30·123	62·1	38·5	23·6	50·8	− 3·6	48·3	45·7	5·1	12·0	0·0	83	119·5	33·9	58·3	56·3	4·2	11·5	0·000	3·5	..
3	First Qr.	30·041	68·0	49·7	18·3	57·5	+ 3·5	54·4	51·6	5·9	15·5	0·8	81	125·6	46·2	58·5	56·3	7·6	11·4	0·000	3·5	..
4	..	29·992	65·9	46·7	19·2	56·0	+ 2·3	52·1	48·4	7·6	21·2	0·4	76	114·7	43·1	58·5	56·3	6·7	11·4	0·000	8·0	0 : w
5	..	29·931	74·5	47·7	26·8	59·5	+ 6·1	55·8	52·5	7·0	16·3	0·4	78	123·1	40·4	58·9	56·7	8·0	11·3	0·000	0·0	0 : w : 0
6	..	29·658	69·1	53·7	15·4	60·8	+ 7·8	58·2	55·9	4·9	8·5	1·9	84	92·6	49·0	59·3	57·1	0·0	11·2	0·036	8·0	0
7	..	29·403	67·6	57·6	10·0	61·5	+ 8·8	57·9	54·8	6·7	14·0	1·0	79	118·3	52·1	60·3	57·7	6·6	11·2	0·196	20·2	0 : w : 0
8	..	29·281	66·2	55·1	11·1	59·2	+ 6·7	56·0	53·1	6·1	12·6	2·8	81	118·5	50·8	60·3	57·8	5·9	11·1	0·057	16·5	0
9	In Equator	29·395	63·4	53·5	9·9	57·6	+ 5·3	55·4	53·4	4·2	8·9	2·2	86	108·3	47·4	59·8	57·9	2·5	11·0	0·066	15·5	0
10	Apogee	29·209	62·9	52·0	10·9	57·2	+ 5·1	54·5	52·0	5·2	7·4	2·5	83	109·6	49·0	60·3	57·3	2·5	11·0	0·174	18·8	0
11	Full	29·738	60·6	44·3	16·3	51·7	− 0·2	47·5	43·2	8·5	15·8	4·2	73	103·7	39·0	59·8	57·3	7·6	10·9	0·000	8·0	w
12	..	30·086	59·4	42·7	16·7	49·1	− 2·6	46·3	43·3	5·8	13·7	1·3	80	104·7	35·3	58·7	56·3	6·2	10·9	0·000	0·0	w
13	..	30·142	62·4	36·4	26·0	49·0	− 2·6	46·2	43·2	5·8	16·0	0·5	80	110·9	29·7	58·3	55·3	7·6	10·8	0·000	7·2	0 : w : 0
14	..	29·963	61·2	39·9	21·3	50·9	− 0·5	47·6	44·2	6·7	18·4	0·0	78	113·0	32·0	57·7	55·3	8·6	10·7	0·000	3·8	0 : w : 0
15	..	29·826	57·8	44·8	13·0	51·9	+ 0·6	50·1	48·3	3·6	7·8	1·0	87	72·1	37·3	57·3	55·1	0·0	10·7	0·000	2·0	..
16	Greatest Declination N.	29·891	56·1	51·3	4·8	53·6	+ 2·4	52·7	51·8	1·8	3·2	0·2	94	60·7	50·5	57·3	55·3	0·0	10·6	0·000	0·0	..
17	..	29·825	56·1	48·2	7·9	51·7	+ 0·6	51·3	50·9	0·8	3·6	0·0	97	74·2	39·3	57·3	55·3	0·0	10·5	0·000	0·0	..
18	..	29·674	54·1	47·9	6·2	51·7	+ 0·7	49·9	48·1	3·6	7·8	0·0	88	67·1	39·8	56·9	54·3	0·5	10·5	0·000	2·5	..
19	Last Qr.	29·597	58·4	49·8	8·6	53·1	+ 2·3	51·2	49·3	3·8	10·1	1·2	87	94·7	44·0	56·1	54·1	1·3	10·4	0·000	5·5	..
20	..	29·621	60·4	49·6	10·8	53·8	+ 3·2	52·4	51·0	2·8	9·3	0·0	90	83·3	45·1	56·5	54·3	0·1	10·3	0·000	0·7	..
21	..	29·294	65·4	50·4	15·0	56·7	+ 6·3	54·6	52·7	4·0	10·1	0·2	86	99·7	45·4	56·7	54·1	3·0	10·3	0·000	13·5	..
22	..	29·087	56·7	43·0	13·7	50·3	+ 0·2	47·8	45·2	5·1	11·8	0·6	83	86·4	38·0	57·1	54·3	2·1	10·2	0·202	8·0	..
23	In Equator	29·374	54·6	40·9	13·7	46·6	− 3·1	43·6	40·2	6·4	13·4	1·5	80	104·8	36·6	56·3	53·7	5·0	10·2	0·010	6·8	..
24	..	29·210	58·5	43·7	14·8	49·7	+ 0·3	47·6	45·4	4·3	9·1	1·6	86	70·0	39·4	55·3	52·8	0·4	10·1	0·316	3·5	..
25	Perigee: New	29·094	55·8	43·0	12·8	47·7	− 1·4	44·8	41·7	6·0	12·4	2·1	80	100·7	38·3	55·1	52·5	3·9	10·0	0·000	3·5	..
26	..	28·981	55·8	39·5	16·3	47·1	− 1·7	45·5	43·7	3·4	7·6	1·0	89	99·8	33·5	54·1	51·8	1·1	10·0	0·454	6·0	..
27	..	29·336	50·1	36·5	13·6	43·4	− 5·1	42·0	40·3	3·1	8·2	0·0	89	88·8	30·5	53·5	50·3	1·7	9·9	0·000	0·2	..
28	..	29·534	51·8	37·1	14·7	43·8	− 4·4	41·3	38·4	5·4	13·2	0·7	80	85·6	33·0	53·3	49·3	4·2	9·8	0·022	0·8	..
29	Greatest Declination S.	29·588	45·3	35·7	9·6	41·8	− 6·1	39·0	35·5	6·3	9·9	3·2	79	65·0	32·8	51·3	48·3	0·0	9·8	0·000	0·0	..
30	..	29·547	43·2	31·8	11·4	37·9	− 9·7	36·5	34·6	3·3	5·7	1·2	88	51·4	27·9	50·3	47·3	0·2	9·7	0·081	0·0	..
31	..	29·693	43·6	35·1	8·5	40·0	− 7·3	39·2	38·2	1·8	4·4	0·5	94	59·8	31·1	49·3	46·3	0·8	9·7	0·034	0·0	..
Means	..	29·613	59·0	45·0	14·0	51·5	+ 0·4	49·1	46·6	4·8	10·9	1·1	84·0	94·6	39·8	56·8	54·3	3·3	10·6	Sum 1·663	5·4	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The results on October 30 for the Barometer and for Air and Evaporation Temperatures depend partly on values inferred from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The Electrical Apparatus was not in action from October 1 to 3 and from October 15 to 31.

The mean reading of the *Barometer* for the month was 29in·613, being 0in·107 *lower* than the average for the 20 years, 1854–1873.

TEMPERATURE OF THE AIR.

The highest in the month was 74°·5 on October 5; the lowest in the month was 31°·8 on October 30; and the range was 42°·7.

The mean of all the highest daily readings in the month was 59°·0, being 0°·6 *higher* than the average for the 37 years, 1841–1877.

The mean of all the lowest daily readings in the month was 45°·0, being 1°·3 *higher* than the average for the 37 years, 1841–1877.

The mean daily range was 14°·0, being 0°·7 *less* than the average for the 37 years, 1841–1877.

The mean for the month was 51°·5, being 0°·4 *higher* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	WIND AS DEDUCED FROM SELF-REGISTERING ANEMOMETERS. Osler's. General Direction. A.M.	P.M.	Pressure on the Square Foot. Greatest.	Least.	Mean of 24 Hourly Measures.	Robinson's. Horizontal Movement of the Air.	CLOUDS AND WEATHER. A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
Oct. 1	NW : NE	SE : NE	0·7	0·0	0·0	123	p.-cl : 2, ci.-cu, ci, slt.-m	9, cu.-s, f, glm : 10, shs.-r
2	NE	SE : SSE	0·0	0·0	0·0	147	f : 6, ci.-cu	8, cu.-s, ci.-cu : 6
3	S : SSW : WSW	WSW : SW	0·0	0·0	0·0	185	p.-cl : 1, ci, cu	4,cu.-s,ci.-cu : so.-ha : 8, ci.-cu
4	S : SSE : SSW	SSW : S	0·0	0·0	0·0	153	p.-cl : 3, th.-cl	7, cu, ci, ci.-s, so.-ha : 7, ci.-cu, lu.-co
5	SSE : SSW	SSW : SSE : ESE	0·0	0·0	0·0	119	tk.-f : 3, ci.-cu, m	3, ci, ci.-s : 5, ci.-cu, ci.-s
6	E : SE : SSE	S : SSW	0·0	0·0	0·0	183	p.-cl : 9, cu.-s, ci.-cu	10 : 10, r : 10
7	S : SW	SSW : SSE : S	2·7	0·0	0·3	340	10, r : 8, cu.-s, ci.-cu	4,cu.-s,ci.-cu : 10 : 10
8	SSW : SW	SW	2·4	0·0	0·2	362	10, r : cu.-s, th.-cl, shs.-r	6, cu.-s, ci.-cu : 2, ci.-cu
9	SSW	SSW	7·5	0·0	1·0	458	th.-cl : 2, ci.-cu, ci, w	10, shs.-r, w : 10
10	SSW	SW : WSW	6·3	0·1	1·6	600	p.-cl, shs.-r : 7, cu.-s, ci.-cu, ci.-s, w	9, shs.-r : 7, cu.-s, cu, lu.-ha
11	WSW : W	WNW : W : WSW	4·0	0·0	0·7	465	v : 1, ci.-cu	4, cu.-s, ci.-cu, ci.-s : 9, ci, cu, lu.-ha
12	WSW	NW : SW	0·0	0·0	0·0	172	lu.-ha : 1, ci	6, ci.-cu, cu.-s, m : 0, slt.-f
13	SW : SSE : S	SSW : SE	0·3	0·0	0·0	136	0, hy.-d : 4, ci, ci.-s, m	4, ci, ci.-s, ci.-cu : 5, th.-cl
14	SE : ESE	ESE : E	1·8	0·0	0·2	243	hy.-d : 0	0 : 0
15	E : ENE	E : NE	0·2	0·0	0·0	152	0 : 10	10, cu.-s, ci.-cu : 10
16	NE : ENE : E	ESE : SSE : Calm	0·0	0·0	0·0	46	10 : 10	10 : 10
17	Calm	NE : E : ESE	0·0	0·0	0·0	54	10 : 10, f	th.-cl, so.-ha, f : 10, tk.-f, hy.-d
18	ENE : E	E	2·4	0·0	0·2	271	p.-cl : 10	9, cu.-s, cu : th.-cl
19	E : ESE	E : ENE	1·4	0·0	0·0	192	p.-cl : 10	9, cu.-s, ci.-cu, ci : 10
20	WSW	SW : S	0·0	0·0	0·0	88	10 : 10, m	10 : 10, slt.-r
21	SSE : S : SSW	SW	2·5	0·0	0·2	273	p.-cl : 8, ci.-cu, ci	9, cu.-s, ci.-cu : 10
22	SW	WSW	3·1	0·0	0·2	310	10, r, w : 10, r	7, n, ci.-cu, cu.-s, sh.-r, hl : 0, l
23	W : WSW	WSW : SW	2·5	0·0	0·2	417	v : 8, cu.-s, ci.-cu, ci.-s	p.-cl, shs.-r : p.-cl, shs.-r
24	SW : SSW	W : WSW	15·0	0·0	1·4	498	10 : 10, r, st.-w	9, st.-w : 1, ci.-cu
25	WSW	SW : SSW	1·1	0·0	0·1	329	p.-cl : 5, cu.-s, ci.-cu	6, ci.-cu, cu.-s : v
26	S : SSW	W : WNW : WSW	2·5	0·0	0·1	311	10, r : 10, r	8, fq.-r : 0
27	WSW : N	N : NNW	0·0	0·0	0·0	162	0 : 2, ci, f	5,ci.-cu,th.-cl : p.-cl : 0
28	W : WSW	WNW : WSW : W	3·9	0·0	0·2	406	0 : 3, ci.-cu, slt.-r	5,cu.-s,ci.-cu,r,hl : 0 : v, r
29	WNW	W : NW : NNW	2·2	0·0	0·2	380	p.-cl : li.-cl, so.-ha	9, cu.-s, ci.-cu, slt.-h : 6, ci.-cu
30	WNW : WSW	WNW : W	2·7	0·0	0·1	311	p.-cl : 10, sn, fr	9, cu.-s, ci.-cu, oc.-r : 10, f, l
31	N : NW	WSW : W : N	0·0	0·0	0·0	158	p.-cl : 9, cu.-s, ci.-cu, f	v, th.-cl : 10, th.-r : 10, th.-r
Means	...	...	..	..	0·2	259		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 49°·1, being 0°·2 *higher* than the average for the 20 years, 1849-1868.
The mean *Temperature of the Dew Point* for the month was 46°·6, being 0°·2 *lower* than the average for the 20 years, 1849-1868.
The mean *Degree of Humidity* for the month was 84·0, being 2·1 *less* than the average for the 20 years, 1849-1868.
The mean *Elastic Force of Vapour* for the month was 0in·318, being 0in·003 *less* than the average for the 20 years, 1849-1868.
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was 3grs·6, being *the same as* the average for the 20 years, 1849-1868.
The mean *Weight of a Cubic Foot of Air* for the month was 536 grains, being 3 grains *less* than the average for the 20 years, 1849-1868.
The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 6·6.
The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·31. The maximum daily amount of *Sunshine* was 8·6 hours on October 14.
The highest reading of the *Solar Radiation Thermometer* was 125°·6 on October 3; and the lowest reading of the *Terrestrial Radiation Thermometer* was 27°·9 on October 30.
The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 2·7; for the 6 hours ending 3 p.m., 1·8; and for the 6 hours ending 9 p.m., 0·9.
The *Proportions of Wind* referred to the cardinal points were N. 3, E. 6, S. 10, and W. 11. One day was calm.
The *Greatest Pressure of the Wind* in the month was 15lbs·0 on the square foot on October 24. The mean daily *Horizontal Movement of the Air* for the month was 259 miles; the greatest daily value was 600 miles on October 10; and the least daily value 46 miles on October 16.
Rain fell on 13 days in the month, amounting to 1in·663, as measured in the simple cylinder gauge partly sunk below the ground; being 1in·241 *less* than the average fall for the 37 years, 1841-1877.

