



STONYHURST COLLEGE  
OBSERVATORY.

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RESULTS  
OF  
METEOROLOGICAL, MAGNETICAL AND  
SOLAR OBSERVATIONS.

BY THE

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## INTRODUCTION.

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THE most important event of the year in connection with this Observatory was the erection of the large grating spectroscope completed by Mr. Hilger in the course of the spring. The instrument now stands near the window of the spectroscopic room adjoining the equatorial dome, and in front of the window a stone pier has been built to support the heliostat and the  $5\frac{1}{2}$  inch object glass of Alvan Clark, which are to be used in conjunction with the spectroscope for photographing the solar spectrum and the spectra of sun-spots. The grating, whose ruled surface is  $3\frac{1}{4}$  inches long by 1 and 15-16th wide, was ruled by Rowland's engine at the Johns Hopkins University, Baltimore, in 1887, on a plate ground, polished, and corrected by John A. Brashear. The number of lines to the inch is 14,438, thus giving a total of almost 50,000 parallel lines on the plate. The grating stands on three levelling screws, which rest in the grooves radiating from the centre of a moveable circle,  $6\frac{1}{2}$  inches in diameter, and which is graduated to degrees, and read by a fixed pointer. The vertical grating can thus be readily placed at any required angle to the incident pencil of parallel rays. This moveable circle is concentric with a fixed circle, 15 inches in diameter,

graduated to  $5'$  of arc, and having two micrometers the heads of which are divided into 300 parts, so that the position of the observing telescope may be read to  $1'$  and by estimation to  $0''.25$ . The collimating and observing telescopes have each a 3 inch object glass of quartz, whose focal length is  $24\frac{1}{2}$  inches. The eye-piece of the observing telescope can be at once replaced, when the spectrum has to be photographed, by a plate-holder which is provided with two rack-and-pinion movements; one vertical, by which four or more exposures can be made on the same sensitized plate; and the other horizontal, the angle which the plate makes with the incident pencil being read on a graduated circle. By this latter arrangement the extreme rays to be photographed can be brought into accurate focus on the same plate. The length of the slit is  $1\frac{1}{4}$  inch. It is actuated by a screw of 50 threads to the inch, and the micrometer is divided into 100 parts; thus the width of the slit may be read to the five-thousandth of an inch, and by estimation to the fifty-thousandth. All the principal draw-tubes are graduated and moved by rack and pinion; and slow motion rods are attached to the slit and to the viewing telescope, so that both may be commanded without removing the eye from the spectrum. The definition with the eye-telescope is excellent, and the trial photographs most satisfactory.

The weather during the year has not been so favourable as in 1887, but yet we have managed to secure 223 full-sized drawings of the solar surface, and the sun has been observed telescopically on 18 other days, all details being recorded. The spot-area has been measured on all the drawings, and the resulting tables and curves are included in this report.

The measurements of the chromosphere and solar prominences are complete for 84 days, and partial for three other dates. Monthly tables have been calculated from the observations. The inclination, or apparent drift, of the chromospheric flames has also been carefully observed on 13 days with a wide tangential slit.

The total lunar eclipse on January the 28th, was well observed with the star spectroscope, prisms of aluminium, quartz, and white-flint being used in succession to examine the spectrum of the eclipsed moon. Three equatorials were employed in observing occultations of stars during the same eclipse.

In the course of the year observations were made of the comets Sawerthal and *e* and *f* Barnard, of the minor planet Sappho, of the phenomena of Jupiter's Satellites, and of lunar occultations.

The meteorological and magnetic observations were all continued as in former years, and the daily photograms of the Barograph and Thermographs, as well as the continuous curves of the direction and velocity of the wind, and the self-recorded traces of the sunshine and rainfall have all been forwarded as usual to the Meteorological Office.

Besides these original documents, reports have been sent weekly to the Meteorological Office, and to the *Clitheroe Times*, and monthly to the same office, to the Registrar General, and to the French Meteorological Society. The daily rainfall has been supplied to Mr. Symons. The Eclipse occultations were forwarded by request to the Pulkowa Observatory. Papers have been written for the *Monthly Notices of the R. A. S.*, on the observations of Jupiter's Satellites and of occultations of stars by the moon, and



also on the comet Barnard *c*, on the total lunar eclipse, and on the changes of the solar surface. The chromosphere observations have appeared in the *Observatory*, and several communications have been printed in the *British Journal of Photography*.

The Rev. E. Colin, S.J., who spent the last year at Stonyhurst Observatory, has just been appointed director of the French Government Observatory, at Antananarivo. On January the 1st, 1887, Mr. James Cullen was succeeded as computer by Mr. Samuel Rowlands.

# Stonyhurst Observatory.

Lat.  $53^{\circ} 50' 40''$  N. Long. 9m. 52s. 68. w. Height of the Barometer  
above the sea, 381 ft.

## METEOROLOGICAL REPORT.

January, 1888.

Results of Observations taken during the Month.	Mean for the last 41 years.
Mean Reading of the Barometer.....	29.774      29.428
Highest                    ,,            on the 9th.....	30.285      30.297
Lowest                    ,,            on the 31st.....	28.711      28.566
Range of Barometer Readings .....	1.574      1.731
Highest Reading of a Max. Therm. on the 8th .....	51.2      51.6
Lowest Reading of a Min. Therm. on the 19th .....	24.2      21.1
Range of Thermometer Readings .....	27.0      30.5
Mean of all the Highest Readings .....	42.2      42.1
Mean of all the Lowest Readings .....	32.3      32.6
Mean Daily Range .....	9.9      9.5
Deduced Monthly Mean (from Mean of Max. and Min.) .....	37.1      37.1
Mean Temperature from dry bulb .....	37.8      37.1
Adopted Mean Temperature .....	37.5      37.1
Mean Temperature of Evaporation .....	36.3      35.9
Mean Temperature of Dew Point .....	34.1      33.8
Mean elastic force of Vapour .....	0.197 in.      0.196 in
Mean weight of Vapour in a cubic foot of air .....	2.2 gr      2.3 gr
Mean additional weight required for saturation .....	0.4 gr      0.4 gr
Mean degree of Humidity (saturation 1.00) .....	0.88      0.86
Mean weight of a cubic foot of air .....	555.3 gr      549.3 gr
Fall of Rain .....	2.723 in.      4.227 in
Number of days on which Rain fell .....	17      19.6
Amount of Evaporation .....	0.918 in.      0.900 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	1	7	1	1	1	12	1	7
Mean Velocity in miles per hour	15.1	9.0	12.4	4.1	23.8	12.0	12.5	8.7
Total No. of miles for each Direction	363	1506	298	112	571	3468	301	1447

The total number of miles registered during the month was 8066.

The max. Velocity of the wind was 40 miles per hour ; direction S. by E. on the 4th at 5 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10.0) 8.8

In the month of January, the highest reading of the Barometer

during 41 years, was on the 18th, in 1882, and was ..... 30.480

The lowest .. .. 26th, 1884 ..... 27.803

The highest Temperature .. .. 7th, 1887 ..... 59.9

The lowest .. .. 15th, 1881 ..... 4.6

The highest adopted mean temperature of the month, 1875 ..... 42.5

The lowest .. .. 1881 ..... 29.2

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The Barometer readings were rather high, and the range small. The temperature was very close to the average for January. The Rainfall was small, and the number of rainy days a little below the average for this month. Prevailing wind S.W.

## February, 1888.

Results of Observations taken during the Month.		Mean for the last 41 years
Mean Reading of the Barometer	29.617	29.495
Highest            ,,            on the 28th	30.107	30.060
Lowest            ,,            on the 11th	28.973	28.676
Range of Barometer Readings	1.134	1.384
Highest Reading of a Max. Therm. on the 6th	49.1	51.9
Lowest Reading of a Min. Therm. on the 13th	14.4	22.7
Range of Thermometer Readings	34.7	29.2
Mean of all the Highest Readings	40.5	44.2
Mean of all the Lowest Readings	29.6	33.8
Mean Daily Range	10.9	10.3
Deduced Monthly Mean (from Mean of Max. and Min.)	34.7	38.6
Mean Temperature from dry bulb	34.8	38.6
Adopted Mean Temperature	34.8	38.6
Mean Temperature of Evaporation	33.4	36.9
Mean Temperature of Dew Point	30.8	34.8
Mean elastic force of Vapour	0.173 in	0.192 in
Mean weight of Vapour in a cubic foot of air	2.0 gr	2.4 gr
Mean additional weight required for saturation	0.4 gr	0.4 gr
Mean degree of Humidity (saturation 1.00)	0.85	0.87
Mean weight of a cubic foot of air	555.2 gr	548.7 gr
Fall of Rain	1.447 in	3.558 in
Number of days on which Rain fell	16	17.3
Amount of Evaporation	0.902 in	0.983 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	3	13	0	0	0	2	10	1

Mean Velocity in miles per hour	11.2	10.5	0	0	0	11.8	13.5	11.3
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Total No. of miles for each Direction	805	3270	0	0	0	566	3243	270
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The total number of miles registered during the month was 8154.  
The Max. Velocity of the wind was 44 miles per hour; direction W.  
at 11 a. m., on the 5th.

Mean amount of Cloud (an overcast sky being indicated by 10·0)	77
In the month of February, the highest reading of the Barometer during 41 years, was on the 11th, in 1849, and was .....	30·452
The lowest .. .. . 6th, 1867.....	28·208
The highest Temperature .. .. . 8th, 1877.....	58·3
The lowest .. .. . 1st, 1855.....	10·1
The highest adopted mean temperature of the month, 1869.....	44·0
The lowest .. .. . 1855.....	28·6

The Barometer readings were pretty close to average. The Temperature was low, with large range of readings. The Rainfall was two inches below the usual mean for February. Prevailing wind N.E., but the heaviest winds blew from the West.

## March, 1888.

Results of Observations taken during the Month.		Mean for the last 41 years.
Mean Reading of the Barometer.....	29°198	29°470
Highest           ,,           on the 1st .....	30°012	30°081
Lowest           ,,           on the 28th.....	28°309	28°695
Range of Barometer Readings .....	1°703	1°386
Highest Reading of a Max. Therm. on the 8th .....	56°2	56°8
Lowest Reading of a Min. Therm. on the 23rd .....	21°3	22°7
Range of Thermometer Readings .....	34°9	34°1
Mean of all the Highest Readings.....	43°0	46°9
Mean of all the Lowest Readings .....	30°3	34°2
Mean Daily Range .....	12°7	13°7
Deduced Monthly Mean (from Mean of Max. and Min.)	35°7	39°6
Mean Temperature from dry bulb.....	36°3	39°8
Adopted Mean Temperature .....	36°0	39°7
Mean Temperature of Evaporation .....	34°1	37°9
Mean Temperature of Dew Point .....	30°9	35°3
Mean elastic force of Vapour .....	0°174 in	0°206 in
Mean weight of Vapour in a cubic foot of air .....	2°0 gr	2°4 gr
Mean additional weight required for saturation .....	0°6 gr	0°5 gr
Mean degree of Humidity (saturation 1°00).....	0°81	0°85
Mean weight of a cubic foot of air.....	546°3 gr	546°8 gr
Fall of Rain .....	3°601 in	3°164 in
Number of days on which rain fell.....	20	17°7
Amount of Evaporation .....	1°522 in	1°721 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	1	13	1	0	0	9	1	6

Mean Velocity in miles per hour	10°3	11°0	15°8	0	0	12°5	14°4	8°9
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Total No. of miles for each Direction	246	3423	380	0	0	2701	345	1281
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The total number of miles registered during the month was 8376.  
The max. Velocity of the wind was 39 miles per hour, direction S.W., on the 9th, at 6 p.m.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	8'3
In the month of March, the highest reading of the Barometer	
during 41 years, was on the 6th, in 1852, and was .....	30'401
The lowest            "            "            31st, 1860 .....	28'199
The highest Temperature            "            25th, 1871 .....	68'0
The lowest            "            "            6th, 1886 .....	11'5
The highest adopted mean temperature of the month, 1871 .....	44'0
The lowest            "            "            1855 .....	35'6

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The Barometer readings were low, with large range. The Temperature was very low. The Rainfall was a little in excess of the mean for March. Prevailing wind S.W.

## April, 1888.

Results of Observations taken during the Month.		Mean for the last 41 years.						
Mean Reading of the Barometer .....	29.476	29.480						
Highest           "           on the 6th .....	29.922	29.968						
Lowest           "           on the 30th .....	28.920	28.774						
Range of Barometer Readings .....	1.002	1.194						
Highest Reading of a Max. Therm. on the 14th.....	60.8	66.1						
Lowest Reading of a Min. Therm. on the 6th .....	25.2	28.3						
Range of Thermometer Readings .....	35.6	37.8						
Mean of all the Highest Readings.....	50.7	53.9						
Mean of all the Lowest Readings .....	36.0	37.9						
Mean Daily Range .....	14.7	16.0						
Deduced Monthly Mean (from Mean of Max. and Min.)	41.9	44.4						
Mean Temperature from dry bulb.....	42.2	44.5						
Adopted Mean Temperature .....	42.1	44.5						
Mean Temperature of Evaporation .....	39.2	41.7						
Mean Temperature of Dew Point .....	35.6	38.3						
Mean elastic force of Vapour .....	0.210 in	0.237 in						
Mean weight of Vapour in a cubic foot of air.....	2.4 gr	2.7 gr						
Mean additional weight required for saturation .....	0.7 gr	0.7 gr						
Mean degree of Humidity (saturation 1.00).....	0.78	0.80						
Mean weight of a cubic foot of air.....	544.8 gr	541.9 gr						
Fall of rain.....	2.303 in	2.341 in						
Number of days on which Rain fell .....	17	14.8						
Amount of Evaporation .....	1.927 in	2.464 in						
No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	13	0	1	1	11	0	9.2
Mean Velocity in miles per hour	0	9.9	0	8.0	15.5	13.0	0	9.2
Total No. of miles for each Direction	0	3101	0	192	373	3444	0	880
The total number of miles registered during the month was 7990.								
The max. Velocity of the wind was 40 miles per hour, direction W. by E. on the 13th, at 11 a. m.								



Mean amount of Cloud (an overcast sky being indicated by 10'0)...	8'0
In the month of April, the highest reading of the Barometer	
during 41 years, was on the 17th, in 1887, and was .....	30'251
The Lowest            "            "            20th, 1868.....	28'358
The highest Temperature            "            14th, 1852.....	74'1
The lowest            "            "            4th, 1885.....	21'1
The highest adopted mean temperature of the month, 1865.....	48'5
The lowest            "            "            1879.....	40'7

The mean reading of the Barometer was very close to the average for April, and the range small. The Temperature was low, and the range of Temperature less than usual. The Rainfall was almost identical with the mean; but the number of wet days was rather larger than is usual in April. Prevailing wind S.W.

## May, 1888.

Results of Observations taken during the Month.		Mean for the last 41 years.						
Mean Reading of the Barometer .....	29.597	29.508						
Highest                    "                    on the 23rd .....	30.110	29.966						
Lowest                    "                    on the 1st .....	28.720	28.925						
Range of Barometer Readings .....	1.390	1.041						
Highest Reading of a Max. Therm. on the 19th.....	78.4	71.8						
Lowest Reading of a Min. Therm. on the 13th.....	31.9	31.4						
Range of Thermometer Readings.....	46.5	48.4						
Mean of all the Highest Readings .....	60.2	59.6						
Mean of all the Lowest Readings .....	41.0	42.0						
Mean Daily Range.....	19.2	17.6						
Deduced Monthly Mean (from Mean of Max. and Min.)	48.9	48.9						
Mean Temperature from dry bulb .....	49.6	49.4						
Adopted Mean Temperature.....	49.3	49.1						
Mean Temperature of Evaporation.....	45.2	46.1						
Mean Temperature of Dew Point .....	40.8	42.6						
Mean elastic force of Vapour .....	0.256 in	0.274 in						
Mean weight of Vapour in a cubic foot of air .....	2.9 gr	2.2 gr						
Mean additional weight required for saturation .....	1.2 gr	0.9 gr						
Mean degree of Humidity (saturation 1.00) .....	0.72	0.76						
Mean weight of a cubic foot of air .....	537.3 gr	537.1 gr						
Fall of Rain.....	0.917 in	2.536 in						
Number of days on which Rain fell.....	11	15.3						
Amount of Evaporation.....	2.527 in	3.437 in						
No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	8	1	4	0	16	0	2
Mean Velocity in miles per hour	0	17.6	15.3	13.5	0	16.0	0	7.4
Total No. of miles for each Direction	0	1459	367	1302	0	6163	0	357
The total number of miles registered during the month was 9648.								
The max. Velocity of the wind was 49 miles per hour, direction S.S.W., on the 2nd at 11 a.m.								

