

STONYHURST COLLEGE

OBSERVATORY.

RESULTS

OF

METEOROLOGICAL AND MAGNETICAL
OBSERVATIONS.

1881.

MANRESA PRESS, ROEHAMPTON.

1882.

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INTRODUCTION.

DURING the last twelve months the daily solar observations of the chromosphere and of the spots have been continued uninterruptedly, and have now become as much a part of the routine work as the meteorological and magnetic observations. Drawings of the sun were made on 163 occasions. A light board is attached to the eye-end of the telescope, and a rapid tracing made of the projected image. The details of each spot are then filled in as accurately as possible, the image being placed close by the side of each sketch which is in progress. The diameter of the projected image is usually $10\frac{1}{2}$ inches, but when a spot presents any features of special interest an enlarged drawing is made on the scale of 30 inches to the solar diameter. The daily measures of the chromosphere and prominences have suffered more from the weather, the entire chromosphere having been examined only 46 times. There appears to be a slight increase in the average height of the chromosphere over the preceding year, but the highest prominence measured was only 101.2 against 147.9 in 1880.

Increased attention has been paid to the exact record of the paths of meteors, and a systematic watch for auroras was undertaken in connection with the work of M. Sophus Tromholt.

The French synchronous meteorological observations are no longer required, and those for the United States Government have been altered slightly in time.

Some of the daily magnetic curves have been forwarded to London for comparison with those of other stations. The time of the flowering of plants is now noted with great care, and 127 specimens belonging to 42 natural orders were collected during the year, of which a list is subjoined.

In the course of the twelve months 46 observations were secured of Jupiter's satellites, and 8 occultations of stars by the moon.

A considerable portion of the year has been occupied in observations in preparation for the coming Transit of Venus, which, weather permitting, will be observed by some of the Observatory staff at Madagascar.

A new star spectroscope is in course of construction, an account of which will appear in a future Report.

The results of some of the astronomical observations have already appeared in the *Monthly Notices* of the R.A.S., in *Copernicus*, and in *Nature*, and the meteorological work is published by the Board of Trade.

S. J. PERRY.

Stonhurst Observatory.

Lat. 53° 50' 40" N. Long. 9m. 52s. 68. w. Height of the Barometer above the sea, 381 ft.

METEOROLOGICAL REPORT.

January, 1881.

Results of Observations taken during the month.	Mean for the last 34 years.	
Mean Reading of the Barometer.....	29'508	29'422
Highest ,, on the 7th	30'280	30'021
Lowest ,, on the 29th	28'480	28'586
Range of Barometer Readings.....	1'800	1'435
Highest Reading of a Max. Therm. on the 30th	47'2	51'6
Lowest Reading of a Min. Therm. on the 15th.....	4'6	20'4
Range of Thermometer Readings	42'6	31'2
Mean of all the Highest Readings	36'4	42'0
Mean of all the Lowest.....	22'6	32'5
Mean Daily Range	13'8	9'5
Deduced Monthly Mean (from Mean of Max. and Min.)	29'3	37'1
Mean Temperature from dry bulb	29'1	37'3
Adopted Mean Temperature	29'2	37'2
Mean Temperature of Evaporation.....	27'9	35'8
Mean Temperature of Dew Point	23'1	33'6
Mean elastic force of Vapour	0'125 in	0'195 in
Mean weight of Vapour in a cubic foot of air	1'5 gr	2'3 gr
Mean additional weight required for saturation.....	0'4 gr	0'4 gr
Mean degree of Humidity (saturation 1'00)	0'79	0'86
Mean weight of a cubic foot of air	559'7 gr	549'3 gr
Fall of Rain	0'472 in	4'104 in
Number of days on which Rain fell	9	20'1
Amount of Evaporation	0'322 in	0'762 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	8	11	4	1	0	2	3	2
Mean Velocity in miles per hour	3.6	5.6	13.9	4.3	0	4.6	5.6	2.9
Total No. of miles for each Direction	667	1484	1335	103	0	219	404	140

The total number of miles registered during the month was 4352.

The max. Velocity of the wind was 30 miles per hour; direction E. by N. on the 18th at noon.

Mean amount of Cloud (an overcast sky being indicated by 10.0) 6.8

In the month of January, the highest reading of the Barometer during 33 years, was on the 8th, in 1859, and was 30.310

The lowest " " 15th, 1865 27.939

The highest Temperature " 7th, 1877 59.9

The lowest " " 15th, 1881 4.6

The highest adopted mean temperature of the month, 1875 42.5

The lowest " " 1881 29.2

The Barometer is slightly higher than the mean of former years. The range is rather great.

The minimum Temperature on the 15th, 4.6, is the lowest ever recorded at Stonyhurst, and the adopted mean Temperature is also the lowest on record.

The Rainfall is exceedingly small. Evaporation less than $\frac{1}{2}$ that for other years.

The prevailing winds were N.E. and E.

February, 1881.

Results of Observations taken during the month.		Mean for the last 34 years.
Mean Reading of the Barometer	29'410	29'477
Highest " on the 21st	29'993	30'074
Lowest " on the 10th	28'345	28'663
Range of Barometer Readings	1'648	1'411
Highest Reading of a Max. Therm. on the 3rd	50'2	51'6
Lowest Reading of a Min. Therm. on the 28th	19'4	22'7
Range of Thermometer Readings	30'8	28'9
Mean of all the Highest Readings	41'1	44'0
Mean of all the Lowest	31'1	33'9
Mean Daily Range	10'0	10'1
Deduced Monthly Mean (from Mean of Max. and Min.)	35'7	38'6
Mean Temperature from dry bulb	36'0	38'6
Adopted Mean Temperature	35'9	38'6
Mean Temperature of Evaporation	34'6	36'8
Mean Temperature of Dew Point	32'6	34'9
Mean elastic force of Vapour	0'187 in	0'199 in
Mean weight of Vapour in a cubic foot of air	2'1 gr	2'4 gr
Mean additional weight required for saturation	0'4 gr	0'4 gr
Mean degree of Humidity (saturation 1'00)	0'88	0'87
Mean weight of a cubic foot of air	549'7 gr	548'4 gr
Fall of Rain	6'320 in	3'770 in
Number of days on which Rain fell	14	18
Amount of Evaporation	2'970 in	0'918 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		2	8	4	0	5	3	4
Mean Velocity in miles per hour	10.4	6.4	9.8	0	12.3	8.8	10.4	3.8
Total No. of miles for each Direction	501	1234	942	0	1479	635	995	38

The total number of miles registered during the month was 5824.

The max. Velocity of the wind was 58 miles per hour, at 3 p.m. on the 7th, direction S. by E.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	8·2
In the month of February, the highest reading of the Barometer during 34 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 is very close to the mean, and the range is slightly in excess.

Temperature is low. Rainfall is 2·5 inches above the mean. Evaporation is also great. The number of wet days was four below the mean.

Prevailing wind from N.E. South winds much stronger. The hourly max. velocity of the wind, 58 miles, is the greatest ever recorded at this Observatory.

March, 1881.