MONTH and DAY, 1878.	Phases of the Moon.	BAROMETER. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	TEMPERATURE. Of the Air. Highest.	Lowest.	Daily Range.	Mean of 24 Hourly Values.	Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	TEMPERATURE. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
Nov. 1	First Qr.	29·784	48·4	38·3	10·1	42·2	− 4·8	40·8	39·1	3·1	6·1	1·1	89	73·5	34·0	48·8	45·3	2·1	9·6	0·008	0·0	..
2	..	29·971	47·0	33·3	13·7	39·6	− 7·1	38·3	36·6	3·0	6·9	0·5	90	60·9	28·4	48·1	45·3	2·2	9·5	0·000	3·0	..
3	..	29·993	45·2	30·7	14·5	38·9	− 7·5	37·6	35·9	3·0	5·7	0·6	90	52·0	27·5	47·5	44·3	0·0	9·5	0·000	0·0	..
4	..	29·628	42·2	32·3	9·9	37·3	− 8·7	36·4	35·2	2·1	6·2	0·0	92	47·2	30·5	46·5	43·7	0·0	9·4	0·000	0·0	..
5	In Equator	29·591	45·2	35·6	9·6	40·1	− 5·5	38·1	35·5	4·6	8·4	2·2	84	78·2	30·8	46·3	43·3	4·5	9·4	0·000	0·0	..
6	Apogee	29·410	44·4	35·4	9·0	40·5	− 4·7	37·5	33·7	6·8	11·2	3·2	77	75·2	31·5	45·3	42·3	0·6	9·3	0·000	0·0	..
7	..	29·549	46·2	32·0	14·2	39·4	− 5·3	37·3	34·6	4·8	9·9	2·1	83	73·9	27·0	45·1	41·8	5·5	9·2	0·000	0·5	..
8	..	29·373	44·6	31·7	12·9	39·8	− 4·5	38·1	35·9	3·9	7·1	1·7	85	57·4	25·6	44·3	41·3	0·3	9·2	0·098	1·5	..
9	..	29·919	42·7	32·3	10·4	37·4	− 6·4	34·8	31·2	6·2	11·1	3·8	79	54·2	28·2	44·1	40·9	4·6	9·1	0·000	2·0	..
10	Full	29·315	50·8	37·2	13·6	46·0	+ 2·6	44·3	42·4	3·6	9·0	2·2	88	52·9	35·3	43·5	40·3	0·0	9·1	0·792	11·0	..
11	..	29·270	43·5	34·0	9·5	40·0	− 3·0	38·3	36·1	3·9	8·4	1·2	86	53·9	32·0	43·7	40·7	0·6	9·0	0·041	2·0	..
12	Greatest Declination N.	29·254	38·8	31·3	7·5	34·7	− 7·9	32·9	30·0	4·7	8·7	2·1	82	71·2	28·2	43·5	40·8	4·0	9·0	0·000	0·0	..
13	..	29·267	39·3	33·8	5·5	36·8	− 5·5	35·9	34·7	2·1	3·4	0·9	93	42·7	29·2	42·7	40·3	0·0	8·9	0·034	0·0	..
14	..	29·291	43·9	36·9	7·0	40·8	− 1·2	40·1	39·3	1·5	4·0	0·5	94	47·8	36·9	42·3	40·3	0·0	8·9	0·440	0·0	..
15	..	29·085	41·7	37·7	4·0	39·7	− 2·1	39·0	38·1	1·6	3·2	0·5	94	43·5	37·7	42·3	40·3	0·0	8·8	0·361	0·7	..
16	..	29·105	44·8	38·2	6·6	41·7	+ 0·1	39·8	37·4	4·3	6·6	1·8	86	60·2	36·3	42·1	40·3	0·2	8·8	0·080	2·3	..
17	Last Qr.	29·358	44·8	39·7	5·1	42·7	+ 1·2	40·8	38·6	4·1	6·2	2·4	86	58·3	35·0	42·1	40·3	0·0	8·7	0·101	0·2	..
18	..	29·798	47·8	38·0	9·8	43·1	+ 1·6	41·6	39·8	3·3	6·7	1·4	88	79·9	32·9	42·1	40·3	4·5	8·7	0·018	0·8	..
19	In Equator	30·226	49·0	34·5	14·5	39·9	− 1·5	39·0	37·8	2·1	7·1	0·0	93	78·2	28·8	42·3	40·5	4·7	8·6	0·000	0·0	..
20	..	30·198	44·1	36·0	8·1	40·0	− 1·3	38·3	36·1	3·9	7·5	0·5	86	50·5	33·9	42·5	40·7	0·0	8·6	0·000	1·0	..
21	..	29·968	42·1	38·5	3·6	39·9	− 1·3	37·9	35·3	4·6	6·2	2·8	84	48·3	37·2	42·3	40·5	0·0	8·5	0·000	0·0	..
22	Perigee	29·881	42·0	36·8	5·2	39·2	− 1·9	37·1	34·4	4·8	7·4	3·0	83	51·8	34·3	42·1	40·3	0·0	8·5	0·000	1·0	..
23	..	29·819	42·9	32·9	10·0	37·3	− 3·7	35·9	34·0	3·3	7·4	0·6	88	76·4	28·5	42·3	40·3	2·6	8·4	0·000	1·0	..
24	New	29·401	51·9	34·6	17·3	42·8	+ 1·8	42·2	41·5	1·3	3·0	0·0	95	51·9	34·5	42·3	40·3	0·0	8·4	0·128	1·5	..
25	Greatest Declination S.	29·213	53·2	40·2	13·0	47·7	+ 6·8	46·1	44·3	3·4	6·2	1·4	89	62·3	39·5	42·3	40·3	0·2	8·3	0·013	4·5	..
26	..	29·292	40·7	38·5	2·2	39·6	− 1·2	38·8	37·8	1·8	3·4	0·7	94	46·1	38·6	44·1	41·5	0·0	8·3	0·181	0·0	..
27	..	29·216	41·0	34·7	6·3	38·5	− 2·3	38·0	37·4	1·1	4·4	0·0	96	41·0	33·9	43·7	41·5	0·0	8·2	0·690	2·0	..
28	..	29·381	42·0	37·4	4·6	40·1	− 0·8	39·1	37·8	2·3	4·8	0·5	92	44·7	37·0	43·3	41·5	0·0	8·2	0·469	9·0	..
29	..	29·735	39·2	27·7	11·5	34·6	− 6·4	33·2	30·9	3·7	6·7	0·0	86	64·2	25·1	42·8	41·3	3·9	8·2	0·000	0·0	..
30	..	29·806	37·4	29·0	8·4	33·7	− 7·5	32·8	31·2	2·5	6·0	0·3	90	45·5	26·5	42·1	40·1	0·0	8·1	0·000	0·0	..
Means	..	29·570	44·2	35·0	9·3	39·8	− 2·9	38·3	36·4	3·4	6·6	1·3	88·1	58·1	32·2	43·7	41·4	1·4	8·8	Sum 3·454	1·5	..
Number of Column for Reference	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The results on November 20 for Air and Evaporation Temperatures depend partly on values inferred from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The Electrical Apparatus was not in action throughout the month.

The mean reading of the *Barometer* for the month was 29in·570, being 0in·201 *lower* than the average for the 20 years, 1854–1873.

Temperature of the Air.

The highest in the month was 53°·2 on November 25; the lowest in the month was 27°·7 on November 29; and the range was 25°·5.
The mean of all the highest daily readings in the month was 44°·2, being 4°·8 *lower* than the average for the 37 years, 1841–1877.
The mean of all the lowest daily readings in the month was 35°·0, being 2°·4 *lower* than the average for the 37 years, 1841–1877.
The mean daily range was 9°·3, being 2°·2 *less* than the average for the 37 years, 1841–1877.
The mean for the month was 39°·8, being 2°·9 *lower* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	Wind as deduced from Self-registering Anemometers. Osler's. General Direction. A.M.	P.M.	Pressure on the Square Foot. Greatest.	Least.	Mean of 24 Hourly Measures.	Robinson's. Horizontal Movement of the Air.	Clouds and Weather. A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
Nov. 1	NNE: NE	NNE: N	0·3	0·0	0·0	241	10 : 10, th.-r	8, cu.-s, ci.-cu, ci.-s: 2, ci.-cu
2	N: NNW	N	1·0	0·0	0·0	262	p.-cl, ho.-fr : 7, ci, ci.-s	8, cu.-s, ci.-cu : 0, hy.-d
3	N: NNW: WSW	NNW: N: NW	0·0	0·0	0·0	188	f, ho.-fr : 0, f	10 : p.-cl : 2, th.-cl
4	WSW: W	NW: NNW: N	1·2	0·0	0·0	239	p.-cl : 10, slt.-f, ho.-fr	10, th.-r, f : 10
5	N: NNE	N: NW	2·3	0·0	0·3	391	p.-cl : 6, ci.-cu, ci	5, cu.-s, ci.-cu : 10
6	WNW: NNW	NNW: N	2·1	0·0	0·3	394	p.-cl : 8, ci.-cu, slt.-sn	10, cu.-s, ci.-cu : 10, th,-r
7	NW: N	NNW: NW: WSW	1·1	0·0	0·1	279	p.-cl : 1, ci.-cu	1, ci.-cu : 1, ci, f, ho.-fr, lu.-co
8	SW	W: WNW: NNW	6·5	0·0	0·9	490	p.-cl : 10, r	8, cu.-s, ci.-cu, r : 10, r, w
9	NW: NNW	WNW: SW: SSW	4·4	0·0	0·2	351	p.-cl, ho.-fr : 3, ci, th.-cl	1, th.-cl, h, m : 5, ci.-cu, m, lu.-ha
10	SW	SW: WSW	13·0	0·0	2·4	713	p.-cl : 10, r, g : 10, r, g	10, r, st.-w : v, r : 0, lu.-ha
11	W: WNW	W: WSW: SSW	2·2	0·0	0·1	397	p.-cl : 10	v, hl, sn : 10, th.-r
12	WSW	SW: NE	0·6	0·0	0·0	261	ho.-fr : 8, th.-cl	9, cu, ci, so.-ha: 10, f : 10
13	NE: N	N: NNE	0·2	0·0	0·0	210	10 : 10	10, th.-r : 10, oc.-r
14	N	N: NNW	2·4	0·0	0·2	375	10, r : 10, r	10, r, sn : 10, c.-r
15	NNW: NW	NW: WNW	2·5	0·0	0·5	458	10, r : 10, r, slt.-f	10, c.-r : 10, c.-r
16	WNW	W: WSW: WNW	2·8	0·0	0·4	405	10, r : 10	9, cu.-s, ci.-cu : 10
17	WNW: NW: NNW	NW: NNW	5·5	0·0	0·4	347	10 : 10, slt.-r	10, r : 10, r, w
18	N: NNE	NNE: NE	6·5	0·0	0·3	389	10, r : 7, ci.-cu, cu.-s	5, cu.-s, ci.-cu, ci, slt.-sh : v, r
19	NE: NNE	NE: NNE: N	0·0	0·0	0·0	140	v : 8, cu.-s, ci.-cu, slt-f	3, cu.-s, ci.-cu: 10, tk.-f : 10, tk.-f
20	N: NE	NE	0·9	0·0	0·0	253	10 : 10	10 : 10
21	NNE: NE	NE: NNE	0·6	0·0	0·0	284	10 : 10	10 : 10
22	NE: NNE	Variable	0·0	0·0	0·0	80	10 : 10	10 : 10, slt.-m
23	WSW: S: SSE	SSE: SE	0·1	0·0	0·0	142	10 : 6, cu.-s, ci.-cu	5, ci.-s, ci, so.-ha : 10
24	ENE: E: SE	SSE: SSW: S	1·4	0·0	0·1	241	10 : 10, r	10, oc.-th.-r : 10
25	S: SSW: SW	W: WNW: NNE	1·3	0·0	0·2	297	p.-cl : 9, cu.-s, ci.-cu	10 : 10, slt.-sh
26	NNE: NE	NNE	0·0	0·0	0·0	157	10 : 10, r	10, fq.-r : 10, fq.-r
27	NNE: N	NNW: N	2·7	0·0	0·1	291	10, fq.-r : 10, c.-r	10, c.-r : 10, c.-r
28	N: NNE	NNE	5·5	0·1	1·6	578	10, c.-r : 10, c.-r, w	10, c.-r, w : 10, oc.-th.-r, w
29	N	N: NNW: SW	2·6	0·0	0·3	281	0, ho.-fr : 1, ci	1, ci.-cu, ci: 0 : 0, ho.-fr, f
30	WSW: E: SE	E: SE: S	0·0	0·0	0·0	94	ho.-fr : 9, cu.-s, ci.-cu, f	10, f : 10, f
Means	...	...	..	..	0·3	308		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 38°·3, being 2°·9 *lower* than
The mean *Temperature of the Dew Point* for the month was 36°·4, being 2°·9 *lower* than
The mean *Degree of Humidity* for the month was 88·1, being 0·8 *greater* than
The mean *Elastic Force of Vapour* for the month was 0^{in}·215, being 0^{in}·025 *less* than
The mean *Weight of Vapour in a Cubic Foot of Air* for the month was 2^{grs}·5, being 0^{gr}·3 *less* than
The mean *Weight of a Cubic Foot of Air* for the month was 548 grains, being 1 grain *less* than
} the average for the 20 years, 1849–1868.

The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 7·9.

The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·16. The maximum daily amount of *Sunshine* was 5·5 hours on November 7.

The highest reading of the *Solar Radiation Thermometer* was 79°·9 on November 18; and the lowest reading of the *Terrestrial Radiation Thermometer* was 25°·1 on November 29.

The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 0·9; for the 6 hours ending 3 p.m., 0·4; and for the 6 hours ending 9 p.m., 0·2.

The *Proportions of Wind* referred to the cardinal points were N. 15, E. 4, S. 4, and W. 7.

The *Greatest Pressure of the Wind* in the month was 13^{lbs}·0 on the square foot on November 10. The mean daily *Horizontal Movement of the Air* for the month was 308 miles; the greatest daily value was 713 miles on November 10; and the least daily value 80 miles on November 22.

Rain fell on 15 days in the month, amounting to 3^{in}·454, as measured in the simple cylinder gauge partly sunk below the ground; being 1^{in}·218 *greater* than the average fall for the 37 years, 1841–1877.