Mean amount of Cloud (an overcast sky being indicated by 10°0)...	75
In the month of May, the highest reading of the Barometer	
during 41 years, was on the 22nd, in 1855, and was.....	30°124
The lowest            "            "            28th, 1877 .....	28°550
The highest Temperature            "            19th, 1864 .....	82°5
The lowest            "            "            4th, 1855 .....	23°5
The highest adopted mean temperature of the month, 1848 .....	55°1
The lowest            "            "            1855 .....	45°0

The mean reading of the Barometer was very close to the average ; but the range was very large. The Temperature differed only slightly from the mean. The fall of rain was very light, and the number of days on which rain fell was small. The prevailing wind was S.W., but the strongest winds were N.E.

## June, 1888.

Results of Observations taken during the Month.		Mean for the last 41 years						
Mean Reading of the Barometer .....	29'540	29'534						
Highest .. on the 18th.....	29'895	29'881						
Lowest .. on the 29th .....	29'075	29'025						
Range of Barometer Readings ..	0'820	0'856						
Highest Reading of a Max. Therm. on the 26th ...	84'0	77'0						
Lowest Reading of a Min. Therm. on the 4th.....	37'5	39'1						
Range of Thermometer Readings.....	46'5	37'9						
Mean of all the Highest Readings .....	65'0	65'6						
Mean of all the Lowest Readings .....	45'2	47'9						
Mean Daily Range .....	19'8	17'7						
Deduced Monthly Mean (from Mean of Max. and Min.)	53'3	54'9						
Mean Temperature from dry bulb .....	53'3	55'0						
Adopted Mean Temperature.....	53'3	55'0						
Mean Temperature of Evaporation .....	49'6	52'0						
Mean Temperature of Dew Point.....	45'9	48'6						
Mean elastic force of Vapour .....	3'10 in	3'56 in						
Mean weight of Vapour in a cubic foot of air .....	3'5 gr	3'9 gr						
Mean additional weight required for saturation.....	1'1 gr	0'9 gr						
Mean degree of Humidity (saturation 1'00) .....	0'76	0'79						
Mean weight of a cubic foot of air .....	533'7 gr	542'7 gr						
Fall of Rain .....	2'467 in	3'649 in						
Number of days on which Rain fell.....	18	16'5						
Amount of Evaporation .....	2'245 in	3'403 in						
No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	11	0	2	1	12	3	1
Mean Velocity in miles per hour	0	7'9	0	5'8	12'2	9'8	13'5	7'0
Total No. of Miles for each Direction	0	2075	0	277	292	2821	973	193
The total number of miles registered during the month was 6631.								
The max. Velocity of the wind was 32 miles per hour, direction S.S.E. on the 12th, at 11 a.m.								

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	7'2
In the month of June, the highest reading of the Barometer during 41 years, was on the 15th, in 1874, and was .....	30'219
The lowest                    ,,                    ,,                    12th, 1862.....	28'632
The highest Temperature                    ,,                    27th, 1878.....	87'2
The lowest                    ,,                    ,,                    30th, 1856.....	34'2
The highest adopted mean temperature of the month, 1858.....	59'0
The lowest                    ,,                    ,,                    1856 and 1860...	52'2

Both the readings and the range of the Barometer were very close to the mean. The Temperature was low, and the range great. The Rainfall was small, but the number of rainy days was in excess of the mean. Prevailing wind S.W.

## July, 1888.

Results of Observations taken during the Month.		Mean for the last 41 years.
Mean Reading of the Barometer .....	29.333	29.504
Highest            ,,            on the 13th.....	29.706	29.874
Lowest            ,,            on the 3rd .....	28.831	28.999
Range of Barometer Readings .....	0.875	0.875
Highest Reading of a Max. Therm. on the 19th ...	74.2	79.0
Lowest Reading of a Min. Therm. on the 10th .....	38.9	42.0
Range of Thermometer Readings .....	35.3	37.0
Mean of all the Highest Readings.....	64.2	67.9
Mean of all the Lowest Readings.....	48.5	50.8
Mean Daily Range .....	15.7	17.1
Deduced Monthly Mean (from Mean of Max. and Min.)	54.5	57.8
Mean Temperature from dry bulb.....	54.4	57.9
Adopted Mean Temperature .....	54.5	57.9
Mean Temperature of Evaporation .....	51.8	54.9
Mean Temperature of Dew Point .....	49.1	52.3
Mean elastic force of Vapour .....	0.350 in	0.302 in
Mean weight of Vapour in a cubic foot of air .....	3.9gr	4.5 gr
Mean additional weight required for saturation .....	0.9gr	1.0 gr
Mean degree of Humidity (saturation 1.00).....	0.82	0.82
Mean weight of a cubic foot of air.....	528.2 in	527.3 in
Fall of Rain .....	8.602 in	4.315 in
Number of days on which Rain fell .....	22	18.1
Amount of Evaporation .....	2.552	3.909

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	11	0	2	1	13	3	1

Mean Velocity in miles per hour	0	6.8	0	11.5	12.7	8.5	12.8	12.0
Total No. of miles for each Direction	0	1799	0	553	305	2666	919	288

The total number of miles registered during the month was 6530.  
The max. Velocity of the wind was 33 miles per hour; direction W.N.W., on the 3rd, at 3 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	8·6
In the month of July, the highest reading of the Barometer	
during 41 years, was on the 24th, in 1868, and was .....	30·112
The lowest        "        "        "        15th, 1877 .....	28·564
The highest Temperature        "        "        22nd, 1873 .....	88·2
The lowest        "        "        "        1st, 1857 .....	36·0
The highest adopted mean temperature of the month, 1852 .....	63·0
The lowest        "        "        "        1888 .....	54·5

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The mean Barometer was low, and the mean Temperature the lowest on record for July. Rainfall was very heavy, being very nearly double the usual fall. Prevailing wind S.W.

## August, 1888.

Results of Observations taken during the Month.	Mean for the last 41 years	
Mean Reading of the Barometer .....	29'548	29'404
Highest ,, on the 31st .....	29'918	29'892
Lowest ,, on the 28th.....	29'081	28'960
Range of Barometer Readings .....	0 837	0'932
Highest Reading of a Max. Therm. on the 9th .....	79'0	77'4
Lowest Reading of a Min. Therm. on the 15th .....	40'2	41'5
Range of Thermometer Readings .....	38'8	35'9
Mean of all the Highest Readings .....	64 5	67'3
Mean of all the Lowest Readings .....	48 5	50'4
Mean Daily Range .....	16'0	16'9
Deduced Monthly Mean (from Mean of Max. and Min.)	54'8	57'2
Mean Temperature from dry bulb .....	55'8	57'5
Adopted Mean Temperature .....	55'3	57'4
Mean Temperature of Evaporation.....	51'8	54'6
Mean Temperature of Dew Point .....	48'4	51'9
Mean elastic force of Vapour .....	0'342 in	0'389 in
Mean weight of Vapour in a cubic foot of air .....	3 8gr	4'3gr
Mean additional weight required for saturation .....	1'1gr	0'9gr
Mean degree of Humidity (saturation 1'00) .....	0'78	0'82
Mean weight of a cubic foot of air .....	531'2gr	525'0gr
Fall of Rain .....	6'112 in	4'704 in
Number of days on which Rain fell .....	20	18'6
Amount of Evaporation.....	3'079 in	3'026 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	6	0	1	5	15	4	0
Mean Velocity in miles per hour	0	3'8	0	5'0	8'2	9'7	3'6	
Total No. of miles for each Direction	0	551	0	121	989	3482	839	0

The total number of miles registered during the month was 5143.  
 The max. Velocity of the wind was 30 miles per hour; direction W. by S. on the 13th, at 11 a.m.



Mean amount of Cloud (an overcast sky being indicated by 10·0)...	7·6
In the month of August, the highest reading of the Barometer during 41 years, was on the 21st, in 1874, and was .....	30·114
The lowest            ,,            ,,            31st, 1876.....	28·555
The highest Temperature            ,,            2nd, 1868.....	88·0
The lowest            ,,            ,,            13th, 1887.....	33·4
The highest adopted mean temperature of the month, 1857 & 1884	61·0
The lowest            ,,            ,,            1848.....	52·5

Barometer readings differed little from the mean for 41 years. The Temperature was low, with large range. The Rainfall was very heavy. Prevailing wind S.W.

## September, 1888.

Results of Observations taken during the Month.		Mean for the last 41 years.
Mean Reading of the Barometer .....	29·749	29·509
Highest ,, on the 12th .....	30·105	30·031
Lowest ,, on the 29th .....	29·198	28·840
Range of Barometer Readings .....	0·907	1·191
Highest Reading of a Max. Therm. on the 13th.....	67·8	72·1
Lowest Reading of a Min. Therm. on the 30th .....	29·8	36·4
Range of Thermometer Readings .....	38·0	35·7
Mean of all the Highest Readings .....	61·2	62·2
Mean of all the Lowest Readings .....	44·7	46·9
Mean Daily Range .....	16·5	15·3
Deduced Monthly Mean (from Mean of Max. and Min.)	51·7	53·3
Mean Temperature from dry bulb .....	52·3	53·9
Adopted Mean Temperature .....	52·0	53·6
Mean Temperature of Evaporation .....	49·2	51·0
Mean Temperature of Dew Point .....	46·3	48·3
Mean elastic force of Vapour .....	0·315 in	0·339 in
Mean weight of Vapour in a cubic foot of air .....	3·6 gr	4·0 gr
Mean additional weight required for saturation .....	0·8 gr	0·8 gr
Mean degree of Humidity (saturation 1·00) .....	0·81	0·82
Mean weight of a cubic foot of air.....	538·5 gr	532·4 gr
Fall of Rain .....	2·659 in	4·566 in
Number of days on which Rain fell .....	15	18·1
Amount of Evaporation .....	2·137 in	2·308 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		1	13	0	0	0	12	2
Mean Velocity in miles per hour	4·7	6·1	0	0	0	7·7	7·9	7·4
Total No. of miles for each Direction	112	190	0	0	0	2223	380	356

The total number of miles registered during the month was 3261.

The max. Velocity of the wind was 29 miles per hour; direction W.S.W., on the 6th at 11 a.m.



## October, 1888.

Results of Observations taken during the Month.		Mean for the last 41 years.
Mean Reading of the Barometer .....	29·602	29·428
Highest ,, on the 21st .....	30·079	30·007
Lowest ,, on the 2nd .....	28·823	28·658
Range of Barometer Readings .....	1·256	1·349
Highest Reading of a Max. Therm. on the 27th .....	64·9	64·2
Lowest Reading of a Min. Therm. on the 1st .....	23·1	29·4
Range of Thermometer Readings .....	41·8	34·8
Mean of all the Highest Readings.....	53·2	54·5
Mean of all the Lowest Readings.....	38·8	41·8
Mean Daily Range .. .....	14·4	12·7
Deduced Monthly Mean (from Mean of Max. and Min.)	45·0	47·2
Mean Temperature from dry bulb.....	45·6	47·8
Adopted Mean Temperature .....	45·3	47·6
Mean Temperature of Evaporation .....	42·9	45·3
Mean Temperature of Dew Point .....	40·2	42·9
Mean elastic force of Vapour.....	0·219 in	0·276 in
Mean weight of Vapour in a cubic foot of air .....	2·9 gr	2·9 gr
Mean additional weight required for saturation .....	0·6 gr	0·6 gr
Mean degree of Humidity (saturation 1·00).....	0·82	0·84
Mean weight of a cubic foot of air .....	542·7 gr	540·6 gr
Fall of Rain .....	2·487 in	5·076 in
Number of days on which Rain fell .....	15	22·0
Amount of Evaporation .....	0·011 in	1·722 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		1	8	0	1	0	9	6

Mean Velocity in miles per hour	4·4	5·2	0	5·0	0	13·6	10·7	4·6
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Total No. of miles for each Direction	105	989	0	119	0	2929	1558	666
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The total number of miles registered during the month was 6362.  
The max. Velocity of the wind was 32 miles per hour; direction S.S.W., on the 28th, at 4 p.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)	7·2
In the month of October, the highest Reading of the Barometer during 41 years, was on the 5th, in 1884, and was .....	30·306
The lowest ,, ,, 19th, 1862.....	28·139
The highest Temperature ,, 9th, 1869 .....	72·8
The lowest ,, ,, 21st, 1880 and 1st 1888.....	23·1
The highest adopted mean temperature of the month, 1861 and 1876	51·6
The lowest ,, ,, 1880.....	43·1

The Barometer readings were rather high and the Temperature below the mean for October. The Rainfall was very small. The number of wet days was considerably below the usual average for the Month. The prevailing winds were S.W., and N.E., and the strongest from S.W.

## November, 1888.

Results of Observations taken during the Month.	Mean for the last 41 years.	
Mean Reading of the Barometer .....	29·317	29·292
Highest ,, on the 21st .....	29·676	30·042
Lowest ,, on the 27th .....	28·444	28·572
Range of Barometer Readings .....	1·232	1·470
Highest Reading of a Max. Therm. on the 15th ...	58·1	55·6
Lowest Reading of a Min. Therm. on the 30th .....	29·8	25·6
Range of Thermometer Readings .....	28·3	30·0
Mean of all the Highest Readings.....	49·4	46·9
Mean of all the Lowest Readings .....	39·2	36·1
Mean Daily Range .....	10·2	10·8
Deduced Monthly Mean (from Mean of Max. and Min.)	43·9	41·1
Mean Temperature from dry bulb .....	45·0	41·4
Adopted Mean Temperature .....	44·5	41·3
Mean Temperature of Evaporation .....	42·5	38·8
Mean Temperature of Dew Point .....	40·1	37·6
Mean elastic force of Vapour .....	0·249in	0·225in
Mean weight of Vapour in a cubic foot of air .....	2·8gr	2·6gr
Mean additional weight required for saturation .....	0·5gr	0·4gr
Mean degree of Humidity (saturation 1·00).....	0·85	0·87
Mean weight of a cubic foot of air.....	539·0gr	544·8gr
Fall of Rain .....	5·786in	4·149in
Number of days on which Rain fell .....	24	19·6
Amount of Evaporation .....	1·416in	1·451in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		0	13	2	0	0	12	3
Mean Velocity in miles per hour	0	14·4	16·0	0	0	20·9	21·2	0
Total No. of miles for each Direction	0	4503	769	0	0	6014	1527	0

The total number of miles registered during the month was 12813  
The Max. Velocity of the wind was 43 miles per hour; direction W.  
by S., on the 20th, at 11 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)			
In the month of November, the highest reading of the Barometer			
	during 41 years, was on the 12th, in 1857, and was .....		30·350
The lowest	„	„ 1st, 1859.....	28·007
The highest Temperature	„	„ 6th, 1872.....	61·9
The lowest	„	„ 17th, 1861.....	19·1
The highest adopted mean temperature of the month, 1881 .....			47·0
The lowest	„	„ 1851 .....	36·7

The mean reading of the Barometer was slightly above the average. The Temperature was high. The Rainfall was also high. Prevailing wind N.E.

## December, 1888.

Results of Observations taken during the month.	Mean for the last 41 years.
Mean Reading of the Barometer.....	29'488
Highest ,, on the 2nd.....	30'072
Lowest ,, on the 8th.....	28'489
Range of Barometer Readings.....	1'583
Highest Reading of a Max. Therm. on the 15th.....	57'0
Lowest Reading of a Min. Therm. on the 28th .....	22'2
Range of Thermometer Readings .....	34'8
Mean of all the Highest Readings .....	55'8
Mean of all the Lowest Readings .....	34'1
Mean Daily Range .....	11'7
Deduced Monthly Mean (from Mean of Max. and Min.)	40'0
Mean Temperature from dry bulb.....	40'7
Adopted Mean Temperature .....	40'4
Mean Temperature of Evaporation .....	38'8
Mean Temperature of Dew Point .....	36'7
Mean elastic force of Vapour .....	0'218 in
Mean weight of Vapour in a cubic foot of air .....	2'6gr
Mean additional weight required for saturation .....	0'4gr
Mean degree of Humidity (saturation 1'00) .....	0'87
Mean weight of a cubic foot of air.....	546'9gr
Fall of Rain .....	2'935 in
Number of days on which Rain fell .....	18
Amount of Evaporation .....	1'006 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		0	3	2	6	2	13	0
Mean Velocity in miles per hour	0	3'1	10'7	12'5	22'2	8'9	0	4'4
Total No. of miles for each Direction	0	222	515	1793	1067	2783	0	523

The total number of miles registered during the month was 6903.  
 The max. Velocity of the wind was 36 miles per hour; direction S. by E.  
 at 4 p.m., on the 25th.



Mean amount of Cloud (an overcast sky being indicated by 10'0)...	8'2
In the Month of December, the highest reading of the Barometer during 41 years, was on the 22nd in 1849, and was .....	30'378
The lowest            ,,            ,,            8th, 1886.....	27'350
The highest Temperature            ,,            9th, 1876.....	58'1
The lowest            ,,            ,,            24th, 1860.....	6'7
The highest adopted mean temperature of the month, 1857.....	44'6
The lowest            ,,            ,,            1878.....	30'3

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The Barometer readings were close to the average, but the Temperature was slightly in excess. The Rainfall was more than two inches below the mean for the month. The prevailing wind was S.W. but the strongest winds were from the South.