Results of Observations taken during the month.		Mean for the last 34 years.
Mean Reading of the Barometer	29'446	29'465
Highest ,, on the 17th	30'105	30'073
Lowest ,, on the 7th	28'700	28'702
Range of Barometer Readings.....	1'405	1'371
Highest Reading of a Max. Therm. on the 7th	55'9	56'5
Lowest Reading of a Min. Therm. on the 1st	18'6	23'2
Range of Thermometer Readings	37'5	33'3
Mean of all the Highest Readings	46'3	46'9
Mean of all the Lowest.....	33'2	34'4
Mean Daily Range.....	13'1	12'5
Deduced Monthly Mean (from Mean of Max. and Min.)	38'8	39'7
Mean Temperature from dry bulb	39'1	40'0
Adopted Mean Temperature	39'0	39'9
Mean Temperature of Evaporation	37'5	38'0
Mean Temperature of Dew Point	35'6	35'6
Mean elastic force of Vapour	0'209 in	0'207 in
Mean weight of Vapour in a cubic foot of air	2'4gr	2'4gr
Mean additional weight required for saturation.....	0'4gr	0'5gr
Mean degree of Humidity (saturation 1'00)	0'88	0'85
Mean weight of a cubic foot of air	547'1gr	546'4gr
Fall of Rain	4'968 in	3'131 in
Number of days on which Rain fell	19	18'0
Amount of Evaporation	3'225 in	1'708 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		0	6	5	0	2	3	11
Mean Velocity in miles per hour	0	6'4	13'4	0	12'0	8'7	20'0	5'2
Total No. of miles for each Direction	0	925	1612	0	574	626	5161	497

The total number of miles registered during the month was 9395.

The max. Velocity of the wind was 39 miles per hour, direction W. by S., at 10 a.m. on the 9th.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	8'6
In the month of March, the highest reading of the Barometer during 34 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 " " 4th, 1866	14'5
The highest adopted mean temperature of the month, 1871	44'0
The lowest " " 1855	35'6

The Barometer is almost identical with the mean of other years.
 Temperature is slightly below the average. Rainfall 1'8 inches in excess.
 The prevailing wind is W.

April, 1881.

Results of Observations taken during the month.		Mean for the last 34 years.
Mean Reading of the Barometer.....	29'594	29'482
Highest " on the 8th	29'781	29'960
Lowest " on the 30th	29'126	28'770
Range of Barometer Readings	0'655	1'190
Highest Reading of a Max. Therm. on the 14th	58'1	66'6
Lowest Reading of a Min. Therm. on the 3rd	25'4	28'7
Range of Thermometer Readings	32'7	37'9
Mean of all the Highest Readings	52'0	54'0
Mean of all the Lowest.....	36'3	38'1
Mean Daily Range	15'7	15'9
Deduced Monthly Mean (from Mean of Max. and Min.)	42'7	44'6
Mean Temperature from dry bulb	42'6	44'7
Adopted Mean Temperature	42'7	44'7
Mean Temperature of Evaporation	40'2	41'8
Mean Temperature of Dew Point	37'2	38'7
Mean elastic force of Vapour	0'222 in	0'236 in
Mean weight of Vapour in a cubic foot of air	2'6gr	2'7gr
Mean additional weight required for saturation	0'6gr	0'7gr
Mean degree of Humidity (saturation 1'00)	0'82	0'80
Mean weight of a cubic foot of air	545'8gr	541'6gr
Fall of Rain	2'010 in	2'288 in
Number of days on which Rain fell	12	15'3
Amount of Evaporation	1'430 in	2'521 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		0	7	10	1	2	3	5
Mean Velocity in miles per hour	0	10'2	11'4	7'8	7'9	6'5	11'7	10'3
Total No. of miles for each Direction	0	1711	3723	187	377	469	1402	492

The total number of miles registered during the month was 8361.

The max. Velocity of the wind was 39 miles per hour, direction W., on the 25th at noon.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	7·1
In the month of April, the highest reading of the Barometer during 34 years, was on the 22nd, in 1855, and was	30·191
The lowest " " 20th, 1868	28·358
The highest Temperature " 14th, 1852	74·1
The lowest " " 12th, 1862	24·7
The highest adopted mean temperature of the month, 1865	48·5
The lowest " " 1879	40·7

The mean Barometer is rather high, but the range is very small.
 The Temperature is low. The Rainfall is slightly below the mean.
 The most prevalent winds were from the E.

May, 1881.

Results of Observations taken during the month.	Mean for the last 34 years.	
Mean Reading of the Barometer	29·676	29·531
Highest " on the 10th.....	30·332	29·958
Lowest " on the 15th.....	28·808	28·970
Range of Barometer Readings.....	1·524	0·988
Highest Reading of a Max. Therm. on the 31st	76·8	71·8
Lowest Reading of a Min. Therm. on the 2nd.....	34·1	31·4
Range of Thermometer Readings	42·7	40·4
Mean of all the Highest Readings	63·2	59·7
Mean of all the Lowest.....	43·3	42·2
Mean Daily Range	19·9	17·5
Deduced Monthly Mean (from Mean of Max. and Min.)	51·6	49·3
Mean Temperature from dry bulb	52·4	49·6
Adopted Mean Temperature	52·0	49·5
Mean Temperature of Evaporation	47·7	46·3
Mean Temperature of Dew Point	43·3	42·8
Mean elastic force of Vapour	0·274 in	0·276 in
Mean weight of Vapour in a cubic foot of air	3·2gr	3·2gr
Mean additional weight required for saturation	1·2gr	0·9gr
Mean degree of Humidity (saturation 1·00)	0·75	0·77
Mean weight of a cubic foot of air	533·4gr	536·9gr
Fall of Rain	5·587 in	2·579 in
Number of days on which Rain fell	15	15·3
Amount of Evaporation	3·952 in	3·587 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	4	5	1	2	10	8	1
Mean Velocity in miles per hour	0	7·6	9·1	11·7	15·5	11·8	7·7	19·7
Total No. of miles for each Direction	0	727	1194	281	743	2936	1475	472

The total number of miles registered during the month was 7628.

The max. Velocity of the wind was 34 miles per hour, direction S., on the 15th at 10 p.m.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	5'8
In the month of May, the highest reading of the Barometer during 34 years, was on the 22nd, in 1855, and was	30'124
The lowest " " 28th, 1877	28'559
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 Barometer is slightly above the mean of previous years. The range 0'5 greater than usual.

Temperature 2'5 above average. Rainfall 3 inches in excess of that of other years, owing to the heavy falls on the 5th (1'64 inches) and 17th (1'138 inches). The number of wet days and the amount of evaporation are almost identical with the mean of other years.

S.W. winds were most frequent, but the strongest were from the South.

June, 1881.