Daily Results of the Meteorological Observations

Month and Day, 1878.	Phases of the Moon.	Barometer. Mean of 24 Hourly Values (corrected and reduced to 32° Fahrenheit).	Temperature. Of the Air. Highest.	Of the Air. Lowest.	Of the Air. Daily Range.	Of the Air. Mean of 24 Hourly Values.	Of the Air. Excess of Mean above Average of 20 Years.	Of Evaporation. Mean of 24 Hourly Values.	Of the Dew Point. Deduced Mean Daily Value.	Difference between the Air Temperature and Dew Point Temperature. Mean Daily Value.	Greatest of 24 Hourly Values.	Least of 24 Hourly Values.	Degree of Humidity (Saturation = 100).	Temperature. Highest in the Sun's Rays as shown by a Self-Registering Maximum Thermometer with blackened bulb in vacuo placed on the Grass.	Lowest on the Grass as shown by a Self-Registering Minimum Thermometer.	Of the Water of the Thames off Greenwich. Highest.	Of the Water of the Thames off Greenwich. Lowest.	Daily Duration of Sunshine.	Sun above Horizon.	Rain collected in a Gauge whose receiving surface is 5 inches above the Ground.	Daily Amount of Ozone.	Electricity.
		in.	°	°	°	°	°	°	°	°	°	°		°	°	°	°	hours.	hours.	in.		
Dec. 1	First Qr.	29.605	39.1	33.2	5.9	36.6	− 4.9	35.7	34.4	2.2	4.5	1.0	92	42.5	32.2	41.3	39.3	0.0	8.1	0.065	0.7	..
2	In Equator	29.793	39.5	34.7	4.8	37.6	− 4.2	36.3	34.5	3.1	4.8	1.7	89	55.6	30.5	40.8	38.8	0.0	8.1	0.000	2.3	..
3	..	29.959	40.5	33.7	6.8	36.7	− 5.4	35.6	34.1	2.6	7.1	0.5	91	61.0	30.8	40.1	38.3	1.6	8.0	0.014	2.2	..
4	Apogee	30.042	41.1	33.4	7.7	37.1	− 5.3	35.5	33.2	3.9	7.0	1.1	86	46.2	29.3	39.8	38.1	0.0	8.0	0.000	0.8	..
5	..	29.911	42.4	32.7	9.7	37.7	− 4.9	36.3	34.4	3.3	6.4	1.4	88	42.4	27.8	39.8	37.8	0.0	8.0	0.010	0.0	..
6	..	29.831	35.3	29.1	6.2	33.2	− 9.5	30.9	26.4	6.8	10.1	1.2	76	47.2	25.0	39.3	37.5	1.8	8.0	0.130	4.0	..
7	..	29.482	35.9	31.7	4.2	35.0	− 7.8	34.2	32.9	2.1	4.7	0.5	92	40.0	31.7	38.8	37.3	0.0	7.9	0.009	0.0	..
8	..	29.342	34.4	31.6	2.8	32.7	−10.1	31.4	28.7	4.0	5.9	1.2	85	45.3	31.2	38.8	37.1	0.2	7.9	0.000	0.0	..
9	Full	29.474	33.1	27.6	5.5	31.1	−11.7	30.2	27.8	3.3	5.1	1.5	86	40.3	19.9	38.7	36.7	0.0	7.9	0.000	0.0	..
10	Greatest Declination N.	29.653	29.4	25.4	4.0	27.8	−14.9	27.6	26.8	1.0	1.9	0.0	95	30.8	22.0	38.3	36.3	0.0	7.9	0.000	0.0	..
11	..	29.680	33.4	26.0	7.4	29.5	−13.0	29.0	27.3	2.2	3.9	0.0	91	35.1	26.0	37.3	35.8	0.0	7.8	0.003	0.0	..
12	..	29.616	29.3	25.5	3.8	27.6	−14.6	27.5	27.1	0.5	5.2	0.0	98	32.8	24.5	36.8	35.3	0.0	7.8	0.000	0.0	..
13	..	29.500	32.0	20.6	11.4	25.4	−16.4	25.1	23.6	1.8	6.2	0.0	93	63.2	20.4	36.7	35.1	3.4	7.8	0.000	0.0	..
14	..	29.450	31.4	20.5	10.9	26.2	−15.3	25.8	23.8	2.4	6.7	0.0	90	42.2	19.0	36.3	34.3	0.0	7.8	0.000	1.0	..
15	..	29.504	34.7	21.3	13.4	29.8	−11.3	28.8	25.6	4.2	6.7	0.0	84	46.2	19.2	35.3	33.9	0.2	7.8	0.010	0.0	..
16	In Equator	29.331	33.4	28.6	4.8	31.4	− 9.4	31.3	31.0	0.4	1.3	0.0	99	34.3	24.0	35.3	33.5	0.0	7.8	0.057	0.0	..
17	Last Qr.	29.306	32.7	23.1	9.6	27.9	−12.6	27.8	27.4	0.5	3.3	0.0	98	33.4	22.8	35.1	33.3	0.0	7.7	0.000	0.0	..
18	..	29.183	40.6	24.9	15.7	33.6	− 6.6	32.5	30.5	3.1	5.2	0.0	88	55.9	23.0	34.8	33.1	0.4	7.7	0.021	1.8	..
19	..	29.084	38.2	31.6	6.6	34.1	− 5.9	32.5	29.7	4.4	5.3	2.0	83	44.2	29.4	35.1	32.8	0.4	7.7	0.000	2.2	..
20	Perigee	29.351	31.8	27.5	4.3	30.3	− 9.5	30.3	30.3	0.0	1.7	0.0	100	32.9	24.0	35.3	33.1	0.0	7.7	0.000	0.0	..
21	..	29.621	32.2	27.5	4.7	29.7	− 9.9	29.1	27.1	2.6	5.3	0.0	90	38.0	26.0	35.1	33.3	0.0	7.7	0.000	1.2	..
22	..	29.615	33.4	24.3	9.1	30.2	− 9.2	30.0	29.4	0.8	3.5	0.0	96	36.8	24.0	34.3	32.8	0.0	7.7	0.141	0.8	..
23	Greatest Dec. S.: New.	29.733	31.1	19.8	11.3	26.4	−12.9	25.9	23.4	3.0	5.5	0.0	88	52.0	18.0	34.1	32.3	3.4	7.7	0.000	0.2	..
24	..	30.127	27.4	13.4	14.0	22.0	−17.3	21.9	21.2	0.8	3.2	0.0	97	31.2	13.0	33.8	32.1	0.0	7.7	0.000	0.8	..
25	..	29.833	31.7	12.2	19.5	25.8	−13.4	25.2	22.1	3.7	5.6	0.0	84	43.2	12.2	34.1	32.3	0.0	7.7	0.101	0.0	..
26	..	29.304	46.3	31.7	14.6	41.1	+ 2.0	40.3	39.3	1.8	7.0	0.0	94	48.0	30.0	34.1	32.3	0.0	7.8	0.116	0.0	..
27	..	29.263	46.3	36.0	10.3	41.4	+ 2.4	40.8	40.1	1.3	2.9	0.4	96	58.9	34.3	34.3	32.3	0.2	7.8	0.135	0.0	..
28	..	29.428	46.9	37.1	9.8	41.9	+ 3.1	40.8	39.5	2.4	4.0	0.7	92	62.1	34.9	35.3	33.3	0.0	7.8	0.005	0.0	..
29	..	29.332	47.6	39.2	8.4	44.6	+ 5.9	43.2	41.6	3.0	6.1	1.5	89	76.3	37.5	35.5	33.7	2.5	7.8	0.105	4.2	..
30	In Equator	29.343	55.4	46.4	9.0	50.6	+12.1	48.9	47.1	3.5	5.6	2.1	88	84.0	44.3	38.3	35.3	1.2	7.8	0.113	8.8	..
31	First Qr.	29.384	53.5	47.8	5.7	50.8	+12.5	47.8	44.7	6.1	8.4	4.0	80	75.1	45.0	40.3	36.8	1.0	7.8	0.127	16.5	..
Means	..	29.551	37.4	29.0	8.4	33.7	− 7.0	32.8	31.1	2.6	5.2	0.7	90.3	47.6	26.8	36.9	35.0	0.5	7.8	Sum 1.162	1.5	..
Number of Column for Reference.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22

The results apply to the civil day, excepting those in Columns 16 and 17, which refer to the 24 hours ending 9h a.m. of the day against which the readings are placed.

The mean reading of the Barometer (Column 2) and the mean temperatures of the Air and Evaporation (Columns 6 and 8) are deduced from the photographic records. The average temperature (Column 7) is that determined from the reduction of the photographic records from 1849 to 1868. The temperature of the Dew Point (Column 9) and the Degree of Humidity (Column 13) are deduced from the corresponding temperatures of the Air and Evaporation by means of Glaisher's Hygrometrical Tables. The mean difference between the Air and Dew Point Temperatures (Column 10) is the difference between the numbers in Columns 6 and 9, and the Greatest and Least Differences (Columns 11 and 12) are deduced from the 24 hourly photographic measures of the Dry-bulb and Wet-bulb Thermometers. The results on December 3 for the Barometer, and on December 3, 4, 11, 13, 17, 18, 20, 22, and 25 for Air and Evaporation Temperatures, depend partly on values inferred from eye-observations, and those on December 4, 27, 28, 29, 30, and 31 for the Barometer, and from December 14 to 16 for Air and Evaporation Temperatures, are deduced entirely from eye-observations, on account of accidental loss of photographic register.

The values given in Columns 3, 4, 5, 14, 15, 16, and 17 are derived from eye-readings of self-registering thermometers.

The Electrical Apparatus was not in action throughout the month.

The mean reading of the *Barometer* for the month was 29in·551, being 0in·240 *lower* than the average for the 20 years, 1854–1873.

Temperature of the Air.

The highest in the month was 55°·4 on December 30; the lowest in the month was 12°·2 on December 25; and the range was 43°·2.

The mean of all the highest daily readings in the month was 37°·4, being 7°·3 *lower* than the average for the 37 years, 1841–1877.

The mean of all the lowest daily readings in the month was 29°·0, being 6°·3 *lower* than the average for the 37 years, 1841–1877.

The mean daily range was 8°·4, being 1°·0 *less* than the average for the 37 years, 1841–1877.

The mean for the month was 33°·7, being 7°·0 *lower* than the average for the 20 years, 1849–1868.

MONTH and DAY, 1878.	WIND AS DEDUCED FROM SELF-REGISTERING ANEMOMETERS.						CLOUDS AND WEATHER.	
	OSLER'S.					ROBINSON'S.		
	General Direction.		Pressure on the Square Foot.			Horizontal Movement of the Air.		
	A.M.	P.M.	Greatest.	Least.	Mean of 24 Hourly Measures.		A.M.	P.M.
			lbs.	lbs.	lbs.	miles.		
Dec. 1	Calm : S	SW : NE	0·7	0·0	0·0	183	10 : 10, r, slt.-f, sn	10, oc.-th.-r : 10
2	NNE : N	N : NNW	1·3	0·0	0·1	269	10 : 10	10 : 10
3	N : NE	NE : NNE	0·9	0·0	0·1	239	10, sn : 10, sn	10 : 10, fq.-th.-r : 10, fq.-th.-r
4	N	NNW	2·7	0·0	0·2	293	0, ho.-fr : 2, ci, ci.-cu	10 : 10
5	NW : W	NW : NNW	2·8	0·0	0·3	274	10 : 10, f	10, f, th.-r : 10, fq.-th.-r : 10
6	NNW	NW : W : WSW	2·8	0·0	0·4	357	p.-cl : 1, ci, ho.-fr	2, ci : 10 : 10, sn
7	WSW : N	N	0·8	0·0	0·0	227	10 : 10	10 : 10 : 10, slt.-r, slt.-sn, sl
8	N : NNW	N : NNE	0·9	0·0	0·1	262	10 : 10	10 : 10
9	N : NW	N	0·3	0·0	0·0	132	10 : 10, f	th.-cl, h : 10, ho.-fr, slt.-f
10	N : NNE : NE	NNE : N	0·0	0·0	0·0	64	10, ho.-fr, slt.-f : 10, f	10, f : 10, tk.-f
11	NNE : N	N : NNE	0·4	0·0	0·0	154	10, f : 10, sn, ho.-fr, slt.-f	10, sn : 10 : th.-cl, h, f
12	N : NW : SW	SW : SSE : ESE	0·0	0·0	0·0	74	10, f : 10, f	10, f : 10, f
13	E	ESE : E	0·0	0·0	0·0	67	f, ho.-fr : 1, ci.-s, ho.-fr	3, ci.-s, ci, so.-ha : 0 : p.-cl, ho.-fr, slt.-f
14	E : ENE : NE	NNE : N : NW	1·1	0·0	0·1	169	ho.-fr : 10	9, cu.-s, ci.-cu : 0
15	W : WSW	WSW : SW	0·6	0·0	0·0	248	ho.-fr : 10	9, cu.-s, ci.-cu, sn : 1, ci.-cu
16	SW : Calm	NE : NNE : N	0·0	0·0	0·0	85	p.-cl : 10, tk.-f	10, tk.-f, th.-r : 10, f, th.-r, sl, sn : 10
17	N : W : NW	NNW : WSW	0·0	0·0	0·0	155	10 : lu.-ha, f	10, f : 10 : 1, li.-cl, ho.-fr, m
18	SW	SW	2·2	0·0	0·3	399	p.-cl : 10, r	v, cu.-s, ci.-cu, ci, ci.-s, so.-ha : 3
19	SW	WSW	2·9	0·0	0·5	422	p.-cl : 5, ci.-cu, ci	p.-cl : vv : 0, ho.-fr
20	WSW : W : E	Calm : N	0·0	0·0	0·0	34	ho.-fr : 10, f	10, f : 10, f
21	WNW : W	WSW	0·2	0·0	0·0	213	10, slt.-f : 10, f	8, cu.-s, ci.-cu, slt.-f : 0, ho.-fr
22	WSW : W	Calm : WSW	1·7	0·0	0·1	242	ho.-fr : 10, sn, glm, f	10, sn, gt.-glm : 0, ho.-fr
23	WSW	WNW : WSW	0·5	0·0	0·0	202	0, ho.-fr : 1, ci, ci.-cu	2, ci.-cu, cu.-s : 0, ho.-fr
24	WSW	Calm : S	0·0	0·0	0·0	84	0, ho.-fr : th.-cl, m, f, ho.-fr	1, th.-cl, f, m : 0, m, f, ho.-fr
25	E : SE	E : ESE	3·0	0·0	0·1	214	tk.-f, ho.-fr : 10, th.-cl, so.-ha	10, sn : 10, sn, sl
26	ESE : S	SSW	3·0	0·0	0·2	320	10, r : 10, r, sc	10, oc.-r : 10, oc.-th.-r
27	SSW	WSW : SW : SE	1·3	0·0	0·1	236	10 : 9	10, th.-r : 10, oc.-th.-r : 10, r
28	W : SW	SSW : SSE	3·0	0·0	0·3	361	10, r, w : 7, ci, ci.-s	9, th.-cl : 7, ci.-cu, th.-cl
29	SSE : S : WSW	SSW : SE : S	1·9	0·0	0·1	295	p.-cl : v	6, ci.-cu, ci.-s : 10, fq.-m.-r : 10, fq.-th.-r
30	SSW : SW	SW	4·0	0·0	1·0	584	10, th-r, w : 10, sc, th.-r	10, w : 10, r : 10
31	SW	SW	15·0	0·2	2·7	839	0, w : 5, st.-w, sc	8, r, st.-w, sc : 10, oc.-hy.-shs, st.-w
Means	...	...	..	..	0·2	248		
Number of Column for Reference.	23	24	25	26	27	28	29	30

The mean *Temperature of Evaporation* for the month was 32°·8, being 6°·5 *lower* than
The mean *Temperature of the Dew Point* for the month was 31°·1, being 6°·3 *lower* than
The mean *Degree of Humidity* for the month was 90·3, being 2·5 *greater* than
The mean *Elastic Force of Vapour* for the month was 0in·174, being 0in·050 less than
The mean *Weight of Vapour in a Cubic of Air* for the month was 2grs·1, being 0gr·5 *less* than
The mean *Weight of a Cubic Foot of Air* for the month was 555 grains, being 4 grains *greater* than
} the average for the 20 years, 1849–1868.

The mean amount of *Cloud* for the month (a clear sky being represented by 0 and an overcast sky by 10) was 7·6.

The mean proportion of *Sunshine* for the month (constant sunshine being represented by 1) was 0·06. The maximum daily amount of *Sunshine* was 3·4 hours on December 13 and 23.

The highest reading of the *Solar Radiation Thermometer* was 84°·0 on December 30; and the lowest reading of the *Terrestrial Radiation Thermometer* was 12°·2 on December 25.

The mean daily distribution of *Ozone* was, for the 12 hours ending 9 a.m., 0·9; for the 6 hours ending 3 p.m., 0·4; and for the 6 hours ending 9 p.m., 0·2.

The *Proportions of Wind* referred to the cardinal points were N. 9, E. 4, S. 7, and W. 9. Two days were calm.

The *Greatest Pressure of the Wind* in the month was 15lbs·0 on the square foot on December 31. The mean daily *Horizontal Movement of the Air* for the month was 248 miles; the greatest daily value was 839 miles on December 31; and the least daily value 34 miles on December 20.

Rain fell on 16 days in the month, amounting to 1in·162, as measured in the simple cylinder gauge partly sunk below the ground; being 0in·642 *less* than the average fall for the 37 years, 1841–1877.

HIGHEST and LOWEST READINGS of the BAROMETER, reduced to 32° Fahrenheit, as extracted from the PHOTOGRAPHIC RECORDS.

MAXIMA.

Approximate Greenwich Mean Solar Time, 1878.	d h m	Reading. in.
January	0.14.40	30·205
	2.11.0	30·230
	4.21.30	30·012
	11.21.0	30·493
	17.22.40	30·352
	26.21.0:	29·955
	31.15.0	30·410
February	4.22.30	30·455
	6.23.0	30·465
	12.0.50	30·093
	15.23.15	30·170
	18.22.30	30·315
	21.12.0:	30·475
	27.21.40	29·757
March	3.22.0	30·410
	4.23.0	30·378
	6.20.0	29·932
	8.22.30	30·091
	10.21.0:	30·100
	13.21.30:	30·361
	15.23.15	30·489
	19.23.0:	30·260
	25.22.0	29·926
	30.20.0:	29·355
April	2.19.0	29·400
	6.19.30	30·065
	11.21.10	30·010
	14.22.0	29·889
	17.22.30	29·628
	21.21.10	29·711
	27.11.0:	30·060

MINIMA.