## Summary of Observations FOR 1888.

	Mean for the last 41 years.
Mean Reading of the Barometer .....	29°520
Highest            ,,            on January 9th.....	30°285
Lowest            ,,            on March 28th.....	28°309
Range of Barometer Readings .....	1°976
Highest Reading of a Max. Therm. on June 26th.....	84°0
Lowest Reading of a Min. Therm. on Feb. 13th.....	14°4
Range of Thermometer Readings .....	69°6
Mean of all the Highest Readings.....	53°3
Mean of all the Lowest Readings.....	39°0
Mean Daily Range .....	14°3
Deduced Yearly Mean (from Mean of Max. and Min.)	45°2
Mean Temperature of dry bulb .....	45°7
Adopted Mean Temperature .....	45°4
Mean Temperature of Evaporation .....	42°9
Mean Temperature of Dew Point .....	39°9
Mean elastic force of Vapour.....	0°254 in
Mean weight of Vapour in a cubic foot of air .....	2°7 gr
Mean additional weight required for saturation .....	0°7 gr
Mean degree of Humidity (saturation 1°00) .....	0°81
Mean weight of a cubic foot of air.....	541°6 gr
Total Fall of Rain in the Year .....	42°039 in
Number of days per Month on which Rain fell .....	17°8
Amount of Evaporation .....	22°242 in

The Maximum monthly mean height of the Barometer was in  
January, 1880, and was..... 29°928

The Minimum    ,,    ,,    in December, 1868, and was ..... 28°984

The Maximum yearly mean height of the Barometer was in 1887,  
and was..... 29°582

The Minimum    ,,    ,,    ,,    in 1866, and was ..... 29°389

The greatest monthly range of the Barometer was in January, 1884, and was .....	2'409
The least ,, ,, in July, 1852, and was .....	0'505
The highest reading of the Barometer, during 41 years, was on January 18th, 1882, and was .....	30'480
The lowest ,, ,, on December 8th, 1886, and was .....	27'350
Extreme range .....	3'130
The highest temperature was on July 15th, 1868, and was.....	88'2
The lowest ,, ,, January 15th, 1881.....	4'6
The highest adopted mean temperature of a month, July 1868.....	62'4
The lowest ,, ,, February, 1855.....	28'6
The highest adopted mean temperature of a year, 1868.....	49'1
The lowest ,, ,, ,, ,, 1879.....	44'1
The greatest monthly mean weight of vapour, } in a cubic foot of air .....	July, 1852..... 5'1
The least ,, ,, ,, February, 1855.....	1'4
The greatest fall of rain in a month, was in October, 1870, and was 13'437in	
The least ,, ,, ,, March, 1852.....	0'047
The greatest number of days on } which rain fell in one month ) July, 1861, December, 1868	31
The least ,, ,, March, 1852 .....	3

# DATES OF OCCASIONAL PHENOMENA.

1888.	Frost.	Hoar Frost only.	Snow.	Hail.
January	1-3, 5, 6, 11-13, 16-20, 24, 26-31	3, 12, 18, 19, 20, 27, 30	1, 30, 31	26, 27, 29
February	1-3, 10-20	1, 12, 13, 28	11, 12, 13, 14, 17, 19, 20, 21, 24, 25, 29	10, 11, 13
March	1-6, 11-31	1, 2, 5, 21, 24, 27, 28	11, 12, 13, 14, 15, 16, 25, 27, 28	4
April	1-9, 23, 25, 26	1, 3, 4, 5, 6, 7, 8, 9		17, 18
May	2-9, 11, 14, 15, 25			2, 3
June				
July	11			23, 24
August				1
September	30			
October	1-7, 10, 13, 20, 22, 23	1, 2, 3, 4, 6, 7, 14, 21, 23	1	2, 5
November	7, 27, 28, 30	28	3	17, 20, 21
December	1, 8-19, 24, 31	9, 10, 11, 14, 16, 17, 18, 29, 30, 31		26

## DATES OF OCCASIONAL PHENOMENA.

(Continued.)

1888.	Heavy Rain.	Fog.	Thunder.	Lightning.	Lunar Halo.	Solar Halo.
January	21	{ 2, 3, 9, 10, 11, } { 12, 13, 30 }				
February						
March					25	
April			17			
May	2		16, 19			
June	2, 6, 7, 13, 24	26	13	19		
July			5, 23	23		
August	1, 6		27, 28	27		
September	1	{ 3, 18, 22, 23, } { 24, 28 }	7			3
October	30	11, 23				
November	17					
December		1, 10, 15				

## OBSERVATIONS OF UPPER CLOUDS (CIRRUS).

Date.	G. M. T.	Cloud Direction.	Velocity. (0-6).	Wind.		Direction of lower Clouds.	
				Direction.	Force. (0-12).		
January	3	9 a.m.	S. by E.	1	W. by S.	0	S. W.
"	3	2 p.m.	W.	1	S. W. by S.	1	W. N. W.
"	10	9 a.m.	N. W.	2	N. N. E.	1	W.
"	20	9 a.m.	S. S. W.	2	N. E.	1	S. S. W.
"	26	Noon.	W.	3	N. E.	5	W. N. W.
"	28	10 a.m.	N.	1	N. W.	0	W. by N.
"	28	Noon.	W.	2	W.	1	
"	29	10 a.m.	N.	1	N.	1	N. N. E.
"	29	4 p.m.	S. S. E.	1	N. by W.	0	S. S. E.
February	3	Noon.	W. by S.	1	W. N. W.	2	W. S. W.
"	7	Noon.	N.	2	N. N. E.	5	W. S. W.
"	9	9 a.m.	W.	1	W. N. W.	1	W. by N.
"	9	Noon.	N. W.	1	W. by N.	1	W.
"	9	2 p.m.	N.	2	W.	3	W. N. W.
"	10	9 a.m.	W.	3	W.	3	W. by N.
"	10	10 a.m.	W.	3	W. by S.	4	W. N. W.
"	11	10 a.m.	W.	2	W. S. W.	3	W. N. W.
"	11	4 p.m.	N. W.	1	N. W. by W.	2	W. N. W.
"	12	Noon.	N. W.	3	S. W. by W.	1	W.
"	12	2 p.m.	W.	2	W. by N.	1	N. W.
"	12	4 p.m.	W.	1	W.	1	W.
"	13	9 a.m.	N. W.	3	W. by S.	1	W.
"	23	10 a.m.	E.	1	E. N. E.	3	N. E.
"	23	Noon.	N. E.	2	E. N. E.	4	N. E.
"	28	9 a.m.	E.	1	N. E. by N.	1	N. E.
"	28	10 a.m.	E.	1	N. E.	2	N. E.
"	28	Noon.	E.	1	N. E. by E.	2	E.
"	28	2 p.m.	E. N. E.	1	N.	2	N. E.
"	28	4 p.m.	E. N. E.	1	N. E. by N.	1	N. E.
March	1	Noon.	N. E.	2	E. N. E.	2	N. E.
"	1	2 p.m.	E.	1	E. N. E.	3	E.
"	1	4 p.m.	E.	2	N. E. by N.	1	E.
"	2	Noon.	W.	3	W. by N.	3	W.
"	3	9 a.m.	N. E.	1	N. by W.	3	N. N. E.
"	3	10 a.m.	N. E.	1	N. N. W.	2	N. N. E.
"	3	Noon.	W.	2	N. N. W.	2	W.
"	4	9 a.m.	N. W.	2	W. N. W.	5	W. N. W.
"	6	4 p.m.	W.	2	W. by S.	3	W.
"	7	9 a.m.	S. W.	1	S. W.	5	W. S. W.
"	13	4 p.m.	N. E.	2	E. N. E.	3	E.
"	16	10 a.m.	N. E.	1	N. E. by E.	2	N. E.
"	20	9 a.m.	N.	1	N. E. by N.	3	N. E.
"	20	10 a.m.	N.	1	N. E. by N.	3	N. E.
"	20	2 p.m.	N. N. E.	1	N. E.	2	N. E.
"	20	4 p.m.	N. E.	1	N. E. by N.	4	N. E.

OBSERVATIONS OF UPPER CLOUDS (*Continued*).

Date.	G. M. T.	Cloud Direction.	Velocity (0-6).	Wind.		Direction of Lower Clouds.
				Direction.	Force (0-12).	
March 27	2 p.m.	N.W.	2	W. by S.	3	W.
April 1	10 a.m.	N.E.	2	N.E.	0	N.E.
" 3	9 a.m.	N.W.	1	N.N.W.	2	N.N.W.
" 3	10 a.m.	N.W.	1	N.	3	N.N.W.
" 11	4 p.m.	W.	2	W. by N.	5	W.
" 14	2 p.m.	W.S.W.	1	W.S.W.	2	W. by S.
" 14	4 p.m.	N.W.	1	W.S.W.	1	W.S.W.
" 16	2 p.m.	N.W.	1	S.W. by W.	2	W.S.W.
" 20	Noon.	N.E.	1	N.E. by N.	2	N.E.
" 24	Noon.	S. by W.	2	N.E. by E.	5	N.E.
" 24	4 p.m.	W.S.W.	3	N.E. by E.	3	N.E.
" 26	4 p.m.	N.E.	1	S.W. by W.	1	N.W.
" 27	9 p.m.	N.W.	1	W.	1	N.N.W.
May 1	9 p.m.	N.	2	W.S.W.	5	S.W.
" 3	Noon.	N.E.	1	W. by S.	7	W.
" 3	2 p.m.	N.N.E.	1	W.	7	W.
" 5	4 p.m.	S.W.	2	W.S.W.	4	W.
" 7	Noon.	S.S.W.	1	W.S.W.	3	S.W.
" 9	9 a.m.	N.W.	1	W.N.W.	2	W. by N.
" 9	10 a.m.	N.W.	1	W.N.W.	1	W. by N.
" 9	Noon.	N.W.	2	W.	3	W. by N.
" 9	4 p.m.	N.W.	1	W.	2	W. by N.
" 13	9 a.m.	W.N.W.	2	S.W.	4	N.N.W.
" 13	Noon.	W.N.W.	1	W.S.W.	5	N.N.W.
" 18	9 p.m.	S.S.E.	1	E. by S.	2	S.E.
" 24	9 a.m.	N.E.	1	N.E. by N.	1	
" 24	Noon.	N.E.	1	N.E.	1	
" 24	4 p.m.	N.E.	1	N.E.	1	
June 1	10 a.m.	S.W.	2	W.	3	W.
" 5	9 a.m.	N.N.E.	2	N.E. by E.	2	N.E.
" 5	10 a.m.	N.E.	1	N.E. by E.	2	E.N.E.
" 5	Noon.	N.E.	1	E. by N.	3	E.N.E.
" 5	2 p.m.	E.N.E.	2	E.N.E.	3	N.E.
" 5	4 p.m.	E.N.E.	3	E.N.E.	3	N.E.
" 10	Noon.	W.N.W.	1	W.	4	W.
" 10	2 p.m.	W.N.W.	1	W.	4	W.
" 10	4 p.m.	N.W.	2	W.	3	W.
" 14	9 a.m.	S.E.	1	W. by S.	1	N.W.
" 14	Noon.	S.E.	2	W.	2	W.
" 14	4 p.m.	N.	3	W.N.W.	2	W.
" 18	10 a.m.	S.E.	2	N.E. by E.	2	N.E.
" 19	2 p.m.	N.N.E.	1	N.E. by E.	1	N.E.
" 19	4 p.m.	N.N.E.	2	N.E.	1	
" 20	9 a.m.	N.W.	2	N.E.	1	N.E.
" 21	Noon.	W. by S.	1	N.E. by E.	2	E.N.E.

## OBSERVATIONS OF UPPER CLOUDS (Continued).

Date.	G. M. T.	Cloud Direction.	Velocity (0-6).	Wind.		Direction of Lower Clouds.	
				Direction.	Force (0-12).		
June	21	4 p.m.	W. by S.	3	N. E.	2	N. E.
"	25	9 a.m.	N. E.	2	N. N. E.	10	E. N. E.
"	25	4 p.m.	S. E.	1	E. N. E.	2	E.
July	1	4 p.m.	S. S. W.	2	S. W. by W.	1	N. N. W.
"	1	9 p.m.	S. W.	1	W. S. W.	0	
"	3	9 p.m.	S. W.	1	W. S. W.	1	S. W.
"	8	2 p.m.	W.	2	W. S. W.	2	W.
"	8	4 p.m.	W.	1	W. S. W.	3	W.
"	8	9 p.m.	W.	1	W. S. W.	0	
"	10	9 a.m.	N. N. W.	2	W. by N.	2	N. W.
"	10	9 p.m.	N. N. W.	1	N. W. by W.	2	N. W.
"	12	4 p.m.	W.	1	W. by N.	4	
"	12	6 p.m.	W.	1	W. N. W.	3	
"	18	2 p.m.	N. E.	1	N. E. by N	2	N. N. E.
"	19	9 a.m.	W.	1	N. E. by N.	1	N. E.
"	21	9 a.m.	W. by S.	1	W. S. W.	2	W.
"	21	10 a.m.	W. by S.	1	W. by S.	2	W.
August	7	2 p.m.	N. E.	1	W. S. W.	3	S. W.
"	8	Noon.	N. N. W.	2	W. S. W.	3	W.
"	8	3 p.m.	W.	1	W. S. W.	3	W.
"	9	9 a.m.	N. N. E.	2	E. S. E.	0	W.
"	9	10 a.m.	N. N. W.	2	N. E.	0	W.
"	9	Noon.	N. N. W.	1	E. S. E.	1	W.
"	9	4 p.m.	N. W.	2	W.	1	W.
"	15	9 a.m.	N. W.	2	N.	0	
"	29	2 p.m.	W.	1	W. S. W.	3	W.
"	30	9 a.m.	S.	2	S. W.	1	S. W.
Sept.	2	Noon.	S. W.	1	W.	2	W.
"	2	2 p.m.	S. S. W.	1	W. by N.	1	W.
"	10	9 a.m.	N. W.	1	N. by W.	2	N. N. W.
"	16	9 a.m.	S. S. E.	1	W. N. W.	1	E.
Oct.	25	8 a.m.	S.	1	S. W. by S.	1	S.
"	29	4.20 p.m.	S. W.	2	S. W.	8	S. W.
"	31	4 p.m.	S. W.	1	W. S. W.	5	S. W.
Nov.	8	8 a.m.	W.	1	E. by N.	3	E.
"	15	4 p.m.	W.	1	W.	2	W.
"	21	12.30 p.m.	N.	1	W.	5	N. W.
"	26	8.30 a.m.	S. S. W.	1	W. S. W.	2	W.
"	26	2 p.m.	W.	2	W. S. W.	3	W.
"	28	10 a.m.	W.	1	S.	1	
Dec.	9	3 p.m.	N. W.	1	N. W. by W.	1	N. W.
"	11	8.30 a.m.	N. W.	1	E. S. E.	1	S. S. E.
"	11	10 a.m.	N. W.	1	S. S. E.	1	
"	26	10 a.m.	S. W.	1	W. by S.	1	S. W.
"	26	2 p.m.	W.	1	W. by S.	1	W.



## THE UPPER GLOWS IN 1888.

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THE peculiar glow encircling the sun, the intensity of which has been on the decrease ever since its first appearance in 1883, may now be said to have practically disappeared. A practised eye could detect some trace of the glow during the months of January, April, and November, but not without extreme difficulty at any other period of the year.

The intermittent pink "fore" and "after glows," however, were almost as frequent in 1888 as in 1887, but there was a marked diminution in their intensity. In some cases it was difficult to distinguish the glow from an ordinary red sunrise or sunset. The dates on which they were observed are as follows:—

January 8, 29.

February 1, 9, 11, 27.

April 8, 10.

May 17, 20.

June 21, 24, 25, 30.

July 7, 23.

August 1, 25.

September 16, 19, 20.

October 13, 14, 21, 30.

November 6, 16.

December 9.