Results of Observations taken during the month.		Mean for the last 34 years.
Mean Reading of the Barometer	29'543	29'521
Highest ,, on the 1st	29'888	29'895
Lowest ,, on the 21st.....	29'010	29'004
Range of Barometer Readings	0'878	0'891
Highest Reading of a Max. Therm. on the 2nd.....	75'9	76'7
Lowest Reading of a Min. Therm. on the 9th	36'4	39'0
Range of Thermometer Readings	39'7	37'7
Mean of all the Highest Readings	64'2	65'3
Mean of all the Lowest	46'8	48'0
Mean Daily Range	17'4	17'3
Deduced Monthly Mean (from Mean of Max. and Min.)	53'7	54'9
Mean Temperature from dry bulb	54'2	54'7
Adopted Mean Temperature	54'0	54'8
Mean Temperature of Evaporation.....	50'3	52'1
Mean Temperature of Dew Point	46'7	48'9
Mean elastic force of Vapour	0'401 in	0'359 in
Mean weight of Vapour in a cubic foot of air	3'6gr	3'9gr
Mean additional weight required for saturation.....	1'1gr	0'9gr
Mean degree of Humidity (saturation 1'00)	0'76	0'79
Mean weight of a cubic foot of air	532'3gr	530'9gr
Fall of Rain	2'738 in	3'772 in
Number of Days on which Rain fell	17	17'4
Amount of Evaporation	2'353 in	3'745 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		2	1	0	3	4	7	9
Mean Velocity in miles per hour	8'2	3'6	0	7'0	9'2	10'3	9'4	6'6
Total No. of miles for each Direction	394	87	0	504	881	1723	2022	629

The total number of miles registered during the month was 6239.

The max. Velocity of the wind was 30 miles per hour, direction S., at 4 p.m. on the 21st.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	8'3
In the month of June, the highest reading of the Barometer during 34 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

The Barometer and Thermometer differ but very slightly from the mean.

The Rainfall is an inch below the average, and the amount of evaporation also very small.

W. winds most frequent, but strongest from S.W. and S.

July, 1881.

Results of Observations taken during the month.		Mean for the last 34 years.
Mean Reading of the Barometer	29'549	29'508
Highest ,, on the 14th.....	29'874	29'876
Lowest ,, on the 31st.....	29'007	29'003
Range of Barometer Readings.....	0'867	0'873
Highest Reading of a Max. Therm. on the 5th	83'2	78'8
Lowest Reading of a Min. Therm. on the 20th.....	41'9	42'5
Range of Thermometer Readings	41'3	36'3
Mean of all the Highest Readings	67'6	68'0
Mean of all the Lowest.....	50'1	51'0
Mean Daily Range	17'5	17'0
Deduced Monthly Mean (from Mean of Max. and Min.)	56'9	57'6
Mean Temperature from dry bulb	56'7	58'0
Adopted Mean Temperature	56'8	57'8
Mean Temperature of Evaporation.....	54'7	55'1
Mean Temperature of Dew Point	52'8	52'5
Mean elastic force of Vapour	0'401 in	0'397 in
Mean weight of Vapour in a cubic foot of air	4'4gr	4'5gr
Mean additional weight required for saturation	0'7gr	0'9gr
Mean degree of Humidity (saturation 1'00)	0'86	0'82
Mean weight of a cubic foot of air	529'1gr	527'2gr
Fall of Rain	5'822 in	4'160 in
Number of days on which Rain fell	20	17'6
Amount of Evaporation	4'622 in	4'077 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	0	0	0	0	13	16	2
Mean Velocity in miles per hour	0	0	0	0	0	9'3	9'0	6'3
Total No. of miles for each Direction	0	0	0	0	0	2991	3530	304

The total number of miles registered during the month was 6825.

The max. Velocity of the wind was 29 miles per hour, direction W., at 5 p.m. on the 6th.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	8'0
In the month of July, the highest reading of the Barometer during 34 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 " " " 1879	54'7

The Barometer is a little above the mean. The Temperature a little lower. Rainfall 1'7 in. in excess. The amount of evaporation is also greater than the mean of former years.

W. and S.W. winds prevailed nearly all through the month.

August, 1881.

Results of Observations taken during the month.	Mean for the last 34 years.	
Mean Reading of the Barometer	29'389	29'485
Highest " on the 31st	29'916	29'889
Lowest " on the 26th	28'757	28'948
Range of Barometer Readings.....	1'159	0'941
Highest Reading of a Max. Therm. on the 5th	75'0	77'1
Lowest Reading of a Min. Therm. on the 2nd	40'1	41'6
Range of Thermometer Readings	34'9	35'5
Mean of all the Highest Readings	63'5	67'2
Mean of all the Lowest.....	48'4	50'9
Mean Daily Range.....	15'1	16'3
Deduced Monthly Mean (from Mean of Max. and Min.)	54'3	57'4
Mean Temperature from dry bulb	55'0	57'5
Adopted Mean Temperature	54'7	57'5
Mean Temperature of Evaporation.....	52'1	54'7
Mean Temperature of Dew Point	46'9	52'3
Mean elastic force of Vapour	0'354 in	0'394 in
Mean weight of Vapour in a cubic foot of air	4'0gr	4'3gr
Mean additional weight required for saturation.....	0'9gr	0'9gr
Mean degree of Humidity (saturation 1'00)	0'83	0'83
Mean weight of a cubic foot of air	528'5gr	527'1 gr
Fall of Rain	6'215 in	4'944 in
Number of days on which Rain fell	22	19'5
Amount of Evaporation	3'965 in	3'423 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		0	3	0	0	2	9	13
Mean Velocity in miles per hour	0	6'9	0	0	11'7	8'1	10'3	10'9
Total No. of miles for each Direction	0	502	0	0	562	1744	3213	1041

The total number of miles registered during the month was 7062.

The max. Velocity of the wind was 36 miles per hour; direction S.W. on the 26th at 10 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...			8·8
In the month of August, the highest reading of the Barometer during 34 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	„	21st, 1864 & 1869	36·0
The highest adopted mean temperature of the month, 1857			61·0
The lowest	„	1848	52·5

The Temperature is nearly 3° below the average.

The Rainfall is more than an inch in excess.

S. W. winds most frequent, but the strongest were from the South.

September, 1881.

Results of Observations taken during the month.	Mean for the last 34 years.	
Mean Reading of the Barometer	29'574	29'508
Highest ,, on the 28th	29'976	30'031
Lowest ,, on the 21st	29'024	28'842
Range of Barometer Readings.....	0'952	1'189
Highest Reading of a Max. Therm. on the 4th	68'1	72'3
Lowest Reading of a Min. Therm. on the 19th	37'1	36'9
Range of Thermometer Readings	30'0	35'4
Mean of all the Highest Readings	63'0	62'3
Mean of all the Lowest.....	47'2	47'1
Mean Daily Range.....	15'8	15'2
Deduced Monthly Mean (from Mean of Max. and Min.)	52'5	53'4
Mean Temperature from dry bulb	53'2	54'0
Adopted Mean Temperature	52'9	53'7
Mean Temperature of Evaporation.....	50'0	51'1
Mean Temperature of Dew Point	47'1	48'5
Mean elastic force of Vapour	0'324 in	0'342 in
Mean weight of Vapour in a cubic foot of air	3'6gr	3'9gr
Mean additional weight required for saturation.....	0'9gr	0'8gr
Mean degree of Humidity (saturation 1'00)	0'81	0'82
Mean weight of a cubic foot of air	534'0gr	531'8gr
Fall of Rain	2'164 in	4'572 in
Number of days on which Rain fell	16	18'6
Amount of Evaporation	1'164 in	2'303 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		8	3	2	0	4	8	4
Mean Velocity in miles per hour	1'7	5'4	7'5	6'9	0	4'4	3'9	2'8
Total No. of miles for each Direction	40	1033	540	335	0	418	722	269

The total number of miles registered during the month was 3357.