Approximate Greenwich Mean Solar Time, 1878.	d h m	Reading. in.
January	1.7.5	30·085
	3.19.0:	29·744
	7.7.30:	29·295
	16.2.50	30·005
	24.21.15	29·178
	28.0.40	29·535
February	2.4.40	30·175
	6.4.20	30·371
	10.11.0:	29·740
	14.2.0	29·625
	17.17.0	29·845
	20.2.0	30·105
	27.9.0	29·485
March	1.8.10	29·478
	4.15.0	30·220
	6.1.35	29·715
	7.13.0	29·675
	9.19.0:	29·779
	11.17.0	29·971
	14.23.0:	30·220
	18.4.30	30·053
	24.13.10	29·273
	28.19.0:	29·015
	31.18.0:	28·970
April	3.4.50	29·250
	10.4.50	29·705
	14.5.0	29·802
	17.2.30	29·541
	20.1.0	29·303
	23.13.0:	29·368
May	1.4.0	29·430

MAXIMA.

Approximate Greenwich Mean Solar Time, 1878.	d h m	Reading. in.
May	4.10.0	29·952
	9.10.0:	29·726
	11.11.0:	29·543
	14.12.0	29·447
	16.1.20	29·707
	17.11.0	29·910
	18.10.0:	29·760
	19.12.0	29·730
	20.18.40	29·756
	21.23.15:	29·799
	26.11.0	29·674
	29.23.0:	29·990
June	1.11.0:	29·895
	5.21.0	30·063
	8.19.0	29·486
	10.10.30	29·665
	14.11.0:	29·730
	21.19.30	30·032
	24.23.0	30·031
	30.20.30	29·763
July	3.20.0	30·000
	8.9.50	29·994
	16.20.0	30·146
	17.20.0	30·170
	31.9.0	30·204
August	4.22.15	29·735
	8.11.30	29·998
	10.22.30	29·678
	12.21.0	29·533
	14.13.30	29·475
	17.22.0	29·909

MINIMA.

Approximate Greenwich Mean Solar Time, 1878.	d h m	Reading. in.
May	7.18.0:	29·440
	10.22.0	29·405
	13.23.0:	29·316
	15.0.30	29·290
	16.10.0	29·626
	17.21.5	29·570
	19.4.30	29·657
	20.7.0	29·601
	21.1.40	29·682
	24.3.10	29·110
	28.5.0	29·585
	31.7.0	29·783
June	4.6.0	29·596
	8.5.10	29·402
	9.7.0	29·375
	11.6.0	29·311
	16.6.0:	29·618
	23.6.0	29·887
	29.18.0	29·573
July	2.5.30:	29·670
	7.7.0:	29·805
	11.6.30	29·685
	17.6.30	30·081
	24.5.0	29·485
August	3.2.0	29·524
	6.5.0	29·520
	10.6.30	29·450
	11.21.0	29·395
	13.16.0	29·116
	16.13.0	29·220
	19.3.0	29·671

HIGHEST and LOWEST READINGS of the BAROMETER, reduced to 32° Fahrenheit, as extracted from the PHOTOGRAPHIC RECORDS—*continued.*

MAXIMA.

Approximate Greenwich Mean Solar Time, 1878.	d h m	Reading. in.
August	20. 20. 50	29·890
	28. 10. 0	29·661
September	2. 0. 0	30·130
	6. 12. 30	29·985
	10. 11. 0 :	30·109
	12. 11. 0	29·975
	16. 11. 30 :	29·905
	18. 22. 0	29·770
	21. 0. 0	30·025
	24. 12. 0	29·620
	27. 21. 0	29·960
October	1. 22. 0	30·170
	8. 19. 0	29·490
	12. 21. 0	30·175
	15. 22. 35	29·932
	19. 21. 0	29·654
	23. 9. 30	29·475
	24. 9. 0	29·200
	25. 9. 0	29·111
	27. 22. 0	29·570

MINIMA.

Approximate Greenwich Mean Solar Time, 1878.	d h m	Reading. in.
August	24. 3. 0	29·268
	29. 18. 0	29·030
September	5. 4. 0	29·810
	8. 4. 0	29·821
	12. 1. 35	29·871
	15. 9. 55	29·332
	17. 19. 0	29·489
	19. 14. 0	29·601
	23. 3. 20	29·280
	25. 5. 0 :	29·482
	29. 19. 30	29·518
October	7. 15. 50	29·203
	9. 23. 0	29·100
	14. 19. 0 :	29·802
	18. 17. 30	29·556
	21. 16. 0	28·968
	24. 0. 0	28·941
	25. 0. 0	29·050
	25. 21. 40	28·848
	28. 8. 0	29·480

MAXIMA.

Approximate Greenwich Mean Solar Time, 1878.	d h m	Reading. in.
October	28. 21. 0	29·635
November	2. 11. 0	30·080
	4. 22. 20	29·644
	7. 8. 50	29·635
	9. 3. 15	30·035
	11. 2. 0	29·382
	13. 11. 0	29·325
	19. 9. 0	30·304
	25. 23. 0	29·335
	29. 22. 0	29·840
December	3. 21. 0	30·064
	5. 13. 30	29·905
	10. 8. 0	29·702
	13. 10. 0 :	29·530
	14. 22. 0	29·541
	17. 11. 0	29·360
	21. 8. 0	29·690
	24. 8. 0	30·200
	26. 10. 30	29·286
	28. 0. 0	29·480

MINIMA.

Approximate Greenwich Mean Solar Time, 1878.	d h m	Reading. in.
October	30. 3. 0	29·502
November	4. 12. 0	29·510
	6. 4. 0	29·340
	8. 2. 0	29·205
	10. 2. 55	29·045
	12. 15. 0	29·221
	15. 6. 0	29·011
	24. 19. 0	29·165
	27. 9. 0	29·130
December	1. 5. 0	29·470
	5. 3. 15	29·838
	8. 1. 0	29·299
	12. 18. 0	29·466
	14. 2. 0	29·398
	16. 18. 0	29·281
	18. 18. 0	28·986
	22. 2. 20	29·580
	26. 1. 0	29·222
	27. 0. 45	29·234
	29. 21. 0	29·316

The readings in the above table are accurate, but the times are occasionally liable to uncertainty, as the barometer will sometimes remain at its extreme reading without sensible change for a considerable interval of time. In such cases the time given is the middle of the stationary period, the symbol : denoting that the reading has been sensibly the same through a period of more than one hour. The readings at October 30, 3^{h}. 0^{m}., December 3, 21^{h}. 0^{m}., and from December 27, 0^{h}. 45^{m}. to December 29, 21^{h}. 0^{m}. are taken from the eye-observations, on account of temporary interruption of the photographic registration.

The reading for January 0^{d}. 14^{h}. 40^{m}. is inserted, as included in the civil day, January 1, which appears in the following tables.

ABSOLUTE MAXIMA AND MINIMA READINGS OF THE BAROMETER for each Month in the YEAR 1878.

[Extracted from the preceding Table.]

1878, MONTH.	Readings of the Barometer.		Range of Reading in each Month.
	Maxima.	Minima.	
	in.	in.	in.
January	30·493	29·178	1·315
February	30·475	29·485	0·990
March	30·489	29·015	1·474
April	30·065	28·970	1·095
May	29·990	29·110	0·880
June	30·063	29·311	0·752
July	30·204	29·485	0·719
August	29·998	29·030	0·968
September	30·130	29·280	0·850
October	30·175	28·848	1·327
November	30·304	29·011	1·293
December	30·200	28·986	1·214

The highest reading in the year was 30^{in}·493 on January 12. The lowest reading in the year was 28^{in}·848 on October 26.

The range of reading in the year was 1^{in}·645.

MONTHLY RESULTS of METEOROLOGICAL ELEMENTS for the YEAR 1878.

1878, MONTH.	Mean Reading of the Barometer.	Temperature of the Air. Highest.	Lowest.	Range in the Month.	Mean of all the Highest.	Mean of all the Lowest.	Mean Daily Range.	Monthly Mean.	Excess of Mean above Average of 20 Years.	Mean Temperature of Evaporation.	Mean Temperature of the Dew Point.	Mean Degree of Humidity. (Saturation = 100.)
	in.	°	°	°	°	°	°	°	°	°	°	
January ..	29·979	54·8	25·7	29·1	44·7	35·6	9·1	40·4	+ 1·7	38·7	36·2	85·2
February..	30·104	60·5	25·1	35·4	47·1	37·4	9·7	42·3	+ 2·6	40·6	38·6	87·2
March	29·889	57·3	24·3	33·0	49·5	35·9	13·5	42·3	+ 0·7	38·9	34·6	74·2
April	29·663	69·7	26·9	42·8	57·9	40·4	17·6	48·0	+ 0·6	45·1	41·9	80·0
May	29·618	73·8	38·2	35·6	65·3	47·4	17·8	55·1	+ 2·0	51·7	48·4	78·4
June	29·771	85·8	40·7	45·1	71·3	50·8	20·6	60·2	+ 0·4	55·6	51·7	74·1
July......	29·860	84·6	44·0	40·6	73·9	54·2	19·6	63·2	+ 0·6	58·7	54·8	74·5
August ...	29·588	79·3	50·7	28·6	72·9	55·4	17·5	62·5	+ 0·6	58·9	55·9	79·5
September.	29·818	77·7	38·2	39·5	66·9	48·6	18·3	56·9	− 0·5	53·8	50·9	80·6
October ...	29·613	74·5	31·8	42·7	59·0	45·0	14·0	51·5	+ 0·4	49·1	46·6	84·0
November .	29·570	53·2	27·7	25·5	44·2	35·0	9·3	39·8	− 2·9	38·3	36·4	88·1
December .	29·551	55·4	12·2	43·2	37·4	29·0	8·4	33·7	− 7·0	32·8	31·1	90·3
Means	29·752	Highest. 85·8	Lowest. 12·2	Annual Range. 73·6	57·5	42·9	14·6	49·7	− 0·1	46·8	43·9	81·3

1878, MONTH.	Mean Elastic Force of Vapour.	Mean Weight of Vapour in a Cubic Foot of Air.	Mean Weight of a Cubic Foot of Air.	Mean Amount of Ozone.	Mean Amount of Cloud. (0–10.)	Rain. Number of Rainy Days.	Rain. Amount collected in a Gauge whose receiving Surface is 5 Inches above the Ground.	Wind. From Osler's Anemometer. Number of Hours of Prevalence of each Wind, referred to different Points of Azimuth. N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Number of Calm or nearly Calm Hours.	Mean Daily Pressure on the Square Foot.	From Robinson's Anemometer. Mean Daily Horizontal Movement of the Air.
	in.	grs.	grs.				in.	h	h	h	h	h	h	h	h	h	lbs.	miles.
January...	0·214	2·5	555	2·1	7·8	11	0·868	140	59	14	13	71	203	160	60	24	0·72	330
February..	0·234	2·7	556	3·8	8·4	13	1·096	74	48	28	68	99	223	96	36	0	0·17	219
March	0·200	2·4	552	2·1	7·7	11	1·058	187	59	36	12	4	125	167	154	0	0·85	348
April.....	0·266	3·0	541	8·5	6·4	15	4·308	38	82	228	62	59	157	69	13	12	0·52	281
May......	0·340	3·8	532	11·9	7·1	22	4·292	38	49	103	51	73	283	116	31	0	0·65	289
June......	0·384	4·3	529	5·9	6·5	14	4·572	29	86	98	53	98	208	76	14	58	0·29	205
July......	0·430	4·8	528	2·3	6·9	9	0·306	143	145	93	22	14	99	154	74	0	0·11	218
August ...	0·447	5·0	523	8·7	7·3	19	5·378	17	70	118	60	75	256	122	14	12	0·22	263
September.	0·373	4·2	534	2·2	6·2	9	0·820	58	16	22	19	53	243	228	72	9	0·18	248
October...	0·318	3·6	536	5·4	6·6	13	1·663	29	52	83	63	128	197	134	41	17	0·22	259
November .	0·215	2·5	548	1·5	7·9	15	3·454	234	135	21	21	33	84	83	109	0	0·28	308
December .	0·174	2·1	555	1·5	7·6	16	1·162	171	63	46	31	54	186	101	56	36	0·22	248
Sums	..	..	..	..	..	167	28·977	1158	864	890	475	761	2264	1506	674	168	..	..
Means	0·300	3·4	541	4·7	7·2	..	..	..	..	..	..	..	..	..	..	..	0·37	268

The greatest recorded pressure of the wind on the square foot in the year was 34 lbs. on August 30.
The greatest recorded daily horizontal movement of the air „ „ 839 miles on December 31.
The least recorded daily horizontal movement of the air „ „ 34 miles on December 20.

MONTHLY MEAN READING of the BAROMETER at every HOUR of the DAY, as deduced from the PHOTOGRAPHIC RECORDS, for the YEAR 1878.

Hour, Greenwich Mean Solar Time (Civil reckoning).	1878. January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly Means.
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
Midnight	29·980	30·123	29·898	29·666	29·629	29·780	29·860	29·611	29·824	29·623	29·575	29·589	29·763
1h. a.m.	29·978	30·120	29·895	29·662	29·626	29·776	29·857	29·603	29·821	29·622	29·570	29·586	29·760
2 ,,	29·977	30·117	29·891	29·658	29·619	29·771	29·853	29·594	29·814	29·617	29·566	29·585	29·755
3 ,,	29·976	30·111	29·889	29·654	29·612	29·767	29·851	29·587	29·810	29·612	29·564	29·583	29·751
4 ,,	29·972	30·107	29·886	29·651	29·607	29·768	29·852	29·581	29·805	29·606	29·562	29·578	29·748
5 ,,	29·968	30·107	29·887	29·653	29·608	29·769	29·855	29·580	29·807	29·608	29·564	29·572	29·748
6 ,,	29·969	30·107	29·891	29·659	29·612	29·773	29·859	29·578	29·814	29·610	29·566	29·570	29·751
7 ,,	29·974	30·109	29·897	29·666	29·614	29·779	29·865	29·583	29·820	29·615	29·571	29·572	29·755
8 ,,	29·981	30·116	29·903	29·668	29·619	29·782	29·867	29·587	29·824	29·618	29·576	29·577	29·760
9 ,,	29·988	30·119	29·908	29·670	29·618	29·783	29·869	29·591	29·830	29·616	29·578	29·582	29·763
10 ,,	29·994	30·120	29·910	29·673	29·619	29·784	29·869	29·592	29·829	29·616	29·581	29·581	29·764
11 ,,	29·994	30·123	29·910	29·674	29·620	29·781	29·871	29·593	29·828	29·613	29·581	29·575	29·764
Noon	29·981	30·116	29·902	29·667	29·617	29·774	29·866	29·588	29·823	29·605	29·571	29·564	29·756
1h. p.m.	29·973	30·103	29·890	29·662	29·613	29·769	29·863	29·584	29·819	29·601	29·566	29·555	29·750
2 ,,	29·971	30·092	29·883	29·657	29·613	29·766	29·860	29·581	29·814	29·599	29·559	29·553	29·746
3 ,,	29·971	30·085	29·876	29·650	29·609	29·761	29·854	29·579	29·810	29·598	29·560	29·554	29·742
4 ,,	29·974	30·083	29·872	29·648	29·607	29·757	29·850	29·576	29·805	29·599	29·563	29·557	29·741
5 ,,	29·977	30·083	29·873	29·651	29·607	29·752	29·847	29·575	29·807	29·605	29·567	29·559	29·742
6 ,,	29·980	30·087	29·878	29·653	29·611	29·754	29·848	29·577	29·810	29·614	29·572	29·560	29·745
7 ,,	29·983	30·091	29·882	29·661	29·617	29·758	29·853	29·582	29·816	29·619	29·573	29·565	29·750
8 ,,	29·984	30·094	29·885	29·670	29·626	29·765	29·860	29·591	29·822	29·620	29·574	29·571	29·755
9 ,,	29·986	30·096	29·882	29·676	29·633	29·773	29·869	29·598	29·826	29·624	29·576	29·572	29·759
10 ,,	29·986	30·098	29·880	29·677	29·638	29·778	29·873	29·599	29·825	29·624	29·577	29·576	29·761
11 ,,	29·989	30·099	29·877	29·682	29·640	29·781	29·874	29·597	29·827	29·623	29·578	29·575	29·762
Means	29·979	30·104	29·889	29·663	29·618	29·771	29·860	29·588	29·818	29·613	29·570	29·571	29·754
Number of Days employed.	31	28	31	30	31	30	31	31	30	31	30	25	..