# SUMMARY OF SOLAR OBSERVATIONS.

	Number of days on which Sunshine was recorded.	Amount of Sunshine expressed in hours.	Number of Sun Drawings, 10½ inches to diameter.	Other Drawings of Sun and Solar notes.	Number of days on which the Entire Chromosphere was measured.	Chromosphere partially measured.
January.....	11	19'6	9	3	3	
February .....	21	82'8	17	1	9	1
March .....	24	93'0	20	1	4	
April.....	23	103'5	18	2	4	
May .....	30	180'1	24	2	13	
June .....	24	169'5	21	2	10	1
July .....	25	98'0	20	2	3	1
August .....	24	132'0	21	1	7	
September .....	26	131'6	23	0	14	
October.....	24	74'7	23	2	8	
November.....	12	20'3	10	1	3	
December.....	13	27'0	17	2	5	1
Totals .....	257	1132'1	223	19	83	4

# TOTAL AMOUNT OF SUNSHINE RECORDED ON EACH DAY.

MONTH.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
January .....	0'1	0	0	0	0	0	0'1	0	0'1	1'8	0	0	0	0	0	0	0
February .....	4'8	0	0	0	0	0'2	4'0	0	5'4	4'2	4'5	3'1	5'2	6'1	4'2	7'2	0
March .....	5'2	1'8	5'5	6'7	8'7	2'0	0'5	0'6	0'6	0	0	0'3	0'1	0	0	6'9	1'5
April .....	11'1	5'6	4'6	1'2	7'7	1'7	4'4	8'3	3'9	0	4'7	0	0'8	7'3	0	6'9	3'7
May .....	1'0	2'8	3'8	12'2	3'2	0'2	0'5	8'5	10'1	4'8	9'9	10'8	2'3	5'7	3'1	0	0'4
June .....	1'7	0	4'6	5'0	5'6	0	1'7	0	3'6	13'1	5'8	0	5'3	13'6	1'0	1'5	13'3
July .....	10'1	0	0'3	2'7	1'7	0	4'0	9'6	2'8	6'0	2'7	5'5	1'1	0	0	0	0'1
August .....	6'8	12'0	3'1	0	5'5	0	5'0	8'9	6'9	1'0	0	1'5	5'0	11'4	1'8	2'5	4'2
September .....	0	4'4	0'8	0'1	0	6'6	6'5	10'1	1'7	4'1	1'6	3'4	8'4	9'2	0'1	2'7	8'8
October .....	0'7	3'0	6'1	1'0	5'3	3'0	6'3	0'2	0	0	1'8	0	7'5	9'2	2'3	0	0'3
November .....	0	0	0	0	0	6'0	2'5	1'1	0	0	0'1	0	0	0'8	0	2'8	0
December .....	0'2	0'5	0	0	0	1'5	0	0	5'5	4'5	0	0	0	0	0	0	0'1

# TOTAL AMOUNT OF SUNSHINE RECORDED ON EACH DAY.

(Continued.)

MONTH.	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly Total.	Approximate percentage each Month.
January .....	0	0	0	0	0	0.2	0	0.1	5.2	0.6	7.2	0	4.1	0.1	19.6	10.5
February .....	6.0	0.3	6.9	1.0	0.2	5.5	0	0	5.3	0.7	5.8	2.2	0	0	82.8	37.0
March.....	7.5	4.0	6.3	10.8	0	2.1	5.6	1.0	4.3	5.1	0	2.0	0	3.9	93.0	30.0
April .....	3.9	2.8	0.6	0.2	1.1	1.4	4.3	9.8	7.5	0	0	0	0	0	103.5	28.8
May .....	3.1	1.7	13.6	12.2	3.9	11.7	14.0	13.2	10.4	6.9	0.5	0.3	1.7	7.6	180.1	41.5
June .....	15.3	11.8	2.0	5.7	0.3	15.4	9.2	12.5	14.1	0.3	0	0	7.1	0	169.5	37.7
July.....	3.9	10.8	0.5	6.3	1.1	3.3	5.5	0.5	6.3	5.0	0	0.1	0.2	7.9	98.0	21.8
August .....	6.2	6.7	0	3.1	5.7	0	0	6.6	5.7	3.1	0	4.4	5.0	9.9	132.0	32.8
September .....	6.4	3.3	7.1	6.0	6.0	4.8	2.1	6.8	6.3	6.8	0	0	7.5	0	131.6	41.8
October .....	1.4	4.7	4.0	8.0	1.4	1.7	0	1.1	0.7	0.1	0	0	0.1	4.8	74.7	26.8
November .....	0	0	0.9	0	0	0	0	0.4	3.2	1.0	0.4	0	1.1	0	20.3	9.4
December .....	1.9	1.1	0	0	0	0	0.1	0.6	0.8	0	0	4.7	5.5	0	27.0	14.5

# MONTHLY TABLES FOR EACH HOUR OF RECORDED SUNSHINE.

Local apparent time.	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9
January .....	0	0	0	0	0'3	2'1	3'8	3'7	2'3	2'3	3'1	1'9	0'1	0	0	0	0
February.....	0	0	0	0'8	5'5	11'5	13'2	13'0	10'0	11'2	9'6	6'4	1'6	0	0	0	0
March .....	0	0	0.6	3'4	7'9	10'3	10'2	13'7	9'6	9'4	10'3	9'4	6'9	1'3	0	0	0
April .....	0	0'2	3'5	7'3	7'0	8'3	10'7	11'6	10'8	9'4	8'0	10'1	8'8	6'9	0'9	0	0
May.....	1'5	5'4	8'2	12'0	13'5	13'4	14'1	15'0	15'1	15'2	14'0	13'6	13'3	14'8	9'4	1'6	0
June.....	3'9	10'3	9'8	11'3	13'6	13'8	12'9	12'8	12'9	11'6	10'8	10'9	9'9	10'5	10'6	3'9	0
July .....	0'7	3'7	4'3	6'1	8'0	8'1	6'5	6'4	6'1	7'5	8'4	8'7	9'9	8'5	3'4	1'7	0
August .....	0	1'1	4'7	7'2	8'7	10'0	11'8	13'8	13'7	15'5	13'4	10'4	9'0	8'1	4'5	0'1	0
September .....	0	0	0'8	6'2	10'2	10'6	14'6	16'9	16'2	17'8	14'5	13'7	7'7	2'4	0	0	0
October .....	0	0	0	2'2	7'2	6'9	7'9	10'9	12'3	9'3	8'1	6'9	2'9	0'1	0	0	0
November .....	0	0	0	0	0	3'3	2'7	4'2	3'3	3'8	1'9	1'1	0	0	0	0	0
December .....	0	0	0	0	0	1'5	4'4	7'3	5'2	5'0	3'6	0	0	0	0	0	0

Total..... 6'1    20'7    31'9    56'5    81'9    99'8    112'8    129'3    117'5    118'0    105'7    93'1    70'1    52'6    28'8    7'3    0

DATES OF SOLAR DRAWINGS, OF NOTES, AND OF OBSERVATIONS OF CHROMOSPHERE

1888	January.	February.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	D c.
1	'47	'40,c	'48	'42,c	'40	'45	'43	'31,c		n	'52	'43
2				'49	'77			'53,c	'48	'53		'47
3	'42		'44,c	'45	'51	'80	'68	'42	'73	'36,c		
4			'45,c	'71,n	'38,c	'66	'68	n		'38		
5			'40,c	'38	'43	'39,c				'38		
6			'48	n					'38	'51	'47,c	'46
7		'40	'38	'47	'55	n	'38,c	'42,c	'40	'37,c	'51	
8				'36,c	'49,c		'45	'45	'37,c	'50	'40	
9	n	'48,c	'52		'70	'66	'67	'41,c		'53		'41,c
10	'41,c	'47	n		'37,c	'41	'44,c		'40			'45,c
11		'39		'53	'41,c	'39,c	'71		'44	'51	'43	'43
12		c,n			'41,c		'43		'68			
13		'45,c	'66	'45	'50	'39	'70	'51	'37,c	'37,c		
14		'44,c		'44	'66,c	'41,c		'45	'39,c	'46,c	'37	'46,c
15		'40,c			'52,c	'74		'37		'36		n
16		'40,c	'49	'41,c		'73		'34	'40	n	'38,c	
17			'50	'48	n	'44,c		'42	'39,c	'50		
18	n	'47,c	'49		'66	'41,c	'79	'39	'47,c	'54		'46,c
19	'61			'68	'53	'39,c	'37,c	'38,c	'67,c	'47,c		'42
20	n	'47,c	'38	'51	'41,c	'48	'73		'42,c	'50,c	n	
21		'41	'42,c		'35,c	'48,c	'40	'68	'46,c	'38,c		'48
22						n	'36	'40	'48,c	'46,c		
23		'45,c	'50		'37,c	'36,c	'35		'46,c	'49		
24			'38	'31	'50,c	'43,c	'44		'51,c			'41
25	'47		'45	'40	'36,c	'36,c		'41,c	'37	'45		'49
26	'44	'43	'53	'40,c	'35	'42,c	'78	'64	'38,c		'44,c	'49
27		'66	'60		'30,c		'41,c	'40	'37,c	'47		
28	'45,c	'40			n						'53	'48
29	'49,c	'43	'51				n	'48				'41,c
30				'76		'67	n	'43	'35,c	'52	'49	'44,c
31	'52		'47		'48		'48	'38,c	'45			'52,n

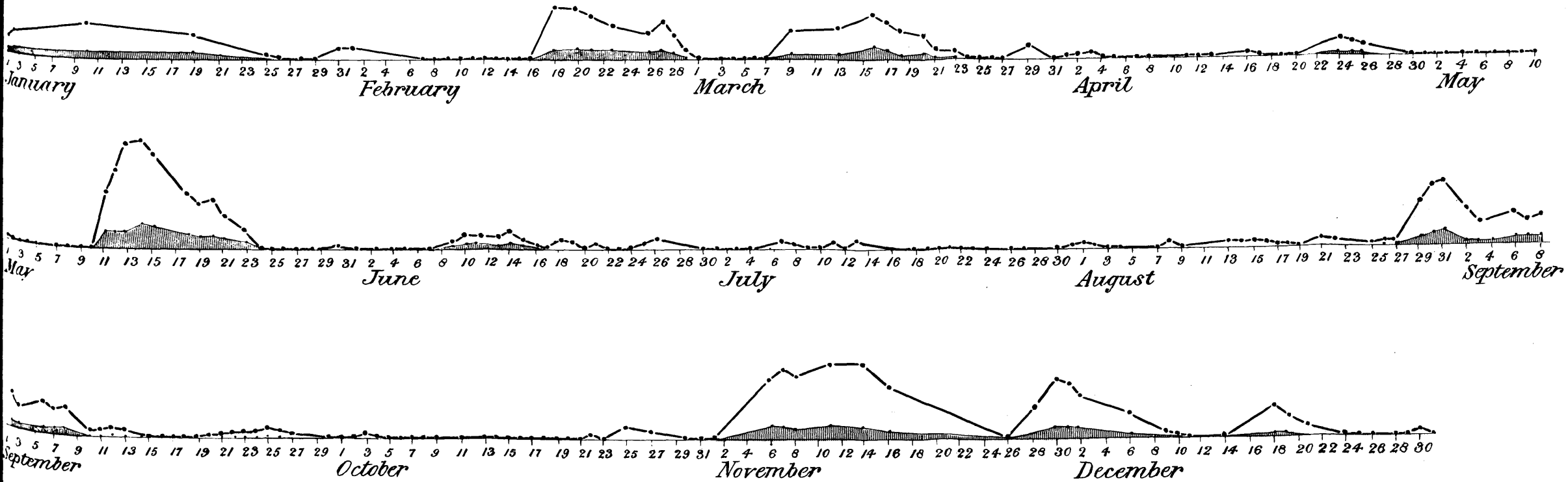
The figures give the Greenwich Civil time, expressed in hundredths of a day, at which the drawings were made; *n* are notes, *c* chromosphere.

**DAILY SUN-SPOT AREAS,  
EXPRESSED IN MILLIONTHS OF THE VISIBLE HEMISPHERE.**

1888	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
January.....	103		134							208						
February .....	54						4		0	0	0	0	0	0	0	0
March .....	14		0	0	0	0	0		170				185			264
April .....	11	11	34	12	7	0	0	0			0		0	0		16
May .....	2	0	0	0	0		0	0	0	0	342	493	647	674	586	
June .....	0		0	0	0		0		36	68	61		53	85	50	16
July .....	0		0	0			29	11	0	0	39	0	43			
August .....	18	2	0	0			0	43	23				30	27	25	27
September.....		215	125			192	155	179		35	33	60	40	36		0
October .....	0	0	19	8	0	0	0	0	0		0		0	0	0	0
November.....	0					373	436	386			472			468		324
December .....	337	274				153			20	6	0			0		

1888.

THE ORDINATE OF THE CURVE SHEWS THE DAILY AMOUNT OF SUN-SPOT AREA, THE SHADED PORTION BEING THE UMBRA.







**DAILY SUN-SPOT AREAS,  
EXPRESSED IN MILLIONTHS OF THE VISIBLE HEMISPHERE.**

1888	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
January.....			141						6	0	0	4	0	0	50
February.....		321		301	250		197			154	226	138	43		
March.....	222	172		150	58		29	12	0	0	0	5			3
April.....	12		2	0				06	89	60				0	
May.....			324	260	285	204	108	0	0	0	0	0	0	0	2
June.....	9	40	36	0	5	0	0	13	27	49				0	
July.....			0	0	0	0	0	0	0	0	0				5
August.....	4	7	0		51	34			10	24	25		260	382	399
September.....	7	0	0	0	20	32	40	40	57	30	23			0	
October.....	0	0	0	0	0	5	0	0	57		35			0	0
November.....									0			106		371	
December.....			185	125	48			0	0	0	0	0	0	0	12

## AGRICULTURAL NOTES.

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**JANUARY.**—During the greater part of the month the ground was too hard for working. A few early flowers were in blossom, in sheltered places, before the close of the second week.

**FEBRUARY** was cold and frosty. Vegetation appeared quite at a standstill. The few early flowers were nearly all killed by the cold, and no outdoor work was done.

**MARCH.**—This month was also cold with keen frosts. Ploughing, for oats, was began early in the month, and continued, with very little interruption, until its close. Very few flowers were in blossom. The lapwing was first heard on the 28th.

**APRIL.**—With the exception of the first week, which was frosty, April was dull and cloudy. Most of the ploughing was finished before the end of the first week. Oat-sowing began early in the month, and finished in most places before the end. A few potatoes were sown towards the close of the month. The house-martin arrived on the 29th, and the cuckoo on the 30th.

**MAY** was rather more promising; but a few frosty nights did some damage to the fruit trees, by nipping the buds and blossoms. Grass was promising well. All the green crops were in the ground by the 25th. Towards the close of the month a want of rain was felt. On the 5th the fieldfare was last seen, and the corncrake first heard. The swift, winchat, and sedge warbler were seen on the 10th, the wood wren was heard on the 15th, and the spotted flycatcher seen on the 22nd.

**JUNE.**—During the greater part of the month, which was rather colder than usual, more rain and sun were wanted. The fruit in many places

was falling off the trees before it was ripe from lack of moisture. Insects did a good deal of damage to the trees. Grass looked very poor, but corn good. There appeared to be a greater abundance of birds than usual; and some of the gardeners were complaining of the damage caused by the hawfinches. Thrushes, willow wrens and blackcaps seemed to be more numerous than usual.

**JULY.**—This was a most unfortunate month for the farmers—being dull, cold and wet. The rain, which was so much wanted at the end of June, came in torrents on the second day of July, and spoiled the fruit. After this the greater part of the month was very wet. The want of sun was much felt. Very little hay was got in. Strawberries were spoiled by the rain, and yielded a very poor crop. Stone fruit was almost entirely destroyed. Currants were fewer than usual.

**AUGUST** was also very wet. A considerable quantity of hay remained out even at the end of the month. A good deal of damage was done to the corn by the heavy rains. Both wheat and oats looked very poor, and in many places great quantities were beaten down. Pears, which were gathered late in the month, were very small and not up to average quantity. Gooseberries fewer than usual. Raspberries yielded a moderate crop.

**SEPTEMBER** was brighter. On the first day a heavy fall of rain beat down a great deal of the corn; but the remainder of the month was generally fine. The last of the hay was got in by the end of the second week. Oats were first cut about the 17th and wheat on the 21st. As so much of the wheat had been beaten down by the rain a good deal of it had to be cut by hand. Reaping was finished by the 27th, and a few oats were carted by the 30th. Green crops began to look more promising during the latter part of the month.

**OCTOBER** was also a good month for agricultural operations generally, although there was a severe frost on the first day, which destroyed nearly all the blossom on the flowers in the gardens, and attacked the tops of the potatoes severely. Corn and wheat were all housed by about the 13th. Ploughing, for wheat, was commenced on the 15th, and a fair quantity sown before the end of the month. There was very little disease among the potatoes. A few green crops were

got in. A house-martin's nest containing a brood of young ones was found as late as the 9th, and a small flock of the same birds was seen in the neighbourhood on the same day. The swallow departed on the 14th, and the redwing was first seen on the 17th, and the fieldfare on the 28th.

NOVEMBER was mild, wet, and cloudy. All green crops were housed during the month. They only yielded a small quantity, and were in most places not very good. Wheat was in the ground in nearly all the neighbourhood by the 25th. Owing to the mild weather a number of wild flowers were in blossom at the end of the month.

DECEMBER.—The work of the month was chiefly confined to tillage. A few flowers still remained in blossom during greater part of the month.

## OBSERVATIONS OF CROPS.

GRAIN, ETC.				GREEN CROPS.				
Name.	When Sown.	In Flower.	In Ear.	When Cut.	Name.	When Sown.	Above Ground.	Stored.
Wheat	Oct.—Nov.	June	July 10th	Sept.	Potatoes	April—May	May 15th	Oct.
Oats	Mar.—Apl.	June	July 12th	Sept.	Turnips	April—May	May 15th	Oct.
Beans	March	June		Sept.	Beet	April—May	May 17th	Oct.—Nov.
					Mangel	April—May	May 21st	Oct.—Nov.