The max. Velocity of the wind was 22 miles per hour, direction S.S.E. and E.S.E., at noon on the 20th, and 1 p.m. on the 21st.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	8.3
In the month of September, the highest reading of the Barometer during 34 years, was on the 15th, in 1851, and was	30'274
The lowest ,, ,, 22nd, 1863	28'371
The highest Temperature ,, 6th, 1868	85'0
The lowest ,, ,, 6th, 1855	30'7
The highest adopted mean temperature of the month, 1865	59'1
The lowest ,, ,, 1863	50'9

The Barometer is very close to the mean of other years.

The Temperature is rather low. The Rainfall is more than 2 inches below the mean, and the evaporation not half the usual amount for the month.

October, 1881.

Results of Observations taken during the month.	Mean for the last 34 years.	
Mean Reading of the Barometer.....	29·625	29·416
Highest ,, on the 6th	30·094	29·990
Lowest ,, on the 14th.....	28·168	28·638
Range of Barometer Readings.....	1·926	1·352
Highest Reading of a Max. Therm. on the 4th	61·1	64·5
Lowest Reading of a Min. Therm. on the 30th.....	24·8	29·5
Range of Thermometer Readings	36·3	35·0
Mean of all the Highest Readings	53·2	54·6
Mean of all the Lowest.....	38·2	42·1
Mean Daily Range	15·0	12·5
Deduced Monthly Mean (from Mean of Max. and Min.)	44·7	47·4
Mean Temperature from dry bulb	44·3	47·9
Adopted Mean Temperature	44·5	47·7
Mean Temperature of Evaporation.....	41·6	45·5
Mean Temperature of Dew Point	38·1	43·1
Mean elastic force of Vapour	0·231 in	0·280 in
Mean weight of Vapour in a cubic foot of air	2·7gr	3·2gr
Mean additional weight required for saturation	0·7gr	0·6gr
Mean degree of Humidity (saturation 1·00)	0·78	0·85
Mean weight of a cubic foot of air	544·4gr	543·6gr
Fall of Rain	3·368 in	5·241 in
Number of days on which Rain fell	12	21·1
Amount of Evaporation	2·078 in	1·666 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		1	8	9	1	1	1	5
Mean Velocity in miles per hour	5·1	6·3	14·5	7·7	4·7	5·5	16·3	12·0
Total No. of miles for each Direction	123	1199	3136	185	113	133	1953	1442

The total number of miles registered during the month was 8284.

The max. Velocity of the wind was 41 miles per hour, direction N.W., at 2 and 3 p.m. on the 14th.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	6'2
In the month of October, the highest reading of the Barometer during 34 years, was on the 6th, in 1877, and was	30'282
The lowest ,, ,, 19th, 1862	28'139
The highest Temperature ,, 9th, 1869	72'8
The lowest ,, ,, 21st, 1880	23'1
The highest adopted mean temperature of the month, 1861 and 1876	51'6
The lowest ,, ,, 1880	43'1

Both the mean Barometer and the range are somewhat in excess of the average.

The Temperature is low, and the Rainfall nearly 2 inches below the mean.

The most frequent winds were E. and N.E., and the strongest generally from the West.

November, 1881.

Results of Observations taken during the month.	Mean for the last 34 years.	
Mean Reading of the Barometer	29'380	29'457
Highest ,, on the 13th.....	29'935	30'057
Lowest ,, on the 16th.....	28'219	28'591
Range of Barometer Readings.....	1'716	1'466
Highest Reading of a Max. Therm. on the 6th	60'8	55'6
Lowest Reading of a Min. Therm. on the 17th.....	30'3	25'3
Range of Thermometer Readings	30'5	30'2
Mean of all the Highest Readings	53'1	46'9
Mean of all the Lowest	42'3	36'2
Mean Daily Range	10'8	10'7
Deduced Monthly Mean (from Mean of Max. and Min.)	47'3	41'2
Mean Temperature from dry bulb	46'6	41'3
Adopted Mean Temperature	47'0	41'3
Mean Temperature of Evaporation.....	45'4	38'9
Mean Temperature of Dew Point	43'6	37'6
Mean elastic force of Vapour	0'284 in	0'225 in
Mean weight of Vapour in a cubic foot of air	3'3gr	2'6gr
Mean additional weight required for saturation	0'4gr	0'4gr
Mean degree of Humidity (saturation 1'00)	0'89	0'87
Mean weight of a cubic foot of air	536'9gr	544'5gr
Fall of Rain	5'226 in	4'141 in
Number of days on which Rain fell	22	19'1
Amount of Evaporation	3'946 in	1'432 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		3	4	5	3	5	3	3
Mean Velocity in miles per hour	13'7	11'5	10'5	17'3	20'6	14'2	10'6	9'4
Total No. of miles for each Direction	985	1107	1216	1248	2477	1021	760	899

The total number of miles registered during the month was 9713.

The max. Velocity of the wind was 45 miles per hour, direction W. by S., on the 27th at 7 p.m.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...			8·4
In the month of November, the highest reading of the Barometer during 34 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 range of the Barometer is rather large. The adopted mean temperature is 6° above the mean of former years.

The Rainfall is an inch in excess, and the evaporation 2·5 inches greater than usual.

December, 1881.

Results of Observations taken during the month.		Mean for the last 34 years.
Mean Reading of the Barometer	29'496	29'450
Highest ,, on the 23rd.....	30'099	30'059
Lowest ,, on the 20th.....	28'362	28'603
Range of Barometer Readings.....	1'737	1'456
Highest Reading of a Max. Therm. on the 2nd	56'7	52'9
Lowest Reading of a Min. Therm. on the 9th	24'6	20'5
Range of Thermometer Readings	32'1	32'4
Mean of all the Highest Readings	44'0	42'8
Mean of all the Lowest.....	33'2	33'4
Mean Daily Range.....	10'8	9'4
Deduced Monthly Mean (from Mean of Max. and Min.)	38'6	38'1
Mean Temperature from dry bulb	38'6	38'8
Adopted Mean Temperature	38'6	38'5
Mean Temperature of Evaporation.....	37'6	37'4
Mean Temperature of Dew Point	34'1	35'4
Mean elastic force of Vapour	0'197 in	0'209 in
Mean weight of Vapour in a cubic foot of air	2'3gr	2'4gr
Mean additional weight required for saturation.....	0'5gr	0'4gr
Mean degree of Humidity (saturation 1'00)	0'85	0'88
Mean weight of a cubic foot of air	548'5gr	547'7gr
Fall of Rain	4'773 in	4'558 in
Number of days on which Rain fell.....	23	20'5
Amount of Evaporation	1'923 in	0'985 in

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		2	2	0	0	8	9	6
Mean Velocity in miles per hour	5'0	1'3	0	0	12'6	8'1	15'9	6'0
Total No. of miles for each Direction	240	60	0	0	2418	1742	2290	571

The total number of miles registered during the month was 7321.

The max. Velocity of the wind was 43 miles per hour, direction S., at 5 p.m. on the 6th.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...			7·5
In the month of December, the highest reading of the Barometer during 34 years, was on the 22nd, in 1849, and was			30·378
The lowest	„	5th, 1876	28·028
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

The range of the Barometer is rather large, but the mean Barometer and Thermometer are almost identical with the mean of previous years. Rainfall is also very close to the average, but the evaporation is an inch above it.