MONTHLY MEAN TEMPERATURE of the AIR at every HOUR of the DAY, as deduced from the PHOTOGRAPHIC RECORDS for the YEAR 1878.

Hour, Greenwich Mean Solar Time (Civil reckoning).	1878. January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly Means.
Midnight	38°·8	40°·7	39°·2	43°·6	50°·8	54°·5	58°·6	58°·3	53°·4	49°·3	38°·7	32°·9	46°·6
1h. a.m.	38·7	40·5	38·9	43·0	50·5	53·8	57·7	58·0	52·8	49·2	38·7	32·9	46·2
2 ,,	38·6	40·4	38·3	42·8	50·3	53·1	57·2	57·7	52·3	48·9	38·6	32·6	45·9
3 ,,	38·6	40·0	37·9	42·4	50·1	53·0	56·6	57·5	52·0	48·5	38·4	32·7	45·6
4 ,,	38·4	39·9	37·6	42·2	49·8	52·9	56·2	57·4	51·5	48·4	38·4	32·7	45·4
5 ,,	38·4	40·0	37·4	42·2	49·8	53·6	56·5	57·5	51·5	47·9	38·3	32·8	45·5
6 ,,	38·2	40·0	37·3	42·3	50·9	55·3	57·9	58·1	51·6	48·0	38·2	33·1	45·9
7 ,,	38·3	39·9	37·6	44·0	52·4	58·0	60·1	59·7	52·9	48·2	38·1	33·4	46·9
8 ,,	38·5	40·3	38·6	46·5	54·5	60·7	62·8	62·0	55·5	49·6	38·4	33·5	48·4
9 ,,	38·9	41·2	40·5	49·2	56·7	62·6	65·3	64·3	58·2	52·2	39·3	33·9	50·2
10 ,,	39·8	42·3	42·3	50·6	58·2	64·6	67·1	66·0	60·1	54·1	40·3	34·6	51·7
11 ,,	41·0	43·6	44·3	52·5	60·0	66·2	68·3	67·5	62·0	55·3	41·8	35·4	53·2
Noon	42·2	45·0	45·5	54·3	61·3	67·5	68·9	68·8	63·3	56·6	42·4	36·0	54·3
1h. p.m.	42·5	45·7	46·8	55·0	61·9	67·8	69·2	69·0	63·9	57·1	42·8	36·6	54·9
2 ,,	42·9	46·0	46·7	54·7	61·9	67·0	70·5	69·4	63·8	56·9	42·7	36·6	54·9
3 ,,	42·4	45·7	46·4	54·9	61·6	66·8	70·2	68·7	62·9	56·0	42·3	36·3	54·5
4 ,,	41·6	45·3	45·6	54·0	60·2	66·5	69·7	67·7	62·3	54·7	41·5	35·5	53·7
5 ,,	40·9	44·0	44·3	53·1	59·7	65·1	68·7	66·2	61·1	53·1	40·7	35·2	52·7
6 ,,	40·6	43·3	42·8	51·4	57·7	63·9	67·0	64·5	59·0	51·8	40·3	34·8	51·4
7 ,,	40·1	42·8	41·6	49·3	55·6	62·1	65·2	62·7	57·3	50·7	39·8	34·6	50·2
8 ,,	39·8	42·5	40·7	47·6	53·7	59·5	62·6	61·0	56·1	50·3	39·5	34·2	49·0
9 ,,	39·4	41·9	39·9	46·2	52·3	57·7	61·1	60·0	54·9	49·7	39·2	33·9	48·0
10 ,,	39·3	41·5	39·4	45·4	51·7	56·6	60·0	59·1	54·1	49·6	38·9	33·6	47·4
11 ,,	39·1	41·5	38·9	44·8	51·2	55·5	59·1	58·6	53·6	49·2	38·6	33·4	47·0
Means	39·9	42·3	41·2	48·0	55·1	60·2	63·2	62·5	56·9	51·5	39·8	34·2	49·6
Number of Days employed.	29	28	24	30	31	30	31	31	30	31	30	28	..

MONTHLY MEAN TEMPERATURE of EVAPORATION at every HOUR of the DAY, as deduced from the PHOTOGRAPHIC RECORDS for the Year 1878.

Hour, Greenwich Mean Solar Time (Civil reckoning).	1878. January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly Means.
	°	°	°	°	°	°	°	°	°	°	°	°	°
Midnight	37·3	39·5	37·0	42·3	49·5	52·5	56·6	56·8	52·1	48·0	37·4	32·1	45·1
1h. a.m.	37·3	39·3	36·8	42·0	49·4	52·0	56·0	56·5	51·7	47·8	37·5	32·2	44·9
2 "	37·3	39·2	36·5	41·6	49·1	51·4	55·7	56·4	51·2	47·7	37·4	32·0	44·6
3 "	37·4	39·0	36·3	41·5	48·9	51·3	55·3	56·3	50·9	47·4	37·3	32·1	44·5
4 "	37·3	38·9	36·0	41·4	48·7	51·2	54·9	56·3	50·6	47·3	37·2	32·1	44·3
5 "	37·2	39·1	35·9	41·4	48·7	51·7	55·1	56·1	50·4	47·0	37·2	32·1	44·3
6 "	37·2	39·0	36·0	41·7	49·4	52·9	56·1	56·6	50·5	47·1	37·1	32·4	44·7
7 "	37·3	39·1	36·2	42·9	50·4	54·4	57·5	57·7	51·4	47·2	37·1	32·7	45·3
8 "	37·3	39·4	36·9	44·5	51·5	56·2	59·0	59·0	53·0	48·2	37·4	32·8	46·3
9 "	37·6	40·0	38·1	46·3	52·8	57·4	60·1	60·2	54·7	49·8	38·0	33·1	47·3
10 "	38·2	40·6	39·0	47·2	53·6	58·0	60·7	61·1	55·8	50·9	38·8	33·7	48·1
11 "	39·0	41·4	39·8	48·1	54·5	58·5	61·0	61·4	56·6	51·4	39·6	34·4	48·8
Noon	39·8	42·3	40·4	49·0	55·0	59·1	61·3	61·9	57·3	51·9	40·1	34·8	49·4
1h. p.m.	39·9	42·9	40·9	49·1	55·2	59·1	61·3	62·0	57·4	51·9	40·4	35·3	49·6
2 "	40·0	42·9	40·7	48·7	55·3	58·9	61·9	62·0	57·0	51·8	40·3	35·2	49·6
3 "	39·7	42·9	40·4	48·7	54·9	59·1	61·8	61·7	56·6	51·4	40·1	35·0	49·4
4 "	39·4	42·7	39·9	48·4	54·1	59·1	61·6	61·1	56·3	50·7	39·6	34·4	48·9
5 "	39·1	41·9	39·1	48·0	53·8	58·5	61·2	60·4	55·9	50·0	39·1	34·1	48·4
6 "	38·8	41·4	38·5	47·1	52·8	57·9	60·5	60·0	55·2	49·3	38·8	33·8	47·8
7 "	38·4	41·0	37·8	45·9	51·8	57·1	59·7	59·1	54·4	48·7	38·4	33·5	47·1
8 "	38·2	40·9	37·5	45·2	50·9	55·9	58·5	58·5	53·9	48·4	38·2	33·2	46·6
9 "	37·9	40·6	36·9	44·2	50·3	54·9	57·8	58·0	53·2	48·1	38·0	33·0	46·1
10 "	37·7	40·3	36·8	43·8	50·0	54·3	57·2	57·6	52·8	48·0	37·7	32·8	45·8
11 "	37·6	40·3	36·7	43·4	49·7	53·5	56·8	57·1	52·2	47·8	37·4	32·6	45·4
Means	38·2	40·6	37·9	45·1	51·7	55·6	58·7	58·9	53·8	49·1	38·3	33·3	46·8
Number of Days employed.	29	28	24	30	31	30	31	31	30	31	30	28	..

MONTHLY MEAN TEMPERATURE of the DEW POINT at every HOUR of the DAY, as deduced by GLAISHER'S TABLES from the corresponding AIR and EVAPORATION TEMPERATURES, for the YEAR 1878.

Hour, Greenwich Mean Solar Time (Civil reckoning).	1878. January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Yearly Means.
	°	°	°	°	°	°	°	°	°	°	°	°	°
Midnight	35·3	38·0	34·1	40·7	48·2	50·6	54·8	55·5	50·8	46·6	35·6	30·5	43·4
1h. a.m.	35·4	37·8	34·0	40·8	48·2	50·2	54·5	55·2	50·6	46·3	35·9	30·8	43·3
2 "	35·5	37·7	34·1	40·2	47·8	49·7	54·4	55·2	50·1	46·4	35·8	30·8	43·1
3 "	35·8	37·7	34·1	40·4	47·6	49·6	54·1	55·2	49·8	46·2	35·8	30·8	43·1
4 "	35·8	37·6	33·8	40·4	47·6	49·5	53·7	55·3	49·7	46·1	35·6	30·8	43·0
5 "	35·6	37·9	33·8	40·4	47·6	49·9	53·8	54·8	49·3	46·0	35·7	30·7	43·0
6 "	35·8	37·7	34·2	41·0	47·8	50·6	54·5	55·2	49·4	46·1	35·6	31·0	43·2
7 "	35·9	38·0	34·3	41·6	48·4	51·2	55·2	56·0	49·9	46·1	35·7	31·4	43·6
8 "	35·7	38·2	34·6	42·3	48·6	52·3	55·8	56·4	50·7	46·7	36·0	31·5	44·1
9 "	35·9	38·5	35·0	43·2	49·2	53·0	55·8	56·8	51·6	47·4	36·3	31·7	44·5
10 "	36·1	38·6	35·0	43·6	49·5	52·5	55·6	57·2	52·0	47·8	36·9	32·3	44·8
11 "	36·5	38·8	34·5	43·6	49·7	52·3	55·3	56·6	51·9	47·7	36·9	32·8	44·7
Noon	36·8	39·2	34·5	43·8	49·6	52·4	55·4	56·5	52·2	47·5	37·3	33·0	44·9
1h. p.m.	36·7	39·7	34·3	43·4	49·5	52·2	55·2	56·5	52·0	47·1	37·5	33·5	44·8
2 "	36·5	39·4	34·0	42·9	49·6	52·4	55·3	56·2	51·3	47·1	37·4	33·2	44·6
3 "	36·4	39·7	33·6	42·8	49·1	52·9	55·3	56·3	51·2	47·1	37·4	33·1	44·6
4 "	36·7	39·7	33·4	42·9	48·7	53·1	55·3	55·9	51·1	46·9	37·2	32·6	44·5
5 "	36·9	39·4	33·0	42·9	48·6	53·1	55·4	55·7	51·4	46·9	37·1	32·4	44·4
6 "	36·5	39·1	33·3	42·6	48·4	52·9	55·3	56·3	51·8	46·8	36·9	32·2	44·3
7 "	36·2	38·8	33·1	42·3	48·2	52·8	55·2	56·0	51·8	46·6	36·6	31·7	44·1
8 "	36·1	39·0	33·4	42·6	48·2	52·7	55·0	56·3	51·8	46·4	36·5	31·5	44·1
9 "	36·0	39·0	33·0	41·9	48·3	52·4	54·9	56·2	51·5	46·4	36·4	31·4	43·9
10 "	35·6	38·8	33·4	41·9	48·3	52·2	54·8	56·3	51·5	46·3	36·1	31·4	43·9
11 "	35·6	38·8	33·8	41·7	48·2	51·6	54·7	55·7	50·8	46·3	35·8	31·1	43·7
Means	36·1	38·6	33·9	42·1	48·5	51·8	55·0	56·0	51·0	46·7	36·4	31·8	44·0

MONTHLY MEAN DEGREE of HUMIDITY at every HOUR of the DAY, as deduced by GLAISHER'S TABLES from the corresponding AIR and EVAPORATION TEMPERATURES, for the YEAR 1878.

Hour, Greenwich Mean Solar Time (Civil reckoning).	1878.												Yearly Means.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
Midnight	88	90	82	90	91	87	87	90	91	91	90	91	89
1h. a.m.	89	90	83	92	92	87	89	90	92	90	91	92	90
2 "	90	91	85	90	92	88	90	91	92	92	90	93	90
3 "	90	92	86	93	92	88	91	92	92	92	91	93	91
4 "	91	92	86	93	92	88	91	93	94	92	90	93	91
5 "	90	93	87	93	92	87	91	91	92	94	91	92	91
6 "	91	92	88	96	89	84	88	90	92	94	90	92	91
7 "	92	94	88	91	86	78	85	88	90	93	91	92	89
8 "	90	93	86	86	80	74	78	82	84	90	92	91	85
9 "	90	90	81	80	76	71	72	76	79	84	90	91	82
10 "	87	87	76	77	73	65	66	74	74	79	88	91	78
11 "	84	83	68	72	68	61	63	67	70	76	84	90	74
Noon	82	80	66	67	65	58	62	64	67	72	83	89	71
1h. p.m.	81	80	62	66	64	57	60	64	65	69	82	89	70
2 "	79	78	62	65	64	60	59	62	64	69	82	88	69
3 "	80	80	61	64	64	61	60	64	66	72	84	89	70
4 "	84	81	63	66	66	62	60	65	67	75	86	89	72
5 "	86	83	64	68	67	65	62	69	71	79	87	89	74
6 "	86	85	69	72	71	68	66	75	77	83	88	90	78
7 "	86	86	73	77	77	72	71	79	82	85	89	89	80
8 "	87	87	75	83	81	79	76	85	86	87	90	89	84
9 "	88	90	76	86	86	83	80	88	89	89	90	90	86
10 "	87	90	80	88	88	85	83	91	91	89	90	90	88
11 "	88	90	82	89	90	87	86	90	90	90	90	91	89
Means	87	87	76	81	79	75	76	80	82	84	88	91	82

TOTAL AMOUNT of SUNSHINE registered in each HOUR of the DAY in each MONTH, as derived from the Records of CAMPBELL'S SELF-REGISTERING INSTRUMENT, for the YEAR 1878.

1878, Month.	Registered Duration of Sunshine in the Hour ending																Total registered Duration of Sunshine in each Month.	Corresponding aggregate Period during which the Sun was above Horizon.	Mean Altitude of the Sun at Noon.
	5h. a.m.	6h. a.m.	7h. a.m.	8h. a.m.	9h. a.m.	10h. a.m.	11h. a.m.	Noon.	1h. p.m.	2h. p.m.	3h. p.m.	4h. p.m.	5h. p.m.	6h. p.m.	7h. p.m.	8h. p.m.			
	h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	h	°
January ..	..	..	..	..	0·5	3·0	6·2	7·2	6·9	5·7	4·7	0·8	..	..	..	..	35·0	259·1	18
February .	..	..	..	..	0·5	2·2	4·8	5·3	6·3	7·1	5·2	1·3	0·2	..	..	..	32·9	277·9	26
March ...	..	..	0·7	2·4	5·0	6·8	9·2	10·3	11·9	9·5	8·6	6·4	2·2	0·1	..	..	73·1	366·9	37
April	..	0·4	5·8	9·8	12·4	11·0	14·1	16·6	14·8	14·1	14·1	11·6	12·4	9·9	3·4	..	150·4	414·9	48
May	..	1·8	8·1	10·5	12·1	12·2	15·1	15·4	15·9	14·6	17·5	13·3	13·7	11·0	4·8	..	166·0	482·1	57
June	..	5·2	12·7	15·1	14·2	15·2	16·8	15·2	16·7	13·9	13·0	14·2	14·2	11·8	5·1	0·1	183·4	494·5	62
July	..	1·5	11·9	15·3	15·5	15·7	13·8	12·1	11·4	13·0	13·9	14·1	12·4	10·3	3·0	..	163·9	496·8	60
August ..	..	0·2	7·1	10·4	13·6	14·0	16·1	16·7	14·5	15·1	16·3	13·2	11·2	9·7	1·9	..	160·0	449·1	52
September	..	..	2·7	7·9	12·2	13·3	12·4	14·1	14·8	13·6	12·3	10·8	10·6	2·8	..	..	127·5	376·9	41
October ..	..	..	..	1·7	9·2	12·4	13·5	14·8	14·3	13·0	11·8	7·4	2·7	..	..	..	100·8	328·7	30
November	..	..	..	..	2·0	4·5	6·3	8·7	7·6	5·2	4·7	1·5	..	..	..	..	40·5	264·4	20
December	..	..	..	..	0·1	1·3	3·6	4·7	4·4	1·8	0·4	..	..	..	..	..	16·3	242·7	16

The hours are reckoned from apparent noon.