# OBSERVATIONS OF TREES AND SHRUBS.

FOREST TREES, ETC.		FRUIT TREES, ETC.			SHRUBS.		
Name.	In Bud.	In Leaf.	Name.	In Blossom.	Ripe.	Name.	In Blossom.
Field Elm	May 11th	May 24th	Apple	May 19th	Aug. 29th	Lilac	May 25th
Oak	May 18th	May 29th	Pear	Ap. 10th	Aug. 25th	Laburnum	May 25th
Sycamore	Ap. 27th	May 25th	Red Currant	Ap. 22nd	July 25th	Red Flowering Currant	Ap. 17th
Lime	Ap. 27th	May 15th	Black Currant	Ap. 27th	July 29th	Dog-Rose	July 7th
Ash	May 21st	May 20th	Strawberry	May 19th	July 10th	Guelder-Rose	June 23rd
Beech	May 3rd	May 15th	Gooseberry	Ap. 12th	Aug. 20th	Woodbine	June 30th
Horse Chestnut	Ap. 21st	May 16th				Elder	June 11th
						Yellow Azalea	May 16th
						Blackthorn	May 10th
						Hawthorn	May 25th

DATES OF THE FLOWERING OF PLANTS AT STONYHURST  
IN 1888.

RANUNCULACEÆ.

Anemone nemorosa	Wood anemone	Mar. 30
Ranunculus Ficaria	Lesser celandine	Mar. 25
R. acris	Meadow crowfoot	May 10
R. repens	Creeping buttercup	May 25
R. bulbosus	Bulbous buttercup	May 22
R. auricomus	Wood crowfoot	May 19
R. lingua	Great spearwort	May 27
R. hederaceus	Ivy-leaved crowfoot	May 25
Caltha palustris	Marsh marigold	April 23
Trollius Europæus	Globe flower	May 28
Aquilegia vulgaris	Columbine	June 25

NYMPHÆACEÆ.

Nymphæa alba	White water lily	June 30
Nuphar lutea	Yellow water lily	June 27

PAPAVERACEÆ.

Chelidonium majus	Common celandine	June 11
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CRUCIFERÆ.

Nasturtium officinale	Common watercress	May 10
Arabis hirsuta	Hairy rock cress	April 24
Cardamine amara	Large bitter cress	May 11
C. pratensis	May flower	May 6
C. hirsuta	Hairy bitter cress	April 29
Sisymbrium officinale	Hedge mustard	May 7
Alliaria officinalis	Garlic mustard	May 10
Brassica campestris	Common wild navew	May 21
Cochlearia Armoracia	Horse radish	June 23
C. officinalis	Scurvy grass	May 6

RESEDACEÆ.

Reseda luteola	Dyer's rocket	June 22
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VIOLACEÆ.

Viola canina	Dog violet	April 15
V. odorata	Sweet violet	Mar. 9
V. palustris	Marsh violet	May 24
V. hirta	Hairy violet	May 29

POLYGALACEÆ.

Polygala vulgaris	Milkwort	May 22
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DATES OF THE FLOWERING OF PLANTS AT STONYHURST  
IN 1888 (*continued*).

## CARYOPHYLLACEÆ.

<i>Lychnis vespertina</i>	Evening campion	May 19
<i>L. diurna</i>	Red robin	May 6
<i>L. Flos cuculi</i>	Ragged-robin	June 11
<i>Arenaria serpyllifolia</i>	Thyme-leaved sandwort	June 6
<i>A. trinervis</i>	Three-nerved sandwort	May 21
<i>Cerastium vulgatum</i>	Mouse-ear chickweed	April 15
<i>Stellaria aquatica</i>	Water starwort	May 29
<i>S. nemorum</i>	Wood starwort	May 21
<i>S. graminea</i>	Lesser starwort	May 25
<i>S. holostea</i>	Great starwort	May 16
<i>S. media</i>	Chickweed	Feb. 6

## HYPERICACEÆ.

<i>Hypericum perforatum</i>	Common St. John's wort	July 10
<i>H. quadrangulum</i>	Square-stalked St. John's wort	July 15
<i>H. humifusum</i>	Trailing St. John's wort	July 19
<i>H. pulchrum</i>	Slender St. John's wort	July 5
<i>H. hirsutum</i>	Hairy St. John's wort	July 19

## LINACEÆ.

<i>Linum catharticum</i>	Cathartic flax	June 24
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## MALVACEÆ.

<i>Malva sylvestris</i>	Common mallow	June 11
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## GERANIACEÆ.

<i>G. Phæum</i>	Dusky crane's-bill	May 21
<i>G. sylvaticum</i>	Wood crane's-bill	May 21
<i>G. pratense</i>	Meadow crane's-bill	June 27
<i>G. Robertianum</i>	Herb Robert	May 27
<i>G. lucidum</i>	Shining crane's-bill	May 13
<i>Oxalis acetosella</i>	Wood sorrel	May 6

## PAPILIONACEÆ.

<i>Ononis arvensis</i>	Rest harrow	July 5
<i>Medicago lupulina</i>	Black medic	June 13
<i>Trifolium pratense</i>	Purple clover	May 20
<i>T. repens</i>	White clover	June 22
<i>T. procumbens</i>	Lesser clover	June 22
<i>Lotus corniculatus</i>	Bird's-foot trefoil	May 27
<i>Vicia cracca</i>	Tufted vetch	June 25

DATES OF THE FLOWERING OF PLANTS AT STONYHURST  
IN 1888 (*continued*).

Vicia sativa	Common vetch	May 26
Lathyrus pratensis	Meadow pea	June 9

## ROSACEÆ.

Spiræa ulmaria	Meadow sweet	July 11
Geum urbanum	Wood avens	June 6
G. rivale	Water avens	May 6
G. intermedium	Intermediate avens	June 5
Fragaria vesca	Wood Strawberry	May 17
Potentilla fragariastrum	Barren Strawberry	Feb. 6
P. reptans	Creeping cinque-foil	June 5
P. tormentilla	Tormentil cinque-foil	May 27
P. comarum	Marsh cinque-foil	June 27
P. anserina	Silver weed	June 5
Alchemilla vulgaris	Lady's mantle	May 8
Sanguisorba officinalis	Great burnet	July 12
Agrimonia eupatoria	Common agrimony	July 23

## ONAGRACEÆ.

Epilobium montanum	Common willow-herb	June 19
E. palustre	Marsh willow-herb	June 24
E. parviflorum	Hoary willow-herb	June 24
E. tetragonum	Square willow-herb	June 27
Circea lutetiana	Enchanter's nightshade	July 1

## SAXIFRAGACEÆ.

Saxifraga umbrosa	London pride	May 17
Chrysosplenium oppositifolium	(Opposite leaved golden saxifrage)	Mar. 20
C. alternifolium	(Alternate leaved do.)	Mar. 25

## UMBELLIFERÆ.

Sanicula europæa	Wood sanicle	June 25
Caucalis anthriscus	Hedge parsley	July 15

## CAPRIFOLIACEÆ.

Adoxa moschatellina	Tuberous moscatel	April 22
Lonicera periclymenum	Honeysuckle	July 21

## ARALIACEÆ.

Hedera helix	Common ivy	Oct. 22
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DATES OF THE FLOWERING OF PLANTS AT STONYHURST  
IN 1888 (*continued*).

STELLATÆ.		
Galium cruciatum	Crosswort	May 13
G. verum	Yellow bedstraw	May 24
G. palustre	Marsh bedstraw	May 26
G. saxatile	Heath bedstraw	June 10
G. aparine	Cleavers	June 17
Asperula adorata	Sweet woodruff	May 9
VALERIANEÆ.		
Valeriana dioica	Marsh valerian	May 7
V. officinalis	Common valerian	July 11
DIPSACEÆ.		
Scabiosa arvensis	Field scabious	June 29
COMPOSITÆ.		
Tussilago farfara	Common colt's-foot	Mar. 21
Tussilago petasites	Butterbur	April 17
Chrysanthemum leucan- themum	Ox-eye daisy	June 7
Achillea millefolium	Common yarrow	July 9
Senecio vulgaris	Groundsel	Feb. 9
S. jacobæa	Ragwort	July 15
Aretium lappa	Common burdock	July 15
Carduus lanceolatus	Spear thistle	July 25
C. palustris	Marsh thistle	June 25
Centaurea nigra	Black knapweed	July 6
Leontodon hispidus	Common hawkbit	June 18
Hypochoeris radicata	Cat's-ear	June 10
Sonchus oleraceus	Common sow thistle	June 22
Taraxacum dens-leonis	Common dandelion	April 1
Hieracium pilosella	Mouse-ear hawkweed	June 11
H. umbellatum	Smooth-leaved hawkweed	July 13
Crepis virens	Smooth crepis	June 12
C. paludosa	Marsh crepis	June 9
Lapsana communis	Nipplewort	June 6
CAMPANULACEÆ.		
Campanula latifolia	Giant bell-flower	July 25
C. rapunculoides	Creeping bell-flower	July 21
C. rotundifolia	Harebell	July 12

**DATES OF THE FLOWERING OF PLANTS AT STONYHURST  
IN 1888 (continued).**

<b>ERICACEÆ.</b>		
<i>Erica tetralix</i>	Cross-leaved heath	July 6
<b>PRIMULACEÆ.</b>		
<i>Primula vulgaris</i>	Common primrose	Mar. 19
<i>P. veris</i>	Cowslip	May 11
<i>Lysimachia vulgaris</i>	Great yellow loosestrife	May 27
<i>L. nemorum</i>	Yellow pimpernel	May 23
<b>APOCYNACEÆ.</b>		
<i>Vinca minor</i>	Lesser periwinkle	April 15
<b>GENTIANACEÆ.</b>		
<i>Menyanthes trifoliata</i>	Common buckbean	June 31
<b>POLEMONIACEÆ.</b>		
<i>Polemonium coeruleum</i>	Jacob's ladder	June 15
<b>CONVOLVULACEÆ.</b>		
<i>Convolvulus sepium</i>	Large convolvulus	July 10
<b>BORAGINACEÆ.</b>		
<i>Myosotis sylvatica</i>	Forget-me-not	May 5
<i>M. arvensis</i>	Field myosote	May 6
<i>Symphytum officinale</i>	Common comfrey	June 3
<b>SOLANACEÆ.</b>		
<i>Solanum dulcamara</i>	Bittersweet	June 22
<b>OROBANCHACEÆ.</b>		
<i>Lathraea squamaria</i>	Toothwort	April 17
<b>SCROPHULARINEÆ.</b>		
<i>Scrophularia nodosa</i>	Common figwort	June 5
<i>S. aquatica</i>	Water figwort	June 24
<i>Mimulus luteus</i>	Yellow mimulus	June 11
<i>Linaria cymbalaria</i>	Ivy-leaved toad-flax	April 17

DATES OF THE FLOWERING OF PLANTS AT STONYHURST  
IN 1888 (*continua*).

<p><i>Digitalis purpurea</i> <i>Veronica serpyllifolia</i> <i>V. officinilis</i> <i>V. anagallis</i> <i>V. beccabunga</i> <i>V. montana</i> <i>V. chamadrys</i> <i>Bartsia odontites</i> <i>Euphrasia officinalis</i> <i>Rhinanthus crista galli</i> <i>Pedicularis sylvatica</i> <i>Melampyrum pratense</i></p>	<p>Foxglove Thyme-leaved speedwell Common speedwell Water speedwell Brooklime speedwell Mountain speedwell Germander speedwell Red bartsia Eyebright Yellow rattle Lousewort Cow-wheat</p>	<p>June 26 May 22 May 17 June 26 June 13 May 20 May 19 July 6 July 2 June 5 May 11 June 5</p>
LABIATE.		
<p><i>Nepeta glechoma</i> <i>Prunella vulgaris</i> <i>Stachys sylvatica</i> <i>Lamium purpureum</i> <i>Ajuga reptans</i></p>	<p>Ground ivy Self-heal Hedge woundwort Purple dead-nettle Bugle</p>	<p>April 17 May 25 June 19 May 6 May 20</p>
PLANTAGINACEÆ.		
<p><i>Plantago major</i> <i>P. lanceolata</i></p>	<p>Greater plantain Ribwort plantain</p>	<p>June 4 May 8</p>
CHENOPODIACIÆ.		
<p><i>Chenopodium bonus Henricus</i> <i>Atriplex patula</i></p>	<p>Good King Henry Common orache</p>	<p>June 8 July 14</p>
POLYGONACEÆ.		
<p><i>Rumex obtusifolius</i> <i>R. crispus</i> <i>R. acetosa</i> <i>Polygonum aviculare</i> <i>P. bistorta</i> <i>P. persicaria</i> <i>P. convolvulus</i></p>	<p>Broad dock Curled dock Sorrel Knotgrass Snakeweed Common persicaria Black bindweed</p>	<p>June 9 June 10 May 21 July 17 July 9 July 4 July 26</p>
EUPHORBIACEÆ.		
<p><i>Mercurialis perennis</i></p>	<p>Dog's mercury</p>	<p>Mar. 19</p>
URTICACEÆ.		
<p><i>Urtica dioica</i></p>	<p>Common nettle</p>	<p>June 7</p>
AROIDEÆ.		
<p><i>Arum maculatum</i></p>	<p>Common arum</p>	<p>May 20</p>

DATES OF THE FLOWERING OF PLANTS AT STONYHURST  
IN 1888 (*continued*).

NAIADACEÆ.		
Potamogeton natans	Broad pondweed	July 20
ALISMACEÆ.		
Alisma plantago	Water plantain	June 24
ORCHIDACEÆ.		
Epipactis latifolia	Helleborine	July 15
Listera ovata	Twayblade	June 27
Orchis mascula	Early orchis	May 7
O. maculata	Spotted orchis	May 24
IRIDACEÆ.		
Iris pseudacorus	Yellow iris	June 27
Crocus vernus	Spring Crocus	Mar. 6
AMARYLLIDÆÆ.		
Narcissus pseudonarcissus	Daffodil	April 15
Galanthus nivalis	Snowdrop	Jan. 23
LILIACEÆ.		
Paris quadrifolia	Herb Paris	May 22
Scilla nutans	Bluebell	May 6
Allium ursinum	Broad-leaved garlic	May 19

## Monthly Magnetical Observations taken at the College Observatory, Stonyhurst, 1888.

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THE Horizontal, Vertical, and Total Forces are calculated to English measure; one foot, one second of mean solar time, and one grain being assumed as the units of space, of time, and of mass.

The Vertical and Total Forces are obtained from the absolute measures of the Horizontal Force and of the Dip.

In the observations of Deflection and Vibration, taken each month for absolute measure of Horizontal Force, the same magnet has always been employed.

The moment of inertia of the magnet with its stirrup, for different degrees of temperature, and the co-efficients in the corrections required for the effects of temperature and of terrestrial magnetic induction on the magnetic moment of the magnet, were determined at the Kew Observatory by the late Mr. Welsh.

The moment of inertia of the magnet with its stirrup, using the grain and foot as the units of mass and of linear measure is 5.27303. Its rate of increase for increase of temperature is 0.00073 for every 10° of Fahr.

The weight of the magnet with its stirrup is approximately 825 grains, and the length of the magnet is nearly 3.94 inches. The moment of inertia was determined, independently of the weight and dimensions, by the method of vibration, with and without a known increase of the moment of inertia.

The temperature corrections have always been obtained from the formula  $q(t^{\circ}-35^{\circ}) + q'(t^{\circ}-35^{\circ})^2$ , where  $t^{\circ}$  is the observed temperature and  $35^{\circ}$  Fahr. the adopted standard temperature. The values of the co-efficients  $q$  and  $q'$  are respectively 0.0001128 and 0.000000436.

The induction co-efficient  $\mu$  is 0.000244.

The correction for error of graduation of the Deflection bar at 1.0 foot is + 0.00004 ft., at 1.3 + 0.000064 ft.

The observed times of vibration are entered in the Table without corrections.

The time of one vibration has been obtained each month from the mean of twelve determinations of the time of 200 vibrations.

The angles of deflection are each the mean of two sets of readings.

In deducing from these observations the ratio and product of the magnetic moment  $m$  of the magnet, and the earth's horizontal magnetic intensity  $X$ , the induction and temperature corrections have always been applied, and the observed time of vibration has been corrected for the effect of torsion of the suspending thread; but no correction has been required for the rate of the chronometer, or for the arc of vibration, the former having been always under 1.5s and the latter never over 50'.

The average deflection of the magnet caused by a twist of the torsion circle through  $90^\circ$ , has been about 7.5 of arc.

In the calculations of the ratio  $\frac{m}{X}$ , the third and subsequent terms of the series  $1 + \frac{P}{r^2} + \frac{Q}{r^4} + \&c.$ , have always been omitted.