The most frequent winds were from S.W. and S.

Summary of the Observations

FOR 1881.

	Mean for the last 34 years.
Mean Reading of the Barometer	29'516
Highest ,, on May 10th	30'332
Lowest ,, on October 14th	28'168
Range of Barometer Readings	2'154
Highest Reading of a Max. Therm. on July 5th	83'2
Lowest Reading of a Min. Therm. on January 15th...	4'6
Range of Thermometer Readings	78'6
Mean of all the Highest Readings	54'0
Mean of all the Lowest.....	39'4
Mean Daily Range	14'6
Deduced Yearly Mean (from Mean of Max. and Min.)	45'7
Mean Temperature of dry bulb	45'7
Adopted Mean Temperature	45'7
Mean Temperature of Evaporation'	43'3
Mean Temperature of Dew Point	40'3
Mean elastic force of Vapour	0'267 in
Mean weight of Vapour in a cubic foot of air	3'0gr
Mean additional weight required for saturation.....	0'7gr
Mean degree of Humidity (saturation 1'00)	0'83
Mean weight of a cubic foot of air	540'9gr
Total Fall of Rain in the Year	49'663 in
Number of days per Month on which Rain fell.....	16'8
Amount of Evaporation	31'952 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 1858,
 and was..... 29'544
 The Minimum , ,, ,, ,, in 1866, and was ... 29'389

The greatest monthly range of the Barometer was in November, 1859, and was	2'290
The least " " in July, 1852, and was	0'505
The highest reading of the Barometer, during 33 years, was on February 11th, 1849, and on March 4th, 1854, and was	30'452
The lowest " " on July 22nd, 1873, and was ...	27'939
Extreme range	2'513
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 13'437 in	
The least " " May, 1853, and May, 1859	0'3
The greatest number of days on } which rain fell in one month } July, 1861, December, 1868	31
The least " " March, 1852	3

The greatest hourly velocity of the wind ever recorded was 58 miles, direction S. by E., on February 7, 1881.

DATES OF OCCASIONAL PHENOMENA.

1881.	Frost.	Hoar frost only.	Snow.	Hail.
January	4-21, 23-27, 30, 31	8-15	11, 15, 19	
February	1, 5-8, 10-13, 20-28	24, 28	2, 7, 14, 26	21, 24, 25
March	1-5, 15, 16, 20-22, 24-31	1, 16, 27-31	1, 4, 21, 24-26	25, 26
April	1-9, 20, 22	1-4, 6	20	19
May				21
June				
July				
August				
September		5, 16		
October	8, 14-17, 26, 28-31	5, 16-18, 29-31		9, 12, 15
November	1, 2, 17, 18, 23, 25, 29	18, 25	1	24, 25
December	1, 8-16, 19-24, 27, 28, 30, 31	13-15, 22, 23, 28, 31	9, 10	5, 6, 19

1881.	Heavy Rain.	Fog.	Thunder.	Lightning.	Lunar Halo.	Solar Halo.
January		8, 24, 25, 28			8	
February	13	15			12	12
March			16, 25	16		
April		28, 29	19, 26, 27	19, 26, 27		
May	5, 17, 19	4, 28	19, 21	19, 21		
June	21		5, 18, 24, 26, 31	5, 18, 24, 26, 31		5
July	5		8, 19-21, 29	19, 29		
August	19, 25, 28, 29	13, 16, 27, 28	9	9		20
September	9	1		14		31
October	12, 14	14	26	22, 23, 25-27		7
November	26, 27	22, 23			3	
December	5, 6					

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	0	0	0	1'8	5'8	6'0	2'1	0	0	3'2	5'0	4'5	6'3	0	3'6	2'6
February.....	0	0	0	0'2	0	7'8	0	0	0'7	0'5	5'1	6'4	0	0	0	0	0
March.....	4'1	4'5	0	0	0	0'5	1'5	3'3	0	0	0	1'8	0	0	7'8	8'6	0
April	10'3	4'0	11'5	6'4	10'3	11'3	7'9	10'7	7'3	10'6	0'3	0	0	1'1	0	0	8'7
May.....	4'1	1'4	6'2	4'5	0	7'1	12'9	14'0	12'8	11'8	10'6	11'8	13'2	0'3	1'6	4'1	0
June.....	12'9	13'0	10'9	5'3	8'5	7'8	5'1	9'6	6'1	0	0	7'5	1'9	7'8	1'7	1'1	0'2
July.....	6'5	5'7	2'0	0'2	5'5	0	0	1'6	4'7	7'7	12'8	6'4	4'8	11'3	12'9	7'8	1'7
August	11'0	7'4	0'9	9'8	8'3	2'5	0'7	0	5'3	3'1	0'7	8'3	0	2'6	2'6	0	3'8
September	9'3	5'9	2'0	0'7	5'5	1'6	3'2	8'7	7'3	0'6	0	0	0'1	5'1	3'0	8'1	0'7
October	8'8	8'7	1'1	3'4	9'2	1'0	1'9	5'2	2'0	0	4'4	5'3	2'6	0'3	7'6	8'5	8'5
November	0	1'7	0	0	0	4'8	0'6	0	0	0	0	0'6	0	0	1'7	0	2'7
December	0	0'4	0	0	0	0	0	3'0	0	3'8	1'4	1'0	0	0	1'2	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 per cent. each Month.
January	0	0.5	5.5	5.7	0.1	1.1	1.1	4.5	1.4	0	0	0.4	0.3	2.7	64.2	30.0
February	0.5	0	0	4.1	8.2	0	5.5	0	0	3.3	5.7	0	0	0	48.0	21.2
March	0	0	3.4	6.0	2.6	0	5.4	1.4	6.9	2.5	10.6	3.3	11.1	11.2	96.5	23.4
April	11.7	3.8	2.7	1.1	7.1	0.2	6.5	8.1	9.5	1.3	7.6	0.1	0	0	160.1	38.0
May	8.2	8.4	5.2	14.3	14.0	15.3	15.1	7.5	5.9	4.4	9.0	14.1	14.4	14.4	266.6	55.5
June	1.4	6.2	3.8	7.2	7.0	5.7	12.6	3.5	7.6	7.2	4.7	3.1	0	0	169.4	35.3
July	0.3	3.0	8.1	12.2	0.3	3.1	2.3	5.4	0	9.7	5.6	2.1	1.9	1.5	147.1	30.7
August	5.7	0	10.8	3.0	3.0	0	0	0	2.9	9.0	9.2	2.0	4.0	1.5	118.1	27.2
September	2.8	9.5	1.9	0	0	0	0	6.5	7.0	7.0	6.2	7.1	0.5	0	110.3	30.8
October	7.7	8.2	7.2	0	0	0.7	0	3.7	2.4	0	0.6	7.6	1.0	1.6	119.2	38.4
November	0	0	4.7	2.1	4.6	2.3	0	0	1.3	1.4	1.2	3.1	0.1	0	32.9	14.6
December	0.5	2.5	0.1	0	0	0.2	0	0	0	3.3	0	0.2	0	0	17.7	10.4