The total registered duration of sunshine during the year was 1249·8 hours; the corresponding aggregate period during which the Sun was above the horizon was 4454·0 hours; the mean proportion for the year (constant sunshine $=1$) was therefore 0·281.

(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 of the Year 1878.

Days of the Month, 1878.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	52·64	51·94	51·25	50·43	50·00	49·74	50·16	50·85	51·83	52·76	53·37	53·50
2	52·63	51·92	51·22	50·45	50·00	49·76	50·12	50·88	51·87	52·77	53·36	53·52
3	52·62	51·91	51·20	50·42	49·97	49·75	50·14	50·88	51·91	52·84	53·35	53·51
4	52·60	51·88	51·17	50·43	49·95	49·76	50·17	50·94	51·91	52·85	53·37	53·51
5	52·59	51·84	51·13	50·40	49·91	49·76	50·19	50·97	51·98	52·90	53·40	53·50
6	52·57	51·82	51·10	50·38	49·93	49·76	50·23	51·01	52·01	52·95	53·41	53·46
7	52·53	51·77	51·07	50·37	49·91	49·78	50·24	51·05	52·07	52·94	53·43	53·48
8	52·50	51·75	51·04	50·35	49·90	49·80	50·25	51·07	52·08	52·95	53·43	53·44
9	52·47	51·73	51·00	50·35	49·88	49·80	50·28	51·10	52·11	52·97	53·43	53·43
10	52·45	51·68	50·97	50·33	49·87	49·80	50·28	51·12	52·14	52·97	53·47	53·42
11	52·43	51·68	50·97	50·30	49·85	49·80	50·31	51·15	52·18	53·01	53·45	53·41
12	52·41	51·67	50·94	50·28	49·85	49·83	50·34	51·18	52·21	53·03	53·45	53·37
13	52·40	51·65	50·90	50·27	49·84	49·84	50·36	51·22	52·23	53·07	53·45	53·37
14	52·40	51·60	50·88	50·25	49·81	49·84	50·37	51·25	52·27	53·09	53·48	53·35
15	52·39	51·60	50·85	50·24	49·80	49·86	50·40	51·28	52·30	53·10	53·48	53·36
16	52·36	51·58	50·83	50·20	49·80	49·88	50·44	51·32	52·33	53·13	53·50	53·34
17	52·32	51·58	50·80	50·21	49·79	49·87	50·47	51·34	52·36	53·13	53·48	53·30
18	52·27	51·52	50·78	50·19	49·78	49·90	50·49	51·35	52·37	53·15	53·53	53·32
19	52·28	51·48	50·77	50·18	49·77	49·90	50·52	51·43	52·42	53·18	53·53	53·30
20	52·26	51·47	50·74	50·17	49·75	49·93	50·54	51·44	52·43	53·20	53·53	53·26
21	52·26	51·44	50·73	50·16	49·75	49·95	50·56	51·47	52·46	53·24	53·53	53·25
22	52·22	51·40	50·70	50·13	49·74	49·96	50·59	51·52	52·48	53·23	53·53	53·24
23	52·18	51·40	50·66	50·11	49·74	49·98	50·61	51·54	52·52	53·25	53·53	53·20
24	52·15	51·36	50·62	50·10	49·75	50·01	50·63	51·56	52·57	53·27	53·53	53·17
25	52·10	51·35	50·62	50·10	49·74	50·02	50·65	51·60	52·63	53·27	53·56	53·16
26	52·08	51·33	50·59	50·07	49·75	50·05	50·69	51·69	52·61	53·30	53·53	53·19
27	52·07	51·29	50·58	50·07	49·74	50·06	50·70	51·67	52·64	53·28	53·50	53·17
28	52·06	51·27	50·55	50·03	49·74	50·07	50·73	51·72	52·68	53·32	53·53	53·16
29	52·02		50·51	50·05	49·74	50·09	50·75	51·75	52·72	53·32	53·53	53·12
30	51·98		50·50	50·02	49·74	50·09	50·78	51·76	52·73	53·30	53·53	53·13
31	51·96		50·48		49·74		50·82	51·80		53·33		53·10
Means.	52·33	51·60	50·84	50·23	49·82	49·89	50·45	51·32	52·30	53·10	53·47	53·32

The mean of the twelve monthly values is 51°·56.

(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 of the Year 1878.

Days of the Month, 1878.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	50·78	48·90	47·68	47·86	47·80	50·40	52·61	55·43	57·20	57·56	56·43	53·30
2	50·72	48·88	47·67	47·81	47·86	50·49	52·66	55·56	57·29	57·50	56·35	53·23
3	50·65	48·83	47·66	47·79	47·91	50·57	52·78	55·58	57·37	57·52	56·30	53·10
4	50·58	48·77	47·67	47·79	47·96	50·65	52·92	55·73	57·43	57·50	56·22	53·08
5	50·48	48·72	47·68	47·76	48·06	50·68	53·03	55·81	57·45	57·51	56·20	52·98
6	50·40	48·65	47·68	47·76	48·11	50·76	53·18	55·88	57·43	57·41	56·12	52·87
7	50·31	48·60	47·70	47·73	48·18	50·84	53·27	55·95	57·50	57·40	56·05	52·78
8	50·21	48·52	47·68	47·68	48·24	50·93	53·38	56·03	57·52	57·35	55·98	52·68

(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 of the Year 1878—*concluded.*

Days of the Month, 1878.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
9	50·10	48·50	47·70	47·67	48·37	50·96	53·51	56·10	57·49	57·29	55·87	52·55
10	50·06	48·40	47·66	47·62	48·43	51·01	53·54	56·10	57·47	57·25	55·82	52·45
11	50·00	48·38	47·73	47·50	48·50	51·07	53·63	56·19	57·55	57·20	55·70	52·38
12	49·94	48·32	47·72	47·43	48·66	51·17	53·75	56·23	57·54	57·18	55·57	52·28
13	49·90	48·28	47·71	47·31	48·70	51·22	53·89	56·29	57·54	57·17	55·47	52·18
14	49·88	48·20	47·78	47·32	48·80	51·19	53·97	56·38	57·57	57·14	55·39	52·08
15	49·83	48·17	47·79	47·33	48·89	51·38	54·03	56·43	57·59	57·10	55·27	51·98
16	49·76	48·10	47·81	47·32	48·98	51·48	54·18	56·47	57·57	57·07	55·18	51·88
17	49·70	48·04	47·84	47·32	49·08	51·70	54·30	56·52	57·62	57·03	55·03	51·75
18	49·59	47·98	47·86	47·33	49·20	51·80	54·38	56·63	57·60	57·00	54·93	51·68
19	49·58	47·90	47·90	47·37	49·25	51·85	54·47	56·69	57·63	57·00	54·80	51·56
20	49·50	47·87	47·91	47·38	49·32	51·92	54·52	56·73	57·59	56·98	54·69	51·43
21	49·48	47·83	47·91	47·38	49·42	52·00	54·60	56·79	57·61	56·98	54·53	51·30
22	49·40	47·78	47·92	47·38	49·51	52·06	54·69	56·85	57·63	56·89	54·42	51·10
23	49·36	47·75	47·89	47·42	49·61	52·13	54·71	56·90	57·59	56·85	54·30	51·09
24	49·27	47·74	47·88	47·47	49·76	52·20	54·79	56·89	57·60	56·84	54·20	50·96
25	49·20	47·70	47·88	47·49	49·80	52·27	54·84	56·98	57·62	56·77	54·15	50·83
26	49·10	47·70	47·88	47·51	49·92	52·34	54·98	57·05	57·62	56·73	53·97	50·80
27	49·10	47·68	47·90	47·57	50·03	52·41	55·02	57·06	57·64	56·65	53·83	50·68
28	49·09	47·68	47·88	47·60	50·11	52·45	55·10	57·12	57·64	56·60	53·75	50·55
29	49·00		47·87	47·70	50·18	52·50	55·18	57·16	57·63	56·55	53·57	50·41
30	48·97		47·87	47·75	50·26	52·51	55·27	57·17	57·59	56·49	53·44	50·32
31	48·93		47·87		50·33		55·37	57·19		56·45		50·20
Means.	49·77	48·21	47·79	47·55	49·01	51·50	54·08	56·45	57·54	57·06	55·12	51·82

The mean of the twelve monthly values is 52°·16.

(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 of the Year 1878.

Days of the Month, 1878.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	47·56	46·38	46·60	46·68	49·53	53·96	58·57	61·15	61·72	59·19	56·18	50·03
2	47·50	46·20	46·68	46·51	49·76	54·03	58·70	61·20	61·71	59·10	55·88	49·94
3	47·47	46·08	46·80	46·39	49·96	54·06	58·89	61·12	61·69	59·10	55·58	49·81
4	47·40	45·92	46·96	46·29	50·16	54·15	59·09	61·32	61·66	59·03	55·30	49·68
5	47·38	45·83	47·08	46·20	50·42	54·17	59·10	61·44	61·59	59·03	55·05	49·51
6	47·38	45·75	47·20	46·18	50·66	54·30	59·17	61·49	61·49	58·90	54·78	49·40
7	47·40	45·72	47·31	46·17	50·85	54·42	59·12	61·45	61·51	58·88	54·50	49·26
8	47·45	45·68	47·39	46·11	51·14	54·56	59·15	61·46	61·50	58·83	54·25	49·10
9	47·45	45·61	47·50	46·13	51·36	54·61	59·26	61·51	61·43	58·80	53·98	48·92
10	47·46	45·52	47·72	46·18	51·68	54·78	59·28	61·51	61·41	58·80	53·78	48·75
11	47·40	45·46	47·63	46·08	51·94	54·88	59·37	61·65	61·50	58·78	53·27	48·60
12	47·33	45·35	47·62	46·03	52·10	55·04	59·47	61·72	61·47	58·78	53·00	48·40
13	47·20	45·28	47·61	46·23	52·20	55·18	59·55	61·78	61·42	58·77	52·80	48·20
14	47·10	45·20	47·67	46·38	52·34	55·40	59·59	61·85	61·43	58·68	52·63	48·00
15	46·98	45·22	47·65	46·52	52·55	55·62	59·59	61·87	61·38	58·54	52·20	47·80

(III.)—Reading of a Thermometer whose bulb is sunk to the depth of 6·4 feet (6 French feet) below the surface of the soil, at Noon on every Day of the Year 1878—*concluded.*

Days of the Month, 1878.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
16	46·83	45·22	47·63	46·70	52·70	55·86	59·69	61·86	61·24	58·40	51·88	47·60
17	46·74	45·30	47·60	46·93	52·89	56·09	59·77	61·90	61·20	58·25	51·68	47·38
18	46·75	45·35	47·51	47·17	53·01	55·98	59·81	61·97	61·10	58·11	51·58	47·20
19	46·82	45·50	47·47	47·40	53·11	55·85	59·91	61·90	60·98	58·04	51·44	46·96
20	46·82	45·63	47·37	47·59	53·23	55·83	59·96	61·83	60·85	57·94	51·34	46·79
21	46·80	45·79	47·32	47·80	53·39	55·90	60·09	61·82	60·76	57·88	51·23	46·59
22	46·72	45·91	47·30	48·00	53·52	55·94	60·26	61·80	60·62	57·70	51·19	46·40
23	46·76	46·03	47·30	48·19	53·61	56·05	60·34	61·80	60·47	57·65	51·09	46·27
24	46·80	46·12	47·31	48·38	53·69	56·33	60·52	61·71	60·28	57·62	51·00	46·10
25	46·87	46·23	47·35	48·57	53·65	56·51	60·68	61·80	60·17	57·50	50·92	45·93
26	46·90	46·32	47·30	48·72	53·70	56·77	60·90	61·82	59·95	57·39	50·78	45·81
27	46·91	46·40	47·27	48·90	53·73	57·03	61·00	61·77	59·79	57·20	50·68	45·61
28	46·88	46·50	47·15	49·03	53·77	57·30	61·08	61·75	59·63	57·04	50·50	45·48
29	46·71		47·03	49·22	53·76	57·61	61·10	61·68	59·48	56·83	50·24	45·32
30	46·61		46·93	49·40	53·73	57·90	61·16	61·65	59·30	56·60	50·08	45·24
31	46·50		46·82		53·93		61·19	61·67		56·38		45·21
Means.	47·06	45·77	47·29	47·20	52·32	55·54	59·85	61·65	60·96	58·19	52·63	47·59

The mean of the twelve monthly values is 53°·00.

(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 of the Year 1878.

Days of the Month, 1878.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	43·58	41·54	45·52	42·61	51·30	55·30	64·53	64·05	63·28	58·41	51·90	45·01
2	43·38	41·40	45·96	42·59	52·00	55·66	63·84	64·18	63·01	58·41	51·50	44·77
3	43·48	41·32	46·37	42·60	52·48	55·69	63·30	64·10	62·93	58·28	51·00	44·63
4	43·74	41·45	46·48	42·80	52·83	56·00	62·79	64·36	62·89	58·20	50·49	44·52
5	44·04	41·67	46·58	42·90	53·11	56·23	62·30	64·18	62·90	58·33	50·00	44·38
6	44·35	41·77	46·62	43·13	53·28	56·40	62·49	64·26	63·00	58·88	49·63	44·23
7	44·52	41·73	46·75	43·26	53·48	56·39	62·73	64·49	63·23	58·61	49·36	43·90
8	44·42	41·50	46·88	43·50	53·70	56·79	63·00	64·78	63·30	58·83	49·08	43·53
9	44·00	41·12	46·84	43·92	53·93	57·18	63·30	65·01	63·32	58·96	48·70	43·21
10	43·68	40·90	46·50	44·27	54·24	57·43	63·17	65·12	63·30	58·81	48·36	42·90
11	43·32	40·94	46·39	44·64	54·50	57·54	63·07	65·30	63·30	58·68	47·80	42·52
12	42·84	41·15	46·19	45·00	54·90	57·59	62·91	65·00	63·04	58·35	47·80	42·18
13	42·34	41·31	46·20	45·22	55·14	57·52	62·76	64·82	62·83	57·98	47·34	41·85
14	42·20	41·58	46·14	45·68	55·51	57·87	62·66	64·63	62·42	57·43	47·02	41·50
15	42·58	42·12	45·71	46·31	55·57	57·68	62·77	64·52	62·10	57·07	46·60	41·16
16	43·12	42·48	45·47	46·90	55·54	57·58	62·92	64·52	61·93	56·83	46·40	40·90
17	43·50	42·92	45·08	47·30	55·50	57·35	63·02	63·90	61·73	56·70	46·40	40·61
18	43·62	43·50	44·70	47·60	55·70	57·28	63·26	64·18	61·48	56·62	46·58	40·46
19	43·44	44·00	44·73	47·86	56·11	57·38	63·76	64·00	61·40	56·54	46·70	40·30
20	43·10	44·11	45·03	48·23	56·28	57·61	64·28	64·10	60·90	56·50	46·70	40·14

(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 of the Year 1878—*concluded.*

Days of the Month, 1878.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
21	43·20	44·18	45·32	48·78	56·08	57·88	64·70	64·14	60·45	56·57	46·63	39·98
22	43·68	44·21	45·56	48·93	55·55	58·35	65·09	64·10	59·94	56·52	46·58	39·88
23	44·40	44·46	45·68	49·22	55·10	59·02	65·30	64·05	59·49	56·50	46·50	39·74
24	44·60	44·71	45·30	49·49	55·00	60·07	65·49	63·89	59·10	56·13	46·38	39·59
25	44·17	44·85	44·90	49·75	55·02	60·62	65·47	63·82	58·69	55·68	46·31	39·41
26	43·60	44·92	44·49	49·85	55·10	61·61	65·30	63·61	58·35	55·20	46·67	39·20
27	43·12	45·00	44·12	50·00	55·13	62·45	64·93	63·40	58·15	54·73	46·70	39·00
28	42·76	45·22	43·90	50·19	55·29	63·23	64·80	63·48	57·92	54·25	46·44	39·40
29	42·60		43·69	50·58	55·45	63·89	64·70	63·52	58·10	53·72	45·80	39·80
30	42·24		43·30	50·90	55·42	64·20	64·50	63·52	58·30	53·12	45·51	40·38
31	41·88		42·90		55·31		64·19	63·45		52·44		41·18
Means.	43·40	42·72	45·46	46·47	54·63	58·33	63·78	64·21	61·36	56·88	47·76	41·62

The mean of the twelve monthly values is 52°·22.