The value of the constant  $P$  was found to be 0.002981.

The Declination observations have been taken once a week. Each reading has been corrected by the photographic curves for all irregular disturbances, as well as for daily and monthly range.



OBSERVATIONS OF DEFLECTION FOR ABSOLUTE  
MEASURE OF HORIZONTAL FORCE.

Month.	G. M. T.		Distances of centres of Magnets.	Tem- perature.	Observed Deflection.	Log <sup>m</sup> X
	D.	H. M.				
January ...	23rd	11 10 a.m.	1'0	34.9	13 13 50	9.05976
	..	11 40 a.m.	1'3	35.5	5 58 38	9.05886
February .	19th	11 27 a.m.	1'0	40.1	13 14 8	9.06026
	..	11 57 a.m.	1'3	39.8	5 58 16	9.05854
March ...	22nd	11 20 a.m.	1'0	45.7	13 14 20	9.05958
	..	11 59 a.m.	1'3	46.9	5 58 28	9.05933
April .....	20th	11 14 a.m.	1'0	49.2	13 13 30	9.06056
	..	11 53 a.m.	1'3	50.0	5 59 10	9.06042
May .....	19th	11 35 a.m.	1'0	55.9	13 12 57	9.06066
	..	11 58 a.m.	1'3	57.8	5 58 44	9.06046
June .....	23rd	11 29 a.m.	1'0	62.7	13 13 1	9.06119
	..	11 48 a.m.	1'3	61.8	5 58 18	9.06018
July .....	20th	11 40 a.m.	1'0	62.4	13 12 45	9.06101
	..	0 15 p.m.	1'3	64.2	5 58 29	9.06056
August ...	17th	11 23 a.m.	1'0	57.8	13 12 28	9.06043
	..	11 48 a.m.	1'3	56.4	5 57 57	9.06061
September	24th	11 10 a.m.	1'0	60.7	13 10 41	9.05976
	..	11 41 a.m.	1'3	61.5	5 57 24	9.05909
October ...	17th	9 20 a.m.	1'0	47.8	13 11 38	9.05941
	..	9 40 a.m.	1'3	50.2	5 58 18	9.05952
November	26th	11 11 a.m.	1'0	48.3	13 10 58	9.05905
	..	11 45 a.m.	1'3	49.8	5 58 29	9.05958
December	14th	11 31 a.m.	1'0	47.9	13 11 15	9.05951
	..	11 54 a.m.	1'3	49.1	5 57 37	9.05830

<sup>m</sup> represents the Magnetic Moment of the Deflecting Magnet.  
X represents the Earth's Horizontal Magnetic Intensity.

VIBRATION OBSERVATIONS FOR ABSOLUTE  
MEASURE OF HORIZONTAL FORCE.

Month.	G. M. T.		Temper- ature.	Time of one vibra- tion.	Log m X	Value of m.
	D.	H. M.				
January ...	23rd	10 11 a.m.	36 <sup>o</sup> 4	5.74201	0.19651	0.42407
February .	19th	10 25 a.m.	41 <sup>o</sup> 0	5.74936	0.19599	0.42386
March ..	22nd	10 45 a.m.	44 <sup>o</sup> 9	5.74985	0.19629	0.42403
April .....	20th	10 8 a.m.	49 <sup>o</sup> 7	5.75002	0.19661	0.42470
May .....	19th	10 20 a.m.	54 <sup>o</sup> 4	5.75123	0.19613	0.42449
June .....	23rd	10 35 a.m.	61 <sup>o</sup> 5	5.74680	0.19636	0.42467
July .....	20th	10 10 a.m.	64 <sup>o</sup> 4	5.74329	0.19687	0.42497
August ...	17th	10 20 a.m.	59 <sup>o</sup> 1	5.74912	0.19686	0.42484
September	24th	10 15 a.m.	57 <sup>o</sup> 1	5.75621	0.19791	0.42481
October ...	17th	10 39 a.m.	51 <sup>o</sup> 1	5.74775	0.19662	0.42420
November	26th	10 28 a.m.	47 <sup>o</sup> 6	5.74782	0.19623	0.42372
December	14th	10 19 a.m.	47 <sup>o</sup> 5	5.75011	0.19618	0.42365

DIP OBSERVATIONS.				MAGNETIC INTENSITY.		
Month.	G. M. T.	Needle.	Dip.	X. or Hori- zontal Force.	Y. or Vertical Force.	Total Force.
January	D. H. M. 24nd 10 20 a.m.	1	69 8 55	3.7035	9.7170	10.3995
	„ 10 50 a.m.	3	69 7 28			
February	20th 10 35 a.m.	1	69 9 19	3.7009	9.7149	10.3961
	„ 10 53 a.m.	3	69 8 11			
March ...	23rd 10 15 a.m.	1	69 8 45	3.7017	9.7081	10.3890
	„ 10 31 a.m.	3	69 7 15			
April ...	21st 10 11 a.m.	1	69 10 10	3.6989	9.7100	10.3891
	„ 10 30 a.m.	3	69 7 17			
May .....	20th 10 36 a.m.	1	69 9 39	3.6966	9.6946	10.3819
	„ 11 5 a.m.	3	69 7 18			
June .....	24th 10 10 a.m.	1	69 8 40	3.6970	9.7067	10.3870
	„ 10 39 a.m.	3	69 9 15			
July .. ...	21st 10 12 a.m.	1	69 8 3	3.6987	9.7112	10.3918
	„ 10 40 a.m.	3	69 8 18			
August...	18th 11 15 a.m.	1	69 8 39	3.6998	9.7056	10.3869
	„ 11 31 a.m.	3	69 7 17			
Sept. ...	25th 10 13 a.m.	1	69 8 40	3.7093	9.7094	10.3911
	„ 10 48 a.m.	3	69 7 38			
October..	17th 11 26 a.m.	1	69 7 4	3.7033	9.7123	10.3946
	„ 11 52 a.m.	3	69 8 18			
Nov.....	27th 10 50 a.m.	1	69 8 35	3.7022	9.7114	10.3932
		3	69 7 15			
Dec.....	15th 11 45 a.m.	1	69 7 59	3.7040	9.7186	10.3999
		3	69 8 28			
Means .....		...	69 7 51	3.7013	9.7183	10.3917

## DECLINATION OBSERVATIONS.

		Uncorrected.		Corrected.	
Month.	G. M. T.	Observation	Monthly Mean.	Observation.	Monthly Mean.
	D. H. M.	o ' "	o ' "	o ' "	" ' "
January ...	2nd ...9 7 a.m.	19 29 40		19 30 15	
	9th...9 3 a.m.	28 15		30 11	
	16th...9 11 a.m.	29 21		31 10	
	23rd...9 5 a.m.	24 0		26 47	
	30th...9 14 a.m.	26 35	19 27 35	26 35	19 28 59
February .	6th ...9 9 a.m.	24 19		26 52	
	13th...9 17 a.m.	25 27		24 21	
	21st ...9 3 a.m.	28 11		29 15	
	27th...9 6 a.m.	37 50	19 26 27	28 43	19 27 33
March ...	5th...9 19 a.m.	24 15		27 2	
	13th...9 1 a.m.	23 38		23 38	
	19th...9 7 a.m.	25 41		26 41	
	26th...9 0 a.m.	29 23	19 24 53	28 33	19 26 19
April .....	2nd...9 17 a.m.	24 28		26 11	
	10th...9 3 a.m.	26 49		27 10	
	17th...8 57 a.m.	26 18		28 25	
	23rd...9 6 a.m.	30 29		29 15	19 27 30
	30th...9 7 a.m.	24 8	19 25 36	26 30	
May .....	7th...8 59 a.m.	27 11		27 21	
	14th...9 10 a.m.	31 10		30 5	
	21st ...9 16 a.m.	30 29		31 2	
	28th...9 2 a.m.	29 26	19 29 36	26 9	19 28 39
June .....	4th...9 10 a.m.	26 20		26 20	
	11th...9 15 a.m.	28 16		27 10	
	20th...9 18 a.m.	30 44		30 22	
	26th...9 6 a.m.	27 10	19 28 8	28 50	19 28 11

DECLINATION OBSERVATIONS (*Continued*).

		Uncorrected.		Corrected.	
Month.	G. M. T.	Observation.	Monthly Mean.	Observation.	Monthly Mean.
	D. H. M.	o ' "	o ' "	o ' "	o ' "
July ...	3rd...9 11 a.m.	19 27 20		19 29 15	
	9th...9 3 a.m.	25 33		27 31	
	16th...9 0 a.m.	27 6		28 57	
	25th...8 58 a.m.	26 38		29 40	
	31st...9 11 a.m.	28 14	19 28 43	30 10	19 29 7
August ...	6th...9 6 a.m.	24 5		25 5	
	13th...9 5 a.m.	25 19		26 21	
	20th...9 16 a.m.	24 4		25 10	
	27th...9 10 a.m.	23 9	19 24 14	24 9	19 25 11
September	3rd...9 4 a.m.	27 18		27 18	
	10th...8 54 a.m.	26 10		26 10	
	18st ...9 1 a.m.	24 5		24 5	
	24th...9 10 a.m.	26 8	19 26 13	27 10	16 26 11
October ...	1st ...9 13 a.m.	24 40		24 50	
	9th...9 8 a.m.	25 21		27 43	
	15th...9 6 a.m.	29 33		33 51	
	29th...9 2 a.m.	26 17	19 26 28	29 40	19 29 1
November	5th...9 12 a.m.	30 45		28 15	
	13th...9 7 a.m.	24 51		29 20	
	19th...9 3 a.m.	26 15		28 11	
	26th...9 5 a.m.	27 0	19 27 13	29 32	19 28 50
December	3rd...9 10 a.m.	25 1		27 15	
	11th...9 5 a.m.	22 17		25 11	
	17th...9 9 a.m.	21 32		24 0	
	24th...9 2 a.m.	24 13		25 9	
	31st ...9 10 a.m.	22 11	19 23 54	25 15	19 25 25
Yearly mean			19 26 50		19 27 39

## MAGNETIC DISTURBANCES.

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JANUARY.—The year began quietly, and the first disturbance of any moment occurred between 4 a.m. and 6 p.m. on the 6th, the Vertical Force being then a little in excess of its normal value, but the Horizontal Force not shewing any marked irregularity. On the 8th the Declination magnet moved Westward at oh. 30m. a.m. and 10 minutes later returned Eastward until 1h. 12m.; it then gradually passed to the Westward and was considerably agitated during the afternoon. The H.F. felt this disturbance only slightly, whilst the V.F. decreased rather rapidly at oh. 35m. a.m., but was above its average value during most of the afternoon. A slight trembling motion of the needle at about 5.33 a.m. on the 13th was the first indication of the coming storm, which lasted until the evening of the 15th. The most rapid movements took place between 2 and 5 p.m. on the 13th, but the greatest oscillations occurred between 6 and 8 p.m. on that day, and somewhat earlier on the 14th. The H.F. magnet was most disturbed between 2 and 4 p.m. on the 13th, and during the evenings of the 13th and 14th. The V.F. began to increase shortly after noon on the 13th, at first quietly, but very rapidly from 2 p.m. until 3.30, when it reached a maximum; it then decreased, but soon rose again and obtained its second and principal maximum at 7.32, the total range being 0.00308 in British units. This component was not much affected during the remainder of the storm. The night of the 21st was somewhat disturbed, and there was a noticeable diminution of the V.F. between 3 and 4 a.m. on the 22nd. Another magnetic storm lasted during the greater part of the 23rd, 24th and 25th. The needle moved through an angle of 25' 4" 0 from 4h. to 4h. 6m. p.m. on the 23rd, but had returned

to its former position at 4h. 18m. This oscillation was followed by another still larger, the needle moving Eastward through  $32^{\circ} 13' \cdot 7$  between 6.21 and 6.47, and then returning Westward. During the afternoon of the 23rd, and from 8 to 11 p.m. on the 14th, the H.F. was very irregular. The curve of the V.F. was very abnormal during the afternoon and on the night of the 23rd. Quietly increasing at noon, it rose very rapidly from 3.10 p.m. and attained its maximum at 3.37. It then fell still more quickly for a few minutes and remained very irregular for some hours: finally it fell again sharply to its minimum which it reached at 11.56. Its total range was 0.00453. The movement of the magnets was rather irregular on each of the three following days, and then the month ended quietly.

**FEBRUARY.**—The magnets remained undisturbed at the beginning of the month, but shewed some slight irregularities during the afternoon of the 3rd and the night of the 4th, the V.F. increasing very perceptibly on both occasions. On the night of the 8th, and the following morning there was some disturbance, but this was less shewn on the V.F. traces. The disturbing force was again apparent on the afternoon of the 10th, and its action was still more manifest about the same hour on the two following days. The V.F. increased considerably on the 16th, and the curves were abnormal during the night of the 18th, and still more so on the early afternoon of the 19th. The following days were all very irregular until the morning of the 26th, the V.F. increasing very much during the hours immediately following the noon of the 22nd. The 29th was also disturbed.

**MARCH.**—The afternoon of the 7th, the whole of the 8th, and still more the afternoon of the 9th, were much disturbed, the most rapid movement of the Declination needle, accompanied by an increase of the V.F., occurring about 5 p.m. on the 9th. There was some similarity between the curves in the early part of the afternoons of the 9th and 10th. From the afternoon of the 15th to the morning of the 20th there was a good deal of disturbing action, most strongly marked on the V.F. curve. The end of the month was remarkably quiet.

**APRIL.**—The first disturbance of the month occurred on the 3rd, and continued for several days. The movements of the Declination magnet were very rapid at about 6 p.m. on the 4th, and those of the H.F. on the same day between 7 and 8 p.m. The corresponding irregularities of the V.F. were a diminution of intensity about 3 a.m., followed by an

increase during the afternoon of the 3rd. The Declination movement at 6 p.m. on the 7th, was repeated on the 8th, but the time was a few minutes earlier on the second occasion. A storm began at about 3 a.m. on the 11th, the oscillations of the Declination needle being most rapid from noon of that day to 9 p.m. The maximum occurred at 1.17 p.m. and the minimum at 8.48, the range being  $42' 58'' \cdot 3$ . The magnet came again to rest on the morning of the 16th, and during the previous two or three days the irregularities consisted mainly of a tremulous motion. The H.F. was most disturbed in the afternoons and during the night of the 11th. The principal change of the V.F. during this storm was a long oscillation commencing with a gradual increase from 1 p.m. on the 11th to nearly 6 p.m., and then a diminution until midnight, the total range being 0'00290. On the 13th and 14th the V.F. was also much disturbed. On the 24th there was a single well marked excursion Eastward just before midnight, accompanied by an increase of the H.F. and a diminution of the V.F.

MAY.—A trembling of the magnet on the morning of April 30th was repeated in an exaggerated form at the same hour on the following day, and there was a rather striking resemblance between the curves of the next two days. On the morning of the 5th, the magnet again trembled slightly, and this increased on the next day. The disturbing force was actively at work from the 7th to the 13th inclusively, but at no time were the excursions of the needle very extensive. The morning of the 16th and the night of the 17th were rather irregular; and at 9.36 a.m. on the 20th a storm began, which culminated on the morning of the 21st. Three of the rapid changes are worth recording, viz.: a Westerly movement through  $31' 17'' \cdot 0$  from 1.30 to 1.58, another through  $28' 38'' \cdot 9$  between 2.39 and 3.0, and an Easterly swing of  $35' 48'' \cdot 6$  from 5.5 to 5.29. The H.F. curve was very irregular from 2.30 to 6 a.m. The V.F. diminished in intensity from 11.22 p.m. on the 20th, and reached its minimum at about 4.45 the next morning; it then rose again at about the same rate as it had fallen. Its range was 0'00429. The night of the 23rd was somewhat disturbed, as was also the whole of the 27th. During the afternoon of the 26th, the H.F. curve was much more irregular than that of the Declination.

JUNE.—Shortly after 3 a.m. on the 3rd the Declination magnet began to tremble slightly, and this movement gradually developed into a storm that lasted for three days, and affected the V.F. very considerably.



Between 6.33 p.m. and 6.51 on the 3rd, the compass needle varied 22' 22" 9 Eastward. No disturbance followed this storm until the 22nd and 23rd, during which days there was some irregularity in the Declination. The disturbing force was felt by the H.F. magnet chiefly from 2 to 6 p.m. on the 22nd.

JULY.—The beginning of the month was abnormal, and there was a slight disturbing force manifesting its presence on the 8th and during the morning of the 9th. The curves between 8 and 9 p.m. on the 16th and 17th were very similar, but the movements of the second day were some minutes earlier than those of the first. Another movement of the same kind was recorded between 9 and 10 p.m. on the 20th, on which day the H.F. was irregular throughout the afternoon, and a long wave of disturbance was superposed on the normal V.F. trace. The H.F. curves shewed a marked irregularity during the afternoons of the 29th and 30th.