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	6'9	10'6	12'4	12'3	11'9	8'6	1'1	0	0	0	0	0
February	0	0	0	1'3	4'0	5'0	6'9	6'4	4'2	6'3	6'7	5'0	2'2	0	0	0	0
March	0	0	1'9	3'7	6'1	10'2	11'3	11'7	10'1	9'9	10'2	9'2	7'6	3'6	1'0	0	0
April	0	0	4'9	9'1	14'5	13'1	15'1	16'5	14'6	15'3	14'4	13'9	13'7	11'7	3'4	0	0
May	2'7	11'2	14'3	14'2	15'9	19'0	21'6	19'6	22'5	21'9	21'9	21'6	19'8	19'1	16'7	4'6	0
June	1'1	7'7	11'4	11'4	12'7	14'6	13'8	12'5	14'4	12'6	12'0	11'4	11'1	9'4	8'7	3'7	0
July ..	0'6	3'5	6'2	7'9	7'7	10'5	11'9	11'2	14'9	12'5	13'2	11'8	11'4	10'9	10'6	4'9	0'2
August	0	1'9	5'6	8'6	7'9	8'9	8'2	8'6	10'5	10'9	10'6	10'2	11'2	8'9	5'0	0'8	0
September	0	0'2	1'6	5'0	7'3	9'7	10'6	11'1	10'9	12'4	12'4	11'5	9'3	6'0	0'4	0	0
October	0	0	0	4'1	10'8	14'9	15'2	14'9	15'1	13'4	13'7	12'5	4'6	0	0	0	0
November	0	0	0	0	0'3	2'6	6'9	5'0	6'1	5'8	4'3	0'9	0	0	0	0	0
December	0	0	0	0	0	0'2	2'0	4'5	6'4	3'2	1'4	0	0	0	0	0	0
Total	4'4	24'5	45'9	65'3	87'6	115'6	134'1	134'4	142'0	136'1	129'4	109'1	90'9	69'6	45'8	14'0	0'2

AGRICULTURAL NOTES.

JANUARY.—This month was exceedingly cold. No out-door work was done, and great numbers of birds were killed by the severity of the weather. In the farm and kitchen yards, under stacks, and at the places for feeding poultry, where the small birds had collected for shelter and food, quantities of chaffinches, ox-eyes, robins, and wrens were found dead in the cold mornings.

FEBRUARY was wet and cold. A little ploughing was done in some places towards the close of the month. No flowers but a few snow-drops were in blossom.

MARCH.—Cold, especially towards the latter end of the month, with heavy falls of snow. But few spring flowers were out, and things were looking very late. Owing to the snow, cattle were not able to be out. Ploughing was going on pretty generally during the first two weeks, but was retarded a great deal towards the end of the month.

APRIL.—Although bright and sunny during the greater part of this month, it was cold owing to the prevalence of strong easterly and north-easterly winds. Vegetation was backward, grass was looking very bad, but the weather was very good for working land, and ploughing was finished in most places by the 25th. Farmers were complaining of the want of rain during the latter part of the month. Most of the potatoes were in by the end of the month.

MAY.—This month was during the greater part sunny and genial. The rain in the commencement of the month did much good, and grass was much improved by it. The hailstorm of the 19th did some damage to the blossom of the currants and gooseberries, but as the

pears and apples were not sufficiently advanced they were not much injured by it. In many places the gooseberries were much damaged by the caterpillars of the saw-fly. Although planting was somewhat retarded by the heavy rain on the 5th and 17th, a good quantity of the green crops were in by the end of the month. The scarcity of singing birds was very marked. Very few nests were to be seen. Thrushes, blackbirds, chaffinches, and robins were very scarce to what they were in previous years, while the ox-eyes, blue-tits, and wrens were scarcely to be found anywhere. The greenfinches and hedge-accenters were as plentiful as in previous years.

JUNE.—By the end of the first week vegetation was, with the exception of wheat, looking well. Oats and grass looked very well. All the green crops were in by the 8th. Towards the middle of the month wild flowers were out in abundance: the bluebell, *endymion nutans*, red robin, *lychnis diurna*, greater stitchwort, *stellaria holostea*, and by the end of the month the spotted orchis, *orchis maculata*, were especially conspicuous. The storm of the 21st brought down a great many apples and pears from off the trees. About the middle of the month the caterpillars of the antler moth, *charæas graminis*, appeared in great numbers in the fields between Clitheroe and Pendle, and the country for about four miles round was so infested with them as to cause great consternation to the farmers. Many people came from Manchester and other towns to see the “plague of caterpillars.” The insects did not confine themselves to the fields, but great numbers were seen crawling along the roads. They attacked both the root and the blade of the grass, and in a few places large patches were laid bare by them. Some farmers rolled the grass with heavy rollers, whilst others kindled large fires in their fields, but with little effect. Clover remained untouched by the insects.

JULY was generally wet and rather cold. Farmers began to cut hay on the 2nd, and by the end of the month it was nearly all in. It was a very fair crop. The Dutch clover very much heavier than has been got in for many years. Oats were looking very well, and wheat looked very much better than in June. Wild flowers were out in profusion, especially the foxglove, *digitalis purpurea*, which was in much greater quantities than in most previous years. There was

also a much greater quantity of fruit of the wood strawberry, *fragaria vesca*, than usual. After the heavy rain on the 5th, the antler moth caterpillars entirely disappeared.

AUGUST was very wet and cold. Vegetation generally appeared to be retarded in consequence. Grain was in some places beaten down, and looked much in want of warmth. Green crops, however, appeared to be improved.

SEPTEMBER was a much better month for agriculture. Oats, which were cut in most places by the 19th, were a very fair crop. A few early apples were ripe on the 3rd, the first wheat was cut on the 28th; about an average crop.

OCTOBER.—With the exception of the second week this month was dry and cold. Oats were all housed by the 3rd. Potatoes all in by the 20th. A very good crop and nearly all free from disease. Wheat housed towards the end of the month. All the green crops were stored by the end of the month.

NOVEMBER.—Wheat was sown by the end of the month. Owing to the unusually mild weather, several spring flowers were in blossom towards the middle of the month. Daisies were plentifully out by the end of the second week. By the 20th several primroses and wallflowers were in blossom. On the 26th a strawberry plant was in flower in the College garden.

DECEMBER.—No out-door work done during the month. Ground too heavy for working.

OBSERVATIONS OF CROPS.

GRAIN, ETC.				GREEN CROPS.				
Name.	When Sown.	In Flower.	In Ear.	When Cut.	Name.	When Sown.	Above Ground.	Stored.
Wheat	Nov.	June 28th	July 10th	Sept. 8th	Potatoes	April	May 8th	Sept.—Oct.
Oats	Mar.—Apl.	June 30th	July 10th	Sept. 7th	Turnips	May	May 15th	Oct.
Peas	March 10th	June 12th		August 15th	Beet	May	May 20th	Oct.
Beans	March 12th	June 19th		Sept. 27th	Mangel	May	May 22nd	Oct.—Nov.

OBSERVATIONS OF TREES AND SHRUBS.