(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 of the Year 1878.

Days of the Month, 1878.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	39·2	36·2	49·6	38·3	56·2	56·0	65·0	63·8	60·7	57·0	45·3	39·0
2	42·0	37·6	49·3	40·0	57·0	56·3	60·3	64·6	60·9	54·2	43·3	39·9
3	43·6	39·7	47·0	39·0	57·0	57·3	60·0	63·8	61·3	57·6	42·0	39·3
4	44·4	40·5	47·3	40·6	55·4	59·0	60·4	65·1	62·4	56·6	41·8	39·2
5	43·8	39·2	46·8	42·0	55·4	56·9	63·5	64·6	64·0	58·3	42·6	39·2
6	44·5	38·5	47·6	41·3	57·0	56·0	65·6	66·8	63·0	59·5	43·0	37·2
7	42·0	37·3	47·4	42·8	58·0	59·5	64·6	66·2	63·7	60·0	43·0	37·7
8	40·2	35·0	47·2	44·0	56·0	61·8	65·8	66·9	64·0	59·3	43·0	36·9
9	38·0	36·0	44·0	44·8	55·8	60·0	65·0	67·0	63·2	58·3	40·7	36·0
10	38·0	37·0	45·4	45·3	57·2	59·5	63·3	67·0	61·3	58·1	45·0	34·8
11	35·8	39·2	45·2	45·0	57·5	58·2	62·3	65·0	61·3	55·3	43·0	34·8
12	35·8	39·3	46·0	46·0	58·7	58·2	63·0	65·4	62·0	53·3	39·8	34·3
13	38·0	41·8	44·0	48·0	59·0	59·2	62·8	64·0	58·7	52·8	39·8	33·2
14	42·0	42·5	41·0	50·0	57·6	56·9	63·7	64·9	58·7	53·0	42·3	33·0
15	44·8	42·3	42·2	51·0	57·2	56·3	64·0	65·0	60·8	53·7	42·0	33·2
16	44·5	44·0	40·4	50·5	57·2	56·7	64·4	63·7	57·8	54·7	42·1	34·3
17	43·0	46·4	38·9	50·2	59·0	56·4	65·8	61·6	59·2	54·0	42·9	33·5
18	39·0	47·0	44·0	49·0	60·2	58·6	68·4	63·2	61·5	54·0	43·7	35·0
19	39·2	43·0	46·0	50·3	58·0	58·2	69·3	64·6	56·3	54·2	42·3	35·0
20	42·9	44·0	46·0	52·8	57·0	59·0	69·3	63·8	55·7	54·7	42·3	34·0
21	46·2	43·4	46·7	50·9	53·0	60·8	69·2	63·3	54·3	56·5	42·0	33·5
22	48·0	45·0	44·6	51·5	54·0	63·0	70·8	64·5	55·2	54·0	42·2	34·2
23	44·8	46·0	40·8	51·8	54·2	65·4	67·2	64·3	54·3	51·0	41·4	32·7
24	40·8	45·0	40·0	52·7	56·1	65·3	68·5	62·9	51·8	53·0	41·3	31·7
25	38·7	45·5	39·8	52·0	54·1	68·1	65·2	62·7	54·5	50·0	47·0	31·8
26	38·0	45·6	38·2	50·2	55·5	69·8	65·3	62·5	53·1	50·8	43·4	35·6
27	37·3	46·0	40·0	51·0	55·3	71·0	65·2	63·3	54·7	47·2	41·6	38·8
28	40·6	47·7	39·8	51·0	57·0	70·9	65·5	64·0	57·3	47·2	42·1	39·0
29	37·1		37·8	54·0	55·0	70·0	64·0	64·1	57·5	46·3	39·8	40·2
30	36·2		37·6	55·0	54·2	67·0	63·4	63·1	57·5	43·8	38·2	45·0
31	36·5		37·6		55·0		64·0	62·0		43·8		46·1
Means.	40·8	41·8	43·5	47·7	56·4	61·0	65·0	64·3	58·9	53·6	42·3	36·4

The mean of the twelve monthly values is 50°·97.

(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 of the Year 1878.

Days of the Month, 1878.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
d	°	°	°	°	°	°	°	°	°	°	°	°
1	41·2	36·6	55·4	43·2	63·8	56·0	69·9	66·0	61·0	60·3	45·6	38·2
2	45·4	40·0	52·4	48·0	68·2	64·8	57·8	71·3	63·9	59·0	41·3	39·4
3	46·2	42·6	53·3	43·6	61·2	61·1	59·1	62·8	68·9	63·8	41·0	37·8
4	47·2	40·5	53·2	48·2	60·8	66·5	68·3	71·9	71·8	63·8	38·5	38·8
5	44·2	38·5	50·9	47·8	65·0	56·8	68·1	74·5	71·3	72·9	44·0	38·3
6	45·5	37·5	52·0	50·2	65·5	63·0	73·8	75·0	65·5	66·5	43·2	34·3
7	42·7	34·7	52·2	49·3	63·0	68·0	71·2	72·5	73·4	66·8	45·4	35·6
8	39·3	33·7	48·8	49·8	57·5	72·1	70·8	72·8	72·0	64·8	43·8	33·0
9	37·2	34·3	43·4	51·1	64·9	64·0	72·2	74·4	66·3	62·9	40·7	31·8
10	40·0	41·4	47·4	48·7	67·0	64·0	64·3	69·0	62·7	59·8	49·3	34·0
11	31·0	40·9	49·2	45·4	62·8	58·2	62·3	71·2	70·7	57·5	42·0	31·6
12	33·8	42·5	48·2	56·4	70·8	63·0	65·8	69·9	66·2	57·0	39·3	28·7
13	43·2	49·0	44·0	60·8	63·8	67·0	69·5	67·8	63·8	61·7	37·8	30·5
14	47·5	49·0	43·8	58·8	61·4	56·6	69·0	70·3	66·0	60·0	43·8	28·8
15	50·2	48·6	43·9	57·3	61·5	58·2	66·2	70·7	66·7	57·2	42·1	31·7
16	43·1	49·0	40·5	55·0	61·8	60·1	73·7	66·8	60·8	56·1	43·7	33·3
17	45·0	57·9	40·1	56·8	65·2	61·0	75·2	65·9	64·5	53·8	43·2	29·9
18	36·0	51·1	50·9	56·0	69·8	65·9	80·2	71·5	62·5	54·5	46·3	37·4
19	41·9	45·2	50·2	57·2	62·0	63·0	80·7	70·8	61·3	56·7	45·5	35·9
20	45·3	44·5	49·9	54·9	57·5	70·2	81·2	67·7	56·5	56·9	43·0	31·8
21	53·0	46·6	51·8	56·6	54·0	72·4	76·3	69·3	57·2	63·3	41·0	30·9
22	54·0	49·0	44·4	56·2	56·2	79·9	78·8	70·5	57·7	54·0	41·8	33·8
23	43·8	48·5	39·8	55·8	58·2	78·4	67·8	69·0	54·0	55·0	43·1	29·3
24	41·0	47·4	43·0	56·2	63·9	79·2	69·8	62·2	52·0	57·0	42·0	24·9
25	33·5	51·0	41·1	59·9	56·8	78·3	64·2	68·0	58·4	53·1	51·9	30·8
26	39·0	49·4	41·7	54·9	61·0	84·2	71·9	69·8	56·0	53·0	41·0	45·0
27	37·5	49·5	43·8	58·2	61·9	84·6	69·0	68·7	61·7	47·2	38·0	45·9
28	42·2	52·9	41·6	57·2	63·3	80·8	69·0	71·0	63·8	48·0	41·5	45·5
29	37·4		34·5	64·0	52·5	78·9	66·5	68·2	64·0	45·2	38·5	43·3
30	36·3		40·2	65·5	54·0	69·9	68·2	64·9	60·6	40·0	36·1	54·0
31	36·0		41·8		62·8		68·0	63·0		40·3		53·0
Means .	41·9	44·7	46·2	54·1	61·9	68·2	70·0	69·3	63·4	57·0	42·5	36·0

The mean of the twelve monthly values is 54°·60.

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

1878, 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..	W.S.W.	N.N.E.	+135	4. 9. 25	− 360		
				5. 8. 30	+ 360		
				11. 22. 0	+ 360		
				18. 21. 0	+ 720	1935	
				18. 22. 0	+ 360		
				26. 22. 0	+ 360		
February.	N.N.E.	W.S.W.	−135	6. 2. 40	+ 360		
				6. 7. 10	+ 360		
				7. 0. 0	+ 360		
				9. 1. 50	+ 360	1305	
				14. 22. 0	− 360		
				15. 0. 0	+ 360		
March ...	W.S.W.	N.N.E.	+135	9. 0. 15	+ 360	855	
				12. 21. 0	+ 360		
April	N.N.E.	S.S.W.	−180	5. 21. 15	+ 360		
				6. 22. 0	− 360		
				6. 23. 40	+ 360		
				7. 22. 0	− 360		
				8. 3. 0	− 360		
				12. 0. 0	+ 360		
				12. 22. 0	+ 360		
				15. 22. 0	− 360		
				16. 8. 45	+ 360		900
				18. 3. 0	− 360		
				19. 22. 0	− 360		
				20. 0. 0	+ 360		
				22. 22. 0	− 360		
				28. 0. 30	− 720		
				28. 7. 20	+ 360		
				28. 22. 0	− 360		
				29. 22. 0	+ 360		
May	S.S.W.	S.S.E.	+315	1. 2. 45	+ 360		
				4. 22. 0	− 360		
				6. 21. 0	+ 360		
				11. 22. 0	+ 360	1395	
				27. 21. 0	− 360		
				28. 0. 30	+ 360		
				30. 23. 40	+ 360		
June.....	S.S.E.	N.E.	−112½	3. 21. 10	+ 360		
				5. 10. 30	+ 360		
				7. 8. 40	− 360		
				8. 10. 0	+ 360		
				8. 22. 0	+ 360		
				13. 8. 30	− 360		
				15. 22. 0	+ 360		
				16. 7. 10	+ 720		
June—*cont.*				16. 21. 15	+ 360		
				17. 2. 50	+ 360	4207½	
				18. 9. 20	+ 720		
				19. 22. 0	+ 360		
				22. 0. 15	+ 360		
				22. 8. 45	+ 360		
				23. 3. 25	−1080		
				24. 2. 50	+ 360		
				26. 0. 10	− 360		
				26. 21. 10	+ 360		
				27. 2. 50	+ 360		
				30. 7. 30	+ 360		
July.....	N.E.	E.N.E.	+ 22½	2. 2. 45	+ 360		
				3. 21. 10	+ 360		
				8. 22. 0	+ 360		
				13. 22. 0	+ 720		
				15. 21. 10	+ 360		
				16. 21. 10	+ 360		
				17. 2. 45	− 360		
				19. 8. 20	+ 720	3982½	
				23. 22. 0	+ 360		
				24. 2. 50	+ 360		
				25. 8. 45	+ 360		
				26. 21. 15	+ 360		
				27. 22. 0	− 360		
				28. 7. 40	− 360		
				28. 21. 10	+ 360		
August...	E.N.E.	W.S.W.	−180	2. 8. 50	− 360		
				4. 21. 15	− 360		
				4. 22. 0	− 360		
				5. 21. 0	+ 360		
				6. 0. 10	+ 360		
				9. 2. 35	+ 360		
				18. 22. 0	− 360		
				19. 3. 0	− 360		
				20. 2. 50	+ 360		
				21. 0. 25	+ 360		1260
				22. 0. 15	− 720		
				22. 22. 0	− 360		
				23. 0. 10	− 360		
				23. 21. 10	+ 360		
				25. 21. 10	− 360		
				26. 9. 15	+ 360		
				28. 21. 15	− 360		
				28. 22. 0	− 360		
				29. 21. 0	+ 720		
September	W.S.W.	W.	+ 22½	3. 22. 0	− 360		
				4. 21. 10	+ 360		

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 or has travelled out of range.

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

1878, Month.	Direction of the Wind. At beginning of Month.	Direction of the Wind. At end of Month.	Apparent Motion.	Times of Shifts of the Recording Pencil.	Amount of Motion.	Monthly Excess of Motion. Direct.	Monthly Excess of Motion. Retrograde.	1878, Month.	Direction of the Wind. At beginning of Month.	Direction of the Wind. At end of Month.	Apparent Motion.	Times of Shifts of the Recording Pencil.	Amount of Motion.	Monthly Excess of Motion. Direct.	Monthly Excess of Motion. Retrograde.
			°	d h m	°	°	°				°	d h m	°	°	°
Sept.—*cont.*				5. 0.15	+ 360	$1102\frac{1}{2}$		November	N.	S.	+ 180	22. 9.15	+ 360	900	
				11. 2.45	+ 360							24. 22. 0	+ 360		
				11. 9.15	+ 360										
October ..	W.	N.	+ 90	1. 21. 0	− 360			December	S.	W.S.W.	$-292\frac{1}{2}$	9. 22. 0	− 360		$652\frac{1}{2}$
				2. 22. 0	+ 360							15. 21. 0	+ 360		
				13. 22. 0	− 360							16. 8.30	− 360		
				14. 1.15	− 360							20. 2.50	− 360		
				16. 21. 0	+ 360		630					24. 0.30	+ 360		
				18. 0.10	− 360							24. 2.45	− 360		
				20. 0.10	− 360							25. 22. 0	+ 360		
				20. 7.40	+ 360										

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 or has travelled out of range.

The whole excess of direct motion for the year was 12240°.

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

	revs.
On 1877, December $31^d. 12^h$	51·1
On 1878, December $31^d. 12^h$	85·2

Implying an excess of direct motion, during the year, of 34·1 revolutions, or 12276°.