AUGUST.—The irregular movements of the compass needle were very extended between 6 p.m. on the 3rd, and 4 a.m. on the 4th, and the H.F. was quite as much disturbed during the early hours of the afternoon of the 3rd. The magnets were again unsteady on the night of the 11th and throughout the following day. A storm began about 3 a.m. on the 16th, and continued until the 20th, the H.F. curve shewing most the effects of the disturbing force on the first day. The V.F. was far less affected, a slow and not very extended oscillation being the only record on the curve. The month ended with a slight disturbance on the afternoon of the 31st.

SEPTEMBER.—The afternoon of the 1st was rather irregular. About noon on the 12th a slight abnormal force affected the magnets, and gave evidence of its presence until the afternoon of the 15th. The V.F. had a similar trace on three dates, viz., the 13th, 15th and 19th, the peculiar movement occurring shortly after midnight, but rather earlier at each repetition; this movement is also traceable on the curve of the 20th, but at a somewhat earlier time. During the nights of the 17th, 18th and 19th, and from 6 to 8 a.m. on the 27th the curves shew disturbance.

OCTOBER.—The first irregular movement observed during this month was on the afternoon of the 5th, which was followed by another in the early hours of the 6th. Again between 10 and 11 p.m. on the 10th the disturbing force was active, and a similar irregularity was repeated on the following day. A slight diminution of the V.F. was recorded on the morning of the 12th, and a very marked decrease during the night of the

19th, the minimum being reached at 11.33 p.m. Strong evidence of an abnormal force was recorded on the curves during the afternoon of the 20th and the whole of the 21st, the motion of the compass needle being very rapid between 10 p.m. and midnight on the 20th, and there was still a disturbance during the afternoons of the 23rd, 24th and 25th. The V.F. traces were all very similar just before midnight on the 20th, 23rd and 24th. The night of the 30th was somewhat disturbed, and the Declination magnet was changing quickly at about 4 a.m. on the 31st. The same day there was a rapid Easterly movement through  $37^{\circ} 0' 2''$  from 8.19 to 8.35 p.m., but the magnet returned immediately to its normal position. The H.F. and V.F. were also disturbed, but to a much less extent.

NOVEMBER.—The magnets were still disturbed on the 1st. The curves were again abnormal on the afternoon of the 4th, the chief irregularity occurring between 10 p.m. and 2 a.m. the same night. The presence of a disturbing force was evident until the morning of the 9th. On the 11th the morning and night were abnormal, but the afternoon was quiet. The chief disturbance of the month began about midnight and continued throughout the 16th and 17th. The three following days were also disturbed, especially during the afternoons. The evening of the 25th was irregular; and the disturbance that commenced on the morning of the 27th lasted for more than two days. The last evening of the month was not very quiet. A short but rapid increase of the H.F. was recorded at 8.39 p.m. on the 17th, and the V.F. was abnormal throughout the whole of that day, but both components of the intensity were very regular on most days of the month.

DECEMBER.—There was considerable irregularity in the magnetic curves during the first days of the month, and a rapid Easterly movement of the needle occurred shortly before 6 p.m. on the 8th, the V.F. increasing and the H.F. diminishing at the same time. The magnets became much more quiet on the morning of the 9th, but were again disturbed on the afternoon of the 13th. The V.F. was slightly above its normal value during the afternoons of the 13th and 14th. A rapid Easterly movement of the needle was recorded between 5 and 6 p.m. on the 15th. Another Easterly oscillation between 4 and 5 a.m. on the 24th was accompanied by a slight diminution of the V.F., and from 8 to 10 p.m. the compass needle was considerably to the East of its mean position. The magnets were quiet from the 27th to the end of the year.

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Resúmen de las Observaciones Meteorológicas per E. M. Cappelletti, Col. Cat. del Sagrado Corazon de Jesus in Puebla	"
Obs. Met. Colegio de San Juan Nepomuceno, Saltillo, Coahnila, Mexico,	"
Memorias de la Sociedad Científica "Antonio Alzate."	La Sociedad.

APPENDIX.

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RESULTS  
OF  
**Meteorological Observations**

TAKEN AT  
ST. IGNATIUS' COLLEGE,  
MALTA,

BY THE  
REV. J. SCOLES, S.J.

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1888.

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# ST. IGNATIUS' COLLEGE.

## MALTA.

Lat. 35° 55' N. Long. 14° 29' E. Barometer Readings reduced to 32° F. at sea level.

### METEOROLOGICAL REPORT.

1888.

January.

Results of Observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer.....inches	30·144	30·051
Highest ,, ,, on the 8th ,,	30·407	30·415
Lowest ,, ,, ,, 31st ,,	29·648	29·538
Range of Barometer Readings .....	0·759	0·877
Highest Reading of Max. Therm. on the 31st.....	64·8	63·9
Lowest ,, Min. Therm. ,, 21st.....	40·7	41·6
Range of Thermometer Readings .....	24·1	22·3
Greatest Range in 24 hours (on the 30th) .....	19·9	18·4
Mean of all the Highest Readings.....	57·5	58·4
Mean of all the Lowest Readings .....	48·7	47·8
Mean Daily Range .....	8·8	10·6
Mean Temperature (deduced from Max. and Min.)	52·4	52·5
Mean Temperature (deduced from Dry Bulb.).....	53·4	52·1
Adopted Mean Temperature .....	52·9	52·3
Mean Temperature of Evaporation .....	48·5	48·1
Mean Temperature of Dew-point .....	44·8	44·9
Mean elastic force of Vapour .....	0·297	0·298
Mean weight of Vapour in a cubic foot of air...grains	3·4	3·4
Mean additional weight required for saturation ,,	1·1	0·9
Mean degree of Humidity .....	76	80
Mean weight of a cubic foot of air .....	543·6	542·9
Fall of Rain.....inches	2·393	3·329
Number of days on which Rain fell .....	10	12
Mean amount of Cloud (an overcast sky = 10) .....	5·3	4·6
Total number of miles of Wind indicated .....	8861	8336
Mean Velocity of Wind per hour .....	11·9	11·2

## February.

Results of Observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer.....inches	29·918	30·064
Highest „ „ on the 4th „	30·199	30·334
Lowest „ „ „ 23rd „	29·511	29·690
Range of Barometer Readings .....	0·688	0·644
Highest Reading of Max. Therm. on the 23rd.....	66·0	67·0
Lowest Reading of Min. Therm. „ 29th.....	40·4	42·0
Range of Thermometer Readings .....	25·6	25·0
Greatest Range in 24 hours (on the 2nd) .....	19·2	18·8
Mean of all the Highest Readings .....	59·6	60·7
Mean of all the Lowest Readings .....	47·4	49·0
Mean Daily Range .....	12·2	11·7
Mean Temperature (deduced from Max. and Min.)	52·5	53·9
Mean Temperature (deduced from Dry Bulb.).....	52·8	54·0
Adopted Mean Temperature .....	52·6	54·0
Mean Temperature of Evaporation .....	48·0	50·0
Mean Temperature of Dew-point .....	44·8	47·3
Mean elastic force of Vapour .....inches	0·297	0·327
Mean weight of Vapour in a cubic foot of air...grains	3·4	3·7
Mean additional weight required for saturation „	0·8	0·8
Mean degree of Humidity .....	79	83
Mean weight of a cubic foot of air .....grains	540·4	541·1
Fall of Rain.....inches	1·730	1·483
Number of days on which Rain fell .....	11	9
Mean amount of Cloud (an overcast sky = 10) .....	3·9	4·0
Total number of miles of Wind indicated .....	8000	6893
Mean Velocity of Wind per hour .....miles	11·5	10·1

## March.

Results of Observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer .....	inches 29'981	30'008
Highest ,, ,, on the 7th ,,	30'425	30'404
Lowest ,, ,, ,, 18th ,,	29'368	29'513
Range of Barometer Readings .....	1'057	0'891
Highest Reading of Max. Therm. on the 27th.....	81'6	74'6
Lowest Reading of Min. Therm. ,, 1st .....	42'1	44'2
Range of Thermometer Readings .....	39'5	30'4
Greatest Range in 24 hours (on the 26th) .....	26'5	23'4
Mean of all the Highest Readings .....	64'4	63'6
Mean of all the Lowest Readings .....	50'4	51'2
Mean Daily Range .....	14'0	12'4
Mean Temperature (deduced from Max. and Min.)	56'7	56'6
Mean Temperature (deduced from Dry Bulb) .....	56'0	56'0
Adopted Mean Temperature .....	56'4	56'3
Mean Temperature of Evaporation.....	52'0	52'5
Mean Temperature of Dew-point .....	48'5	49'4
Mean elastic force of Vapour .....	inches 0'342	0'354
Mean weight of Vapour in a cubic foot of air...grains	3'8	4'0
Mean additional weight required for saturation ,,	1'1	1'0
Mean degree of Humidity .....	77	79
Mean weight of a cubic foot of air .....	grains 536'5	536'7
Fall of Rain .....	inches 0'790	0'692
Number of days on which Rain fell .....	7	6
Mean amount of Cloud (an overcast sky = 10) .....	3'9	4'2
Total number of miles of Wind indicated .....	7673	7886
Mean Velocity of Wind per hour .....	miles 10'3	10'6

## April.

Results of Observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer.....inches	29'957	29'930
Highest ,, ,, on the 14th ,,	30'196	30'246
Lowest ,, ,, ,, 4th ,,	29'350	29'460
Range of Barometer Readings.....	0'846	0'786
Highest Reading of Max. Therm on the 7th .....	82'9	75'1
Lowest ,, Min. Therm. ,, 15th.....	49'9	47'9
Range of Thermometer Readings .....	33'0	27'2
Greatest Range in 24 hours (on the 22nd) .....	21'9	20'9
Mean of all the Highest Readings.....	70'0	67'5
Mean of all the Lowest Readings .....	55'7	54'2
Mean Daily Range .....	14'3	13'3
Mean Temperature (deduced from Max. and Min.)	61'8	59'8
Mean Temperature (deduced from Dry Bulb) .....	61'4	59'8
Adopted Mean Temperature .....	61'6	59'8
Mean Temperature of Evaporation .....	56'2	55'9
Mean Temperature of Dew-point .....	51'7	52'3
Mean elastic force of Vapour .....inches	0'384	0'393
Mean weight of Vapour in a cubic foot of air... grains	4'3	4'4
Mean additional weight required for saturation ,,	1'8	1'4
Mean degree of Humidity .....	71	77
Mean weight of a cubic foot of air .....grains	529'9	530'6
Fall of Rain.....inches	0'090	0'606
Number of days on which Rain fell .....	2	5
Mean amount of Cloud (an overcast sky= 10) .....	4'0	4'0
Total number of miles of Wind indicated .....	9251	7869
Mean Velocity of Wind per hour ... ..miles	12'8	10'9

## May.

Results of Observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer.....inches	30°031	30°033
Highest „ „ on the 9th „	30°191	30°197
Lowest „ „ „ 23rd „	29°849	29°651
Range of Barometer Readings..... „	0°342	0°546
Highest Reading of Max. Therm. on the 12th.....	80.1	84.0
Lowest „ Min. Therm. „ 1st.....	52.4	51.1
Range of Thermometer Readings.....	27.7	32.9
Greatest Range in 24 hours (on the 11th).....	25.2	25.2
Mean of all the Highest Readings.....	72.3	73.3
Mean of all the Lowest Readings.....	59.3	58.3
Mean Daily Range.....	13.0	15.0
Mean Temperature (deduced from Max. and Min.)...	64.8	64.4
Mean Temperature (deduced from Dry Bulb).....	64.3	64.5
Adopted Mean Temperature.....	64.5	64.5
Mean Temperature of Evaporation.....	60.6	60.3
Mean Temperature of Dew-point.....	57.1	56.3
Mean elastic force of Vapour..... inches	0.467	0.456
Mean weight of Vapour in a cubit foot of air...grains	5.1	4.9
Mean additional weight required for saturation „	1.7	1.9
Mean degree of Humidity.....	76	73
Mean weight of a cubit foot of air..... grains	527.2	527.2
Fall of Rain.....inches	1.567	0.273
Number of days on which Rain fell.....	5	3
Mean amount of Cloud (an overcast sky = 10).....	4.5	2.8
Total number of miles of Wind indicated.....	7423	6993
Mean Velocity of Wind per hour..... miles	10.0	9.4

## June.

Results of Observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer.....inches	29.998	29.998
Highest ,, ,, on the 3rd ,,	30.180	30.179
Lowest ,, ,, ,, 30th ,,	29.872	29.799
Range of Barometer Readings..... ,,	0.308	0.380
Highest Reading of Max. Therm. on the 9th .....	92.1	88.2
Lowest Reading of Min. Therm. ,, 1st .....	60.2	59.3
Range of Thermometer Readings .....	31.9	28.9
Greatest Range in 24 hours (on the 9th) .....	30.0	23.2
Mean of all the Highest Readings .....	84.1	79.2
Mean of all the Lowest Readings .....	67.1	64.4
Mean Daily Range .....	17.0	14.8
Mean Temperature (deduced from Max. and Min.)	74.9	71.1
Mean Temperature (deduced from Dry Bulb) .....	74.0	70.6
Adopted Mean Temperature .....	74.5	70.9
Mean Temperature of Evaporation .....	68.1	65.6
Mean Temperature of Dew-point .....	63.5	61.6
Mean elastic force of Vapour .....	0.586	0.548
Mean weight of Vapour in a cubic foot of air...grains	6.4	5.9
Mean additional weight required for saturation ,,	2.9	2.3
Mean degree of Humidity .....	70	72
Mean weight of a cubic foot of air .....	516.0	520.0
Fall of Rain .....		0.140
Number of days on which Rain fell .....		2
Mean amount of Cloud (an overcast sky = 10) .....	1.8	2.2
Total number of miles of Wind indicated .....	5351	6549
Mean Velocity of Wind per hour .....	7.4	9.1



## July.

Results of Observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer .....	inches 30·001	30·025
Highest ,, ,, on the 27th ,,	30·114	30·177
Lowest ,, ,, on the 17th ,,	29·837	29·876
Range of Barometer Readings .....	0·277	0·301
Highest Reading of Max. Therm. on the 10th ...	102·8	96·1
Lowest ,, ,, Min. Therm. on the 4th ...	63·6	64·9
Range of Barometer Readings .....	39·2	31·2
Greatest Range in 24 hours (on the 8th) .....	31·8	25·8
Mean of all the Highest Readings .....	89·0	86·5
Mean of all the Lowest Readings .....	70·8	60·6
Mean Daily Range .....	18·2	16·9
Mean Temperature (deduced from Max. and Min.)	79·4	77·5
Mean Temperature (deduced from Dry Bulb) .....	78·0	77·0
Adopted Mean Temperature .....	78·7	77·3
Mean Temperature of Evaporation .....	70·8	70·3
Mean Temperature of Dew-point .....	65·5	65·4
Mean Elastic force of Vapour .....	inches 0·628	0·627
Mean Weight of Vapour in a cubic foot of air, grains	6·8	6·7
Mean additional weight required for saturation ,,	3·7	3·4
Mean degree of Humidity .....	65	67
Mean Weight of a cubic foot of air .....	grains 512·1	514·1
Fall of Rain .....	inches	
Number of days on which Rain fell .....		
Mean amount of Cloud (an overcast sky = 10) ...	0·7	0·5
Total number of miles of Wind indicated .....	5888	5212
Mean Velocity of Wind per hour .....	miles 7·9	7·0

## August.

Results of observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer.....inches	30'047	29'994
Highest ,, ,, on the 11th ,,	30'276	30'142
Lowest ,, ,, on the 28th ,,	29'838	29'862
Range of Barometer Readings .....	0'438	0'280
Highest Reading of Max. Therm. on the 17th.....	97'4	95'5
Lowest ,, ,, Min. Therm. on the 21st .....	64'0	66'7
Range of Thermometer Readings .....	33'4	28'8
Greatest Range in 24 hours (on the 2nd) .....	27'2	25'1
Mean of all the Highest Readings .....	85'1	87'1
Mean of all the Lowest Readings .....	69'8	71'7
Mean Daily Range .....	15'3	15'4
Mean Temperature (deduced from Max. and Min.)	76'5	78'5
Mean Temperature (deduced from Dry Bulb) .....	76'2	78'8
Adopted Mean Temperature .....	76'4	78'7
Mean Temperature of Evaporation .....	68'7	71'8
Mean Temperature of Dew-point .....	63'3	67'0
Mean Elastic force of Vapour .....	0'582	0'662
Mean Weight of Vapour in a cubic foot of air, grains	6'3	7'1
Mean additional weight required for saturation ,,	3'7	3'5
Mean degree of Humidity .....	65	68
Mean Weight of a cubic foot of air.....grains	515'3	511'7
Fall of Rain.....inches	0'080	0'192
Number of days on which Rain fell .....	1	1
Mean amount of Cloud (an overcast sky = 10) .....	1'0	1'3
Total number of miles of Wind indicated .....	6441	5631
Mean Velocity of Wind per hour .....	8'7	7'6