FOREST TREES, ETC.						FRUIT TREES, ETC.			SHRUBS.	
Name.	In Bud.	In Leaf.	Divested of Leaves.	Name.	In Blossom.	Ripe.	Name.	In Blossom.		
Field Elm	May 16th	May 24th	Oct. 21st	Apple	May 18th	Aug. 27th	Lilac	June 3rd		
Oak	May 9th	May 26th	Nov. 9th	Pear	May 12th	Aug. 25th	Privet	Aug. 15th		
Sycamore	Ap. 20th	May 5th	Oct. 19th	Cherry	Ap. 28th	Aug. 3rd	Syringa	June 1st		
Plane	Ap. 5th	Ap. 22nd	Oct. 8th	Peach	Ap. 23rd	none	Laburnum	May 25th		
Lime	Ap. 22nd	May 8th	Oct. 19th	Red Currant	Ap. 27th	July 13th	Red Flowering Currant	Aug. 26th		
Hawthorn	May 19th	June 15th	Nov. 24th	White Currant	Ap. 27th	July 12th	Dog Rose	June 6th		
Hazel	Ap. 14th	May 14th	Nov. 2nd	Black Currant	May 5th	Aug. 10th	Holly	June 12th		
Ash	May 18th	May 30th	Oct. 22nd	Strawberry	Ap. 24th	June 29th	Guelder-Rose	June 26th		
Beech	Ap. 14th	May 16th	Oct. 25th	Gooseberry	Ap. 5th	Aug. 30th	Woodbine	June 28th		
Horse Chesnut	Ap. 5th	May 21st	Oct. 15th	Plum	May 5th	Oct. 20th	Portugal Laurel	July 6th		
Mountain Ash	Ap. 19th			Apricot	Ap. 7th	none	Elderberry	June 12th		
							Tree Mallow	May 6th		

DATES OF THE FLOWERING OF PLANTS AT STONYHURST
IN 1881.

RANUNCULACEÆ.		
Anemone nemorosa	Wood anemone	April 16th
Ranunculus ficaria	Lesser celandine	March 16th
<i>R. repens</i>	Creeping buttercup	May 20th
<i>R. bulbosus</i>	Bulbous buttercup	May 20th
Trollius Europæus	Globe flower	May 20th
Aquilegia vulgaris	Common columbine	June 5th
Aconitum napellus	Monk's-hood (<i>cult.</i>)	July 4th
NYMPHÆACEÆ.		
Nuphar lutea	Yellow water lily	June 21st
PAPAVERACEÆ.		
Papaver Rhæas	Red poppy	July 8th
CRUCIFERÆ.		
Cardamine pratensis	May flower	April 22nd
<i>C. hirsuta</i>	Hairy bitter cress	May 7th
Alliaria officinalis	Garlic mustard	May 4th
VIOLACEÆ.		
Viola canina	Dog violet	April 25th
POLYGALACEÆ.		
Polygala vulgaris	Milkwort	June 27th
CARYOPHYLLACEÆ.		
Lychnis flos cuculi	Ragged Robin	May 16th
<i>L. diurna</i>	Red Robin	May 24th
Stellaria media	Chickweed	April 5th
<i>S. holostea</i>	Great starwort	May 23rd
HYPERICACEÆ.		
Hypericum quadrangulum	Square-stalked hypericum	June 28th
<i>H. perforatum</i>	Common hypericum	July 10th
GERANIACEÆ.		
Geranium pratense	Meadow geranium	June 30th
<i>G. Robertianum</i>	Herb Robert geranium	May 26th
<i>G. lucidum</i>	Shining geranium	May 24th
Oxalis acetosella	Wood sorrel	April 29th
PAPILIONACEÆ.		
Sarcothamnus scoparius	Common broom	May 28th
<i>Ononis arvensis</i>	Rest harrow	June 20th
Medicago lupulina	Black medic	June 9th
<i>Trifolium repens</i>	White clover	May 28th

DATES OF THE FLOWERING OF PLANTS AT STONYHURST
IN 1881 (*continued*).

T. pratense	Purple clover	June 2nd
Lotus corniculatus	Common bird's-foot trefoil	May 26th
Vicia cracca	Tufted vetch	July 1st
V. hirsuta	Hairy vetch	May 20th
Lathyrus pratensis	Meadow vetchling	June 9th
ROSACEÆ.		
Spiræa ulmaria	Meadow sweet	June 30th
Geum urbanum	Common avens	May 26th
G. rivale	Water avens	May 20th
Fragaria vesca	Wood strawberry	May 7th
Potentilla fragariastrum	Strawberry-leaved potentil.	April 12th
P. tormentilla	Tormentil potentil	June 6th
P. anserina	Silver weed	June 9th
Alchemilla vulgaris	Lady's mantle	April 28th
Sanguisorba officinalis	Burnet sanguisorb	July 17th
ONAGRACEÆ.		
Cirœa lutetiana	Enchanter's nightshade	July 3rd
LYTHRARIÆ.		
Lythrum salicaria	Purple loosestrife	May 26th
SAXIFRAGACEÆ.		
Saxifraga tridactylites	Rue-leaved saxifrage	April 25th
S. umbrosa	London pride saxifrage	May 24th
Chrysosplenium oppositifolium	Opposite chrysosplene	April 15th
S. alternifolium	Alternate chrysosplene	April 18th
UMBELLIFERÆ.		
Heracleum spondylium	Common Heracleum	July 4th
Bunium flexuosum	Tuberous bunium	May 28th
CAPRIFOLIACEÆ.		
Adoxa moschatellina	Tuberous moscatel	April 24th
STELLATÆ.		
Galium cruciatum	Crosswort galium	May 10th
G. verum	Yellow galium	May 29th
G. saxatile	Heath galium	June 12th
G. aparine	Cleavers galium	May 17th
Asperula odorata	Woodruff asperule	May 20th
VALERIANEÆ.		
Centranthus ruber	Red centranth (<i>cult.</i>)	July 1st
Valeriana dioica	Marsh valerian	May 23rd
V. officinalis	Common valerian	July 2nd

DATES OF THE FLOWERING OF PLANTS AT STONYHURST
IN 1881 (*continued*).

DIPSACEÆ. Scabiosa avensis	Field scabions	July 21st
COMPOSITÆ. Tussilago farfara T. petasites Bellis perennis Chrysanthemum leucanthemum Achillea millefolium Senecio vulgaris S. Jacobæa Arctium lappa Carduus palustris Centaurea nigra Hypochoeris radicata Taraxacum dens-leonis Hieracium pilosella Erica vulgaris	Common colt's-foot Butterbur colt's-foot Common daisy Ox-eye daisy Yarrow Groundsel senecio Ragwort senecio Common burdock Marsh thistle Black centaurea Long-rooted cat's-ear Common dandelion Mouse-ear hawkweed Common heath	April 24th April 27th March 12th June 20th June 29th March 12th July 4th July 27th June 26th June 26th June 9th May 20th June 8th July 3rd
PRIMULACEÆ. Primula vulgaris P. veris Lysimachia vulgaris	Common primrose Cowslip Common lysimachia	March 16th May 1st May 26th
AQUIFOLIACEÆ. Ilex aquifolium	Common holly	June 12th
APOCYNACEÆ. Vinca minor	Lesser periwinkle	April 24th
BORAGINEÆ. Mysotis palustris Symphytum officinale	Forget-me-not Common comfrey	May 3rd June 5th
SOLANACEÆ. Solanum dulcamara	Bittersweet	June 26th
OROBANCHACEÆ. Lathræa squamaria	Toothwort	April 19th
SCROPHULARINEÆ. Antirrhinum majus Scrophularia aquatica Digitalis purpurea Veronica chamædrys Euphrasia officinalis Rhinanthus crista-galli Pedicularis palustris	Great snapdragon Water figwort Purple foxglove Germander veronica Common eyebright Common yellow rattle Marsh red rattle	July 4th June 1st June 21st May 1st July 3rd June 7th June 7th

DATES OF THE FLOWERING OF PLANTS AT STONYHURST
IN 1881 (*continued*).