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	1878.												Mean for the Year.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
h	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.	Miles.
1 a.m.	13·0	8·9	13·0	10·1	9·4	8·0	7·0	9·2	9·0	9·7	12·2	10·4	10·0
2 a.m.	13·7	9·1	12·9	9·5	9·6	7·0	6·6	9·0	8·6	10·1	11·8	9·9	9·8
3 a.m.	12·9	8·1	12·6	9·6	9·9	6·6	6·8	9·2	8·6	9·7	11·9	10·1	9·7
4 a.m.	14·2	8·1	12·4	9·2	10·2	6·4	6·4	8·8	8·6	9·2	12·3	9·3	9·6
5 a.m.	13·5	8·0	12·0	9·5	9·8	6·2	6·6	9·1	9·3	9·2	12·6	8·7	9·5
6 a.m.	13·2	8·0	12·4	9·2	10·2	6·0	7·4	9·6	8·7	8·7	12·5	9·6	9·6
7 a.m.	13·5	8·0	12·0	9·4	10·4	6·2	7·5	10·3	9·0	7·9	13·2	9·1	9·7
8 a.m.	13·1	7·9	12·4	10·0	11·5	6·6	8·3	10·8	9·7	8·9	12·8	9·7	10·1
9 a.m.	13·6	8·4	13·4	11·4	12·8	8·1	9·4	11·6	10·2	9·9	13·2	10·0	11·0
10 a.m.	13·4	8·4	15·0	12·9	13·0	9·0	10·0	12·8	10·7	11·8	13·4	10·7	11·8
11 a.m.	13·3	8·9	15·2	13·0	13·1	9·3	10·3	12·5	11·0	12·1	13·2	10·7	11·9
Noon.	14·5	9·8	16·2	13·5	14·7	9·5	11·0	12·6	12·5	12·9	13·3	10·0	12·5
1 p.m.	15·4	11·2	17·1	14·5	16·0	11·3	11·6	13·1	13·3	14·0	14·2	10·5	13·5
2 p.m.	15·0	10·6	17·4	14·8	16·1	10·8	11·0	13·1	13·2	13·6	13·8	10·3	13·3
3 p.m.	14·8	10·7	18·4	15·2	15·9	10·8	11·8	14·6	12·9	13·4	13·8	10·2	13·5
4 p.m.	13·4	9·8	17·8	14·7	15·9	10·8	11·7	14·1	11·7	12·5	12·9	10·4	13·0
5 p.m.	13·3	9·9	17·0	14·4	14·3	10·5	11·3	12·9	11·0	11·2	12·1	10·5	12·4
6 p.m.	13·7	9·6	16·1	13·2	13·8	9·9	11·5	11·4	10·4	10·4	12·1	10·6	11·9
7 p.m.	13·5	9·6	14·9	11·8	12·6	9·1	10·4	10·5	10·3	10·4	12·7	11·2	11·4
8 p.m.	13·5	9·7	14·6	11·8	11·2	8·7	9·0	10·1	10·1	11·1	13·0	11·5	11·2
9 p.m.	14·2	9·5	14·2	11·4	10·2	8·5	8·7	9·5	10·6	11·0	13·0	11·8	11·0
10 p.m.	13·9	9·3	13·8	11·1	9·5	8·5	7·9	9·5	9·9	10·7	13·1	10·9	10·7
11 p.m.	14·0	8·9	14·2	10·9	10·0	8·4	8·0	9·0	9·4	10·6	12·7	11·4	10·6
Midnight.	13·1	8·5	13·0	10·4	9·5	8·4	7·6	9·4	9·3	10·4	11·7	10·9	10·2
Means	13·7	9·1	14·5	11·7	12·1	8·5	9·1	10·9	10·3	10·8	12·8	10·4	11·2
Greatest Hourly Measures	42	27	42	34	42	31	29	41	38	40	40	44	..
Least Hourly Measures	0	0	1	0	0	0	0	0	0	0	0	0	..

AMOUNT OF RAIN COLLECTED IN EACH MONTH OF THE YEAR 1878.

1878, MONTH.	Number of Rainy Days.	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.	Gauge partly sunk in the Ground read daily.	Gauge partly sunk in the Ground read Monthly.	On the "Royalist" Police Ship.
		in.	in.	in.	in.	in.	in.	in.	in.	in.
January......	11	0·448	0·512	0·586	0·586	0·815	0·975	0·868	1·000	0·684
February.....	13	0·775	0·885	0·973	1·000	1·048	1·285	1·096	1·100	0·888
March	11	0·221	0·283	0·479	0·826	0·888	1·040	1·058	0·970	0·543
April........	15	3·482	3·835	3·626	4·313	4·174	3·630	4·308	4·270	3·761
May.........	22	3·292	3·413	3·767	4·157	4·202	4·695	4·292	4·280	2·897
June.........	14	3·956	4·269	4·295	4·692	4·480	5·010	4·572	4·455	3·949
July.........	9	0·177	0·190	0·240	0·280	0·282	0·400	0·306	0·253	0·390
August	19	4·290	4·636	4·804	5·200	5·347	6·560	5·378	5·400	6·374
September....	9	0·428	0·489	0·719	0·732	0·776	1·025	0·820	0·842	0·563
October......	13	1·033	1·072	1·346	1·408	1·559	1·820	1·663	1·675	1·137
November....	15	1·068	1·223	2·299	3·334	3·289	3·730	3·454	3·500	2·453
December	16	0·634	0·706	1·002	1·078	1·079	1·270	1·162	1·211	0·773
Sums	167	19·804	21·513	24·136	27·606	27·939	31·440	28·977	28·956	24·412

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 2	....	38 4
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 Gauges partly sunk in the Ground	155 3	....	0 5
	Above Level of River. Ft. In.		Above Deck. Ft. In.
Gauge on the "Royalist" Police Ship, moored in Blackwall Reach.	17 0	....	8 8

The unusually large rainfall recorded at the "Royalist" for the month of August is owing to a heavy partial fall which took place on August 4, on which occasion the amount registered was about 1 inch in excess of that collected at the Royal Observatory.

ROYAL OBSERVATORY, GREENWICH.

OBSERVATIONS

OF

LUMINOUS METEORS

1878.

Month and Day, 1878.		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						°	
January	28	10. 4. 19	N.	1	Bluish-white	0·8	Train	..	1
July	17	10. 25. 40	S.	2	Bluish-white	1	Slight	..	2
August	7	10. 0. ±	S.	1	Bluish-white	0·5	None	8	3
"		10. 13. 46	E.	1	Yellow	0·5	Train	5	4
"		10. 16. 6	S., P.	Jupiter	Blue	1	Very fine	..	5
"		10. 31. ±	S.	2	Bluish-white	1	Slight	10	6
"		10. 42. 36	S.	1	Orange	1	None	7	7
"		11. 7. 1	E., S.	3	Bluish-white	0·5	Slight	6	8
"		11. 15. 41	S.	> 1	Yellow	1	2^s	..	9
"		11. 32. 21	S.	2	Bluish-white	0·5	Train	..	10
August	8	9. 40. 55	H., S.	> Jupiter	. . .	..	. . .	..	11
"		9. 54. 50	S.	2	Bluish-white	0·5	Slight	..	12
"		9. 57. 10	H.	3	Bluish-white	0·5	None	..	13
"		9. 59. 35	H.	1	Bluish-white	0·5	Slight	..	14
"		10. 8. 30	P.	2	Bluish-white	0·5	Slight	6	15
"		10. 28. 45	S.	3	Bluish-white	0·5	None	10+	16
"		10. 30. 5	H.	1	Bluish-white	0·5	Train	4	17
"		10. 35. 20	S.	1	Bluish-white	0·8	Train	..	18
"		10. 45. 29	S.	3	Bluish-white	0·5	None	..	19
"		10. 46. 0	H.	3	Bluish-white	0·5	None	..	20
"		10. 49. 5	E.	2	Red	0·5	None	10	21
"		10. 51. 23	H., S.	2	Bluish-white	0·5	Slight	..	22
"		10. 52. 5	H., P.	1	Bluish-white	0·5	Train	..	23
"		11. 9. 50	P.	2	Bluish-white	1	None	..	24
"		11. 17. 0	H.	4	Bluish-white	0·4	None	..	25
"		11. 23. 43	S.	> Jupiter	Blue	1	Very fine	..	26
"		11. 24. 55	H.	2	Bluish-white	0·5	Slight	..	27
August	9	9. 24. 45	H.	1	Bluish-white	0·5	Slight	..	28
August	10	11. 33. 0	N.	Jupiter	White	1	None	10	29
August	12	9. 11. ±	H.	Jupiter × 2	Bluish-white	..	Fine; 4^s	35	30
"		10. 36. 11	N.	< Jupiter	Reddish-yellow	2	Very fine	..	31
August	17	9. 45. 42	N.	2	White	1	None	6	32
"		9. 53. 27	N.	1	White	0·8	Train	10	33
August	20	9. 19. 25	N.	> 1	White	1	Train	..	34
August	25	8. 37. 35	N.	Jupiter	Bluish-white	1·5	Fine	20	35
"		11. 55. 25	N.	2	White	0·3	None	3	36
September	6	8. 13. 0	H.	Jupiter	Red	3	Fine	..	37
October	7	5. 52. 0	H.	Jupiter × 3	. . .	..	. . .	..	38
October	17	6. 53. 36	S.	2	Blue	0·5	None	6	39
October	18	8. 10. 0	G.	1	Blue	0·8	None	10	40
"		8. 15. 0	G.	2	Bluish-white	0·5	None	..	41
"		8. 16. 0	N.	2	White	..	Train	..	42
"		9. 36. 30	H.	2	White	..	. . .	..	43
"		9. 49. 30	H.	> 1	Bluish-white	..	Slight; 2^s	..	44
October	22	6. 27. +	S.	Jupiter	Green	1·5	Fine; 2^s	..	45
"		9. 0. 0	G.	1	Blue	1	Fine	10	46
"		9. 55. 45	H.	1	Bluish-white	0·5	None	..	47
"		10. 5. 25	H.	> 1	Blue	1	Fine	..	48
"		10. 8. 30	H.	2	Bluish-white	..	Slight	..	49

August 7. The observations were interrupted by clouds.

No. for Reference.	Path of Meteor through the Stars.
1	Moved from direction of Procyon and passed across ι and β Orionis.
2	Shot from a point nearly midway between η and ζ Ursæ Majoris, and disappeared a little to left of ζ Ursæ Majoris.
3	Passed 6° below α Pegasi and 2° below ζ Pegasi.
4	Passed from direction of β Trianguli across β Andromedæ. Path a little curved.
5	Passed close to λ Andromedæ and 1° to left of β Andromedæ.
6	Passed directly between α Lyræ and δ Cygni towards a point 3° to right of α Aquilæ.
7	Passed 1° above δ Andromedæ and disappeared 1° below α Andromedæ.
8	Passed 2° below ε Piscium moving towards a point 4° below γ Piscium.
9	Passed from α Aquilæ and disappeared close to β Draconis.
10	Passed from a little below γ Persei and disappeared near η Persei.
11	Was seen to burst at ε Delphini showing various colours, red, green, and others: fragments seen 6 seconds afterwards.
12	Shot from ε Cephei and disappeared very close to β Cassiopeiæ.
13	Appeared close to λ Pegasi, disappeared at α Pegasi.
14	Appeared near α Cephei and passed across ι Cephei.
15	Passed from β Ursæ Minoris and disappeared very close to α Draconis.
16	Passed from 1° below α Cephei and disappeared 3° below α Cygni.
17	Passed across γ Cassiopeiæ and bisected a line joining α and δ Cassiopeiæ.
18	Shot from a point about 2° above γ Andromedæ and disappeared slightly below β Andromedæ.
19	Passed 2° below λ Andromedæ and disappeared about 1° to left of β Pegasi.
20	Shot from a point near α Andromedæ in direction of β Andromedæ and disappeared 4° before reaching that star.
21	From direction of α Cassiopeiæ moved towards β Pegasi.
22	From direction of α Pegasi passed directly between α and δ Equulei.
23	Appeared near λ Pegasi, passed across α Equulei.
24	From α Andromedæ to a point 2° to right of γ Pegasi.
25	Shot from near α Pegasi and disappeared 6° south of α Equulei.
26	Shot from α Draconis and disappeared about 3° to left of β Ursæ Minoris.
27	From direction of γ Persei disappeared 2° to left of ε Cassiopeiæ.
28	From a point midway between α and ζ Pegasi shot towards horizon at right angles to line joining those stars.
29	Passed between γ and δ Cygni moving from direction of α Cephei.
30	Passed across ζ Ursæ Majoris and disappeared near ε Boötis.
31	From direction of α Aquilæ moved parallel to line joining β Cygni and α Lyræ, passing across μ Herculis. Sparks at end of course.
32	From direction of ι Cephei to ε Cassiopeiæ.
33	Passed across θ and λ Herculis.
34	Fell perpendicularly towards horizon in east, passing nearly midway between β Persei and β Trianguli.
35	From direction of a point midway between α and γ Pegasi passed near α Aquarii.
36	From near 13 Lyræ moved towards γ Draconis.
37	From a point about 15° above ε Ursæ Majoris shot across that star and towards γ Ursæ Majoris.
38	Appeared near the Moon and moved in a nearly perpendicular direction downwards, slanting towards south; no stars were visible.
39	Appeared about 5° to left and 1° above α Lyræ and disappeared near that star.
40	Appeared near μ Aquilæ, travelled towards and disappeared about 2° before reaching α Aquilæ.
41	Appeared a little to right of the Pleiades moving downwards.
42	From a point about 2° below α Draconis to ζ Ursæ Majoris.
43	Appeared near Polaris and disappeared near β Ursæ Minoris.
44	Moved from a point about 10° east of Polaris, and disappeared near υ Ursæ Majoris.
45	Appeared near γ Cassiopeiæ and disappeared about 7° above and a little to left of α Draconis.
46	Moved from a point midway between α and β Ursæ Majoris and disappeared a little below δ Ursæ Majoris.
47	Appeared near λ Tauri and disappeared near μ Tauri.
48	Moved from Aldebaran across π Tauri, and disappeared near λ Ceti.
49	Appeared near ι Aurigæ and disappeared near the Pleiades.

Month and Day, 1878.		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						°	
October	22	10. 14. 15	H.	1	Blue	..	Fine; 1s	..	1
	"	10. 19. 40	H., P.	2	Bluish-white	..	None	..	2
	"	10. 23. 40	P.	1	Bluish-white	0·5	None	..	3
	"	10. 37. 35	H.	2	Bluish-white	..	None	..	4
	"	10. 37. 35	H.	3	Bluish-white	..	. . .	..	5
	"	10. 38. 15	P.	2	Bluish-white	0·5	None	..	6
	"	10. 43. 46	H.	2	Bluish-white	0·5	. . .	..	7
	"	10. 53. 44	H., P.	2	Bluish-white	0·5	. . .	..	8
	"	10. 54. 15	H., P.	1	Blue	..	Train; 1s	..	9
	"	11. 15. 0	H.	1	Bluish-white	..	Train; 1s	..	10
	"	12. 45.	H.	> 1	Bluish-white	2	Fine	..	11
	"	12. 46. ±	H.	> 1	Bluish-white	2	Fine; 1s	..	12
October	24	7. 19.	H.	1	Bluish-white	..	Slight	..	13
	"	9. 11. 23	S.	2	Bluish-white	..	None	..	14
October	25	7. 30.	G.	2	Bluish-white	0·8	. . .	9	15
	"	7. 48.	G.	1	Blue	0·9	Slight	10+	16
	"	8. 0.	G.	1	Bluish-white	1	None	8	17

No. for Reference.	Path of Meteor through the Stars.
1	Appeared about 10° below Aldebaran and disappeared near ξ Tauri.
2	Appeared near π Tauri and disappeared near π^1 Orionis.
3	From π^3 Orionis to ν Eridani.
4	Moved from Aldebaran and disappeared near γ Orionis.
5	Appeared near δ Tauri and moved towards π^1 Orionis.
6	From η Aurigæ to θ Aurigæ.
7	Moved from β Tauri in direction of ζ Tauri.
8	Moved from Capella and disappeared near β Aurigæ.
9	Shot from ϵ Geminorum and disappeared near 64 Aurigæ.
10	Moved from μ Geminorum and disappeared close to ϕ Orionis.
11	Moved from a point between Castor and Pollux, travelled across ι Ursæ Majoris, and disappeared near β Ursæ Majoris.
12	From γ Orionis passed between π^3 and π^5 Orionis and disappeared a little below α Ceti.
13	Appeared near α Cygni and disappeared near α Lyræ.
14	Moved from direction of δ Cassiopeiæ, disappeared near γ Andromedæ.
15	Appeared near β Cassiopeiæ, moved in direct line towards and disappeared near ϵ Cassiopeiæ.
16	Shot from a point midway between α and β Ursæ Majoris, and disappeared near α Canum Venaticorum.
17	Appeared near β Andromedæ and moved towards π Andromedæ.