## September.

Results of observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer.....inches	30·089	30·052
Highest „ „ on the 12th „	30·252	30·248
Lowest „ „ on the 30th „	29·919	29·825
Range of Barometer Readings..... „	0·333	0·423
Highest Reading of Max. Therm. on the 9th.....	91·1	92·3
Lowest „ „ Min. Therm. on the 30th.....	64·0	63·7
Range of Thermometer Readings .....	27·1	28·6
Greatest Range in 24 hours (on the 9th) .....	22·4	22·7
Mean of all the Highest Readings .....	84·0	82·9
Mean of all the Lowest Readings .....	69·7	68·8
Mean Daily Range .....	14·3	14·1
Mean Temperature (deduced from Max. and Min.)	75·9	75·1
Mean Temperature (deduced from Dry Bulb) .....	76·0	75·3
Adopted Mean Temperature .....	76·0	75·2
Mean Temperature of Evaporation.....	71·3	69·2
Mean Temperature of Dew-point .....	67·9	64·8
Mean Elastic force of Vapour .....inches	0·682	0·615
Mean Weight of Vapour in a cubic foot of air grains	7·3	6·7
Mean additional weight required for saturation „	2·4	2·8
Mean degree of Humidity .....	76	70
Mean Weight of a cubic foot of air..... grains	515·6	516·3
Fall of Rain.....inches	0·630	1·134
Number of days on which Rain fell .....	2	5
Mean amount of Cloud (an overcast sky=10) .....	2·6	2·3
Total number of miles of Wind indicated .....	4804	6001
Mean Velocity of Wind per hour ..... miles	6·7	8·3

## October.

Result of Observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer .....	inches 30'062	30'048
Highest ,, ,, on the 27th ,,	30'329	30'292
Lowest ,, ,, on the 17th ,,	29'737	29'700
Range of Barometer Readings .....	0'592	0'592
Highest Reading of Max. Therm. on the 5th .....	88'8	87'8
Lowest ,, ,, Min. Therm. on the 22nd .....	52'0	55'8
Range of Thermometer Readings .....	36'8	32'0
Greatest Range in 24 hours (on the 9th) .....	17'6	19'5
Mean of all the Highest Readings .....	74'5	75'5
Mean of all the Lowest Readings.....	62'4	64'1
Mean Daily Range .....	12'1	11'4
Mean Temperature (deduced from Max. and Min.)	67'6	68'9
Mean Temperature (deduced from Dry Bulb) .....	67'3	68'4
Adopted Mean Temperature .....	67'5	68'7
Mean Temperature of Evaporation .....	62'4	63'8
Mean Temperature of Dew-point .....	58'6	60'1
Mean Elastic force of Vapour ... ..inches	0'492	0'521
Mean Weight of Vapour in a cubic foot of air ..grains	5'4	5'7
Mean additional weight required for saturation ,,	2'0	1'9
Mean degree of Humidity .....	74	76
Mean Weight of a cubic foot of air.....grains	525'0	523'5
Fall of Rain .....	inches 4'058	3'323
Number of days on which Rain fell .....	7	8
Mean amount of Cloud (an overcast sky = 10).....	3'7	4'4
Total number of miles of Wind indicated.....	7944	6843
Mean Velocity of Wind per hour .....	miles 10'7	9'2

## November.

Results of observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer .....	inches 30·110	30·052
Highest ,, ,, on the 17th.....	,, 30·313	30·276
Lowest ,, ,, on the 10th.....	,, 29·794	29·675
Range of Barometer Readings .....	,, 0·519	0·601
Highest Reading of Max. Therm. on the 2nd .....	77·6	74·6
Lowest ,, ,, Min. Therm. on the 23rd ...	49·1	49·8
Range of Thermometer Readings .....	28·5	24·8
Greatest Range in 24 hours (on the 2nd).....	20·2	17·9
Mean of all the Highest Readings .....	69·0	67·8
Mean of all the Lowest Readings.....	57·2	57·0
Mean Daily Range .....	11·8	10·8
Mean Temperature (deduced from Max. and Min.)	62·0	61·5
Mean Temperature (deduced from Dry Bulb) .....	61·5	61·0
Adopted Mean Temperature .....	61·8	61·3
Mean Temperature of Evaporation ....	56·6	57·0
Mean Temperature of Dew-point .....	53·0	53·9
Mean Elastic force of Vapour .....	inches 0·403	0·416
Mean Weight of Vapour in a cubic foot of air, grains	4·5	4·7
Mean additional weight required for saturation ,,	1·5	1·3
Mean degree of Humidity.....	75	79
Mean Weight of a cubic foot of air.....	grains 533·2	532·1
Fall of Rain .....	inches 0·739	4·130
Number of days on which Rain fell.....	7	11
Mean amount of Cloud (an overcast sky = 10) .....	4·4	4·9
Total number of miles of Wind indicated .....	7738	6786
Mean Velocity of Wind per hour.....	miles 10·7	9·4

## December.

Results of observations taken during the Month.		Mean for the last 5 years.
Mean Reading of Barometer .....	inches 30'166	30'054
Highest ,, ,, on the 15th... ,,	30'531	30'383
Lowest ,, ,, on the 22nd... ,,	29'907	29'572
Range of Barometer Readings .....	0'624	0'811
Highest Reading of Max. Therm. on the 1st.....	71'2	67'9
Lowest ,, ,, Min. Therm. on the 9th .....	43'7	43'7
Range of Thermometer Readings.....	27'5	24'2
Greatest Range in 24 hours (on the 10th) ..	18'1	17'0
Mean of all the Highest Readings .....	63'2	61'6
Mean of all the Lowest Readings.....	53'9	51'8
Mean Daily Range .....	9'3	9'8
Mean Temperature (deduced from Max. and Min.)	57'9	56'1
Mean Temperature (deduced from Dry Bulb) .....	57'5	55'4
Adopted Mean Temperature.....	57'7	55'7
Mean Temperature of Evaporation .....	53'3	51'6
Mean Temperature of Dew-point.....	50'1	48'4
Mean Elastic force of Vapour.....inches	0'362	0'341
Mean Weight of Vapour in a cubic foot of air, grains	4'1	3'8
Mean additional weight required for saturation ,,	1'1	1'0
Mean degree of Humidity .....	79	79
Mean Weight of a cubic foot of air.....grains	538'5	539'1
Fall of Rain .....	inches 1'668	3'264
Number of days on which Rain fell .....	7	13
Mean amount of Cloud (an overcast sky = 10) .....	6'4	5'0
Total number of miles of Wind indicated .....	7275	8608
Mean Velocity of Wind per hour..... miles	9'8	11'6

## Summary of Observations FOR 1888.

Results of observations taken during the Month.	Mean for the last 5 years.	
Mean Reading of Barometer .....inches	30'042	30'031
Highest „ „ on the 15th Dec. „	30'531	30'520
Lowest „ „ on the 4th April „	29'350	29'363
Range of Barometer Readings ..... „	1'181	1'157
Highest Reading of Max. Therm. on the 10th July	102'8	98'0
Lowest „ „ Min. Therm. on the 29th Feb.	40'4	41'1
Range of Thermometer Readings.. .....	62'4	56'9
Greatest Range in 24 hours on the 8th July .....	31'8	27'6
Mean of all the Highest Readings .....	73'5	72'4
Mean of all the Lowest Readings.....	59'4	59'2
Mean Daily Range .....	14'1	13'2
Mean Temperature (deduced from Max. and Min.)	65'2	64'9
Mean Temperature (deduced from Dry Bulb.) .....	64'9	64'6
Adopted Mean Temperature .....	65'1	64'8
Mean Temperature of Evaporation .....	59'7	59'8
Mean Temperature of Dew-point.....	55'7	56'1
Mean Elastic force of Vapour.....inches	0'444	0'451
Mean Weight of Vapour in a cubic foot of air, grains	5'1	5'1
Mean additional weight required for saturation „	2'0	1'8
Mean degree of Humidity.....	74	75
Mean Weight of a cubic foot of air .....grains	527'8	527'8
Fall of Rain ..... inches	13'745	17'620
Number of days on which Rain fell.....	59	72
Mean amount of Cloud (an overcast sky = 10) .....	3'5	3'4
Total number of miles of Wind indicated .....	86662	83144
Mean Velocity of Wind per hour .....miles	9'9	9'5
The maximum monthly mean height of the Barometer was in February, 1887, and was.....inches 30'180		
The minimum „ „ in January, 1886, and was „ 29'844		

The maximum yearly mean height of the Barometer was in 1884, and was .....	inches	30·057
The minimum ,, ,, in 1885, and was.....	,,	30·009
The greatest monthly range of the Barometer was in January, 1886, and was .....	,,	1·201
The least ,, ,, ,, in August 1883, and was.....	,,	0·188
The highest reading of the Barometer during 5 years was on the 26th January, 1887, and was .....	,,	30·627
The lowest ,, ,, on the 17th January, 1886, and was ..	,,	29·155
Extreme range .....	,,	1·472
The highest temperature was on the 8th August, 1885, and was		103·9
The lowest ,, ,, 12th March, 1886, ,,		40·2
The highest mean temperature of a month was in August, 1885, and was.....		83·2
The lowest ,, ,, January, 1887, and was		51·6
The greatest monthly mean weight of vapour in a cubic foot was in August, 1885, and was .....	grains	7·9
The least ,, ,, January, 1884, and was ,,		3·3
The highest observed Dew-point was on the 30th August, 1885, and was.....		78·7
The lowest ,, ,, 14th December, 1883, and was		29·8
The greatest fall of rain in a month was in October, 1887, and was .....	inches	8·803
The greatest number of days on which rain fell in one month was in January, 1886 ..	days	16
The highest temperature registered in sunshine was on the 24th July, 1887, and was .....		158·4
The lowest temperature registered on ground was on the 15th January, 1885, and was .....		33·8
The highest observed sea temperature was on the 5th August, 1887, and was .....		85·0
The lowest ,, ,, ,, on 6th March, 1888, and was		57·5





## APRIL.

The Dew-point ranged between  $59.5^{\circ}$  on the 8th and  $41.1^{\circ}$  on the 11th.

In Sunshine, the highest reading was  $131.4^{\circ}$  on the 7th.

On Ground, the lowest reading was  $42.1^{\circ}$  on the 15th.

The Sea has risen from  $61.3^{\circ}$  to  $63.0^{\circ}$ .

Lightning was seen on the 15th.

The Temperature rose above  $70^{\circ}$  on 14 days.

## MAY.

The Dew-point ranged between  $46.0^{\circ}$  on the 7th and  $61.5^{\circ}$  on the 13th.

In Sunshine, the highest reading was  $140.2^{\circ}$  on the 28th.

On Ground, the lowest reading was  $45.3$  on the 8th.

The Sea has risen from  $63.0^{\circ}$  to  $69.4^{\circ}$ .

Thunderstorms passed on the 17th and 27th.

Lightning was seen on the 26th.

An average month except as regards rainfall and clouds which are notably in excess.

## JUNE.

The Dew-point ranged between  $49.3^{\circ}$  on the 9th and  $70.9^{\circ}$  on the 22nd.

In Sunshine, the highest reading was  $146.5^{\circ}$  on the 11th.

On Ground, the lowest reading was  $53.3^{\circ}$  on the 3rd.

The Sea has risen from  $69.4^{\circ}$  to  $77.0^{\circ}$ .

Slight earthquake shocks were felt on the 22nd.

## JULY.

The Dew-point ranged between  $50.9$  on the 8th and  $74.3$  on the 11th.

In Sunshine, the highest reading was  $154.7$  on the 10th.

On Ground, the lowest reading was  $56.0$  on the 27th.

The Sea has risen from  $76.0$  to  $82.8$ .

## AUGUST.

The Dew-point ranged between  $51.8^{\circ}$  on the 17th, and  $72.0^{\circ}$  on the 18th.

In Sunshine, the highest reading was  $146.5^{\circ}$  on the 2nd.

On Ground, the lowest reading was  $56.9^{\circ}$  on the 21st.

The Sea has fallen from  $79.9^{\circ}$  to  $76.4^{\circ}$ .

Lightning was seen on the 26th and 27th.

## SEPTEMBER.

The Dew-point ranged between  $73.5^{\circ}$  on the 9th and  $62.2^{\circ}$  on the 30th.

In Sunshine, the highest reading was  $143.3$  on the 17th.

On Ground, the lowest reading was  $57.2^{\circ}$  on the 30th.

The Sea has remained stationary at about  $78.9^{\circ}$ .

A Thunderstorm passed on the 18th.

Lightning was seen on the 19th, 20th, 27th and 28th.

## OCTOBER.

The Dew-point ranged between  $74.1^{\circ}$  on the 3rd and  $40.6^{\circ}$  on the 21st.

In Sunshine, the highest reading was  $135.8^{\circ}$  on the 2nd.

On Ground, the lowest reading was  $47.4^{\circ}$  on the 22nd and 30th.

The Sea has fallen from  $77.9^{\circ}$  to  $69.0^{\circ}$ .

Thunderstorms passed on the 8th, 10th and 12th.

Lightning was seen on the 17th.

Total Rainfall since last June  $4.768$  inches ;  
the average of 5 years,  $4.659$  inches.

## NOVEMBER.

The Dew-point ranged between  $64.2^{\circ}$  on the 7th and  $38.2^{\circ}$  on the 23rd.

In Sunshine, the highest reading was  $126.3^{\circ}$  on the 5th.

On Ground, the lowest reading was  $43.8^{\circ}$  on the 12th.

The Sea has fallen from  $69.0^{\circ}$  to  $64.8^{\circ}$

A Thunderstorm passed on the 19th.

Lightning was seen on the 22nd and 23rd.

Hail fell on the 23rd.

Total Rainfall since last June  $5.507$  inches ;  
the average of 5 years,  $8.769$  inches.

Rainfall much below average.

## DECEMBER.

Dew-Point, ranged between  $60.8^{\circ}$  on the 2nd, and  $37.5^{\circ}$  on the 8th.

In Sunshine, the highest reading was  $117.4^{\circ}$  on the 3rd.

On ground the lowest reading was  $36.5^{\circ}$  on the 9th.

The Sea has fallen from  $65.4^{\circ}$  to  $62.1^{\circ}$ .

A Thunderstorm passed on the 19th.

Lightning was seen on the 4th and 27th.

Total Rainfall since last June  $7.175$  inches ; the average of 5 years,  
 $12.033$  inches.

## NOTES FOR THE YEAR.

Dew-Point, ranged between  $31.7^{\circ}$  on the 14th January and  $74.3^{\circ}$  on the 11th July.

In Sunshine the highest reading was  $154.7^{\circ}$  on the 10th July.

On Ground the lowest reading was  $34.0^{\circ}$  on the 29th February.

The Sea has ranged from  $57.5^{\circ}$  to  $82.8^{\circ}$ .

Thunderstorms passed on 13 days.

Hail fell on 6 days.

The range of temperature and pressure is above the average.

The amount of rainfall and the number of days with rain is much below the average.

J. SCOLLS, S.J.

*St. Ignatius' College.*



# St. Ignatius' College, Malta.

Lat. 35° 55' N.

Long. 14° 29' E.

Barometer Readings reduced to 32° F. at sea level.

## METEOROLOGICAL REPORT FOR 1887.

Results of observations taken during the Months.	1886.
Mean Reading of Barometer .....inches	30·031
Highest „ „ on the 26th Jan. ..	30·627
Lowest „ „ on the 7th April ..	29·491
Range of Barometer Readings ..	1·136
Highest Reading of Max. Therm. on the 24th July .....	100·2
Lowest Reading of Min. Therm. on the 11th January.....	43·0
Range of Thermometer Readings .....	57·2
Greatest Range in 24 hours on the 29th May	29·0
Mean of all the Highest Readings .....	73·3
Mean of all the Lowest Readings .....	59·7
Mean Daily Range .....	13·6
Mean Temperature (deduced from Max. and Min.) .....	65·6
Mean Temperature (deduced from Dry Bulb)	65·2
Adopted Mean Temperature .....	65·4
Mean Temperature of Evaporation .....	60·3
Mean Temperature of Dew-point.....	56·6
Mean Elastic force of Vapour ..... inches	0·459
Mean Weight of Vapour in a cubic foot of air.....grains	5·2
Mean additional weight required for saturation .....	1·9
Mean degree of Humidity .....	75
Mean Weight of a cubic foot of air...grains	527·3
Fall of Rain .....	17·220
Number of days on which Rain fell .....	82
Mean amount of Cloud (an overcast sky = 10.	3·7
Total number of miles of Wind indicated...	79631
Mean Velocity of Wind per hour .....miles	9·1

The Dew Point ranged between 75°0 on the 30th September, and 34°5 on the 31st December.

In Sunshine, the highest reading was 158°4 on the 24th July.

On Ground, the lowest reading was 36°0 on the 30th January.

The Sea has ranged between 58°5 and 85°0.

The mean temperature of the Sea is 69°0.

J. SCOLES, S.J.