<p>LABIATÆ. Mentha aquatica Nepeta glechoma Stachys sylvatica S. palustris Ajuga reptans</p>	<p>Water mint Ground ivy Hedge stachys Marsh stachys Creeping bugle</p>	<p>July 4th April 21st June 24th July 9th May 22nd</p>
<p>POLYGONACEÆ. Rumex acetosa R. acetosella Polygonum bistorta</p>	<p>Sorrel dock Sheep-sorrel dock Bistort polygonum</p>	<p>June 15th June 2nd June 20th</p>
<p>EUPHORBIACEÆ. Euphorbia peplus Mercurialis perennis</p>	<p>Petty spurge Dog's mercury</p>	<p>June 20th April 23rd</p>
<p>ORCHIDACEÆ. Listera ovata Orchis mascula O. maculata Habenaria bifolia</p>	<p>Twayblade listera Early orchis Spotted orchis Butterfly orchis</p>	<p>June 6th May 20th June 15th June 26th</p>
<p>IRIDACEÆ. Iris pseudacorus Crocus vernus</p>	<p>Yellow iris Spring crocus</p>	<p>June 6th March 13th</p>
<p>AMARYLLIDEÆ. Narcissus pseudonarcissus Galanthus nivalis</p>	<p>Daffodil Snowdrop (<i>cult.</i>)</p>	<p>May 5th Feb. 10th</p>
<p>LILIACEÆ. Paris quadrifolia Scilla nutans</p>	<p>Common Paris Bluebell squill</p>	<p>May 24th May 6th</p>
<p>AROIDÆÆ. Arum maculatum</p>	<p>Common arum</p>	<p>May 27th</p>

OBSERVATIONS OF UPPER CLOUDS (CIRRUS).

Date.	G. M. T.	Cloud Direction.	Velocity.	Wind.		Direction of Lr. Clds.
				Direction.	Force (0 to 12).	
January 5	11 a.m.	E. by N.	2	N.E.	1	N.E.
" 7	10.30 a.m.	N.E.	1	N.E.	1	
" 13	1 p.m.	E.	2	N.N.E.	0	E.
" 20	9 a.m.	E.	3	N.E.	2	E.
" 31	2.30 p.m.	N.	2	S.W.	1	W.S.W.
February 9	10.15 a.m.	W. by S.	1	S.	0	S.W.
" 11	8 a.m.	N.E.	2	N.E.	3	N.
" 24	11 a.m.	S.E.	3	N.E.	0	N.E.
" 27	Noon.	N.E.	1	E.N.E.	2	N.E.
" 28	10 a.m.	N.E.	2	N.E.	0	N.E.
March 1	9 a.m.	S. by E.	1	N.N.W.	0	W.
" 2	10.30 a.m.	N.W.	2	N.N.E.	1	N.E.
" 15	9 a.m.	S.S.E.	3	E.	1	E.
" 26	1.30 p.m.	N. by E.	2	N.	0	N.W.
" 30	11 a.m.	N.E.	1	E.	1	N.E.
" 31	7.30 a.m.	E.	2	N.N.E.	1	
April 1	1.15 p.m.	N.E.	3	E.	3	
" 2	8 a.m.	S. by E.	2	E.N.E.	3	E.
" 3	9.30 a.m.	S.W.	1	E.	4	E.
" 5	8 a.m.	E.	1	E.N.E.	3	E.
" 20	11 a.m.	N. by W.	3	N.N.W.	2	E.
" 22	6 p.m.	N.N.E.	1	N.E.	1	E.
" 24	7 a.m.	S.	2	S.W.	1	W.
" 25	11.30 a.m.	W.	2	W.	7	W.
" 25	3 p.m.	W.	2	W.	5	W.
" 26	2 p.m.	W.	1	W.	5	W.
" 28	10.30 a.m.	E.	3	W.	1	N.W.
May 1	11 a.m.	E.	3	W.S.W.	4	N.E.
" 7	6 p.m.	W.N.W.	1	W.S.W.	3	N.W.
" 10	7 a.m.	E.	1	N.E.	2	N.E.
" 10	11.30 a.m.	E.N.E.	2	N.E.	1	N.E.
" 12	Noon.	N.E.	1	W.	2	N.E.
" 12	2 p.m.	E.N.E.	2	W.N.W.	2	N.E.
" 12	4 p.m.	N.E.	3	W.N.W.	2	N.E.
" 13	Noon.	N.	2	W.	3	N.
" 13	2 p.m.	N.	2	W.	3	N.
" 18	3.30 p.m.	W. by S.	3	S.W.	4	W.
" 19	1 p.m.	W.S.W.	2	W.S.W.	3	S.W.
" 20	6 p.m.	W.	3	W.S.W.	3	W.
" 25	7 p.m.	N.W.	1	E.N.E.	2	S.E.
" 29	2 p.m.	N.W.	2	E.	2	
" 29	6 p.m.	N.W.	1	E.	2	
June 2	2 p.m.	W. by S.	2	W.	2	W. by S.
" 3	10 a.m.	W. by N.	2	W.	3	
" 3	Noon.	N.W.	1	W.S.W.	3	N.W.

OBSERVATIONS OF UPPER CLOUDS (Continued).

Date.	G. M. T.	Cloud Direction.	Velocity.	Wind.		Direction of Lr.Clds.	
				Direction.	Force (oto 12).		
June	3	4 p.m.	N.W.	1	W.	3	N.W.
"	6	2 p.m.	W. by S.	2	W.	2	W. by S.
"	13	11.20 a.m.	N. by W.	1	N.E.	1	N.N.E.
"	14	9 a.m.	N.	2	N.E.	0	E.
"	21	1.30 p.m.	W.N.W.	2	S.W.	4	S.
"	23	2.45 p.m.	N.E.	3	W.	2	S.W.
July	2	11.30 a.m.	N.W.	1	W.S.W.	1	W.
"	9	10.20 a.m.	W. by S.	3	W.	1	S.
"	12	4 p.m.	N.E.	2	W.	2	S.W.
"	14	10.30 a.m.	W.	2	W.	2	W.
"	16	10 a.m.	W.	1	W.	2	W.
"	16	2 p.m.	W.	1	W.	2	W.
"	16	4 p.m.	W.	2	W.	2	W.
"	21	Noon.	W.	2	W.N.W.	1	N.E.
"	22	10 p.m.	N.W.	1	W.N.W.	2	N.W.
"	27	3 p.m.	N.E.	2	W.N.W.	3	W.
"	28	1.30 p.m.	N.	2	S.	3	W.S.W.
August	1	3.30 p.m.	N.E.	3	W.N.W.	2	W.
"	2	2.45 p.m.	E. by N.	2	W.S.W.	2	W.
"	12	9.15 a.m.	N.	1	W.	1	S.W.
"	27	10.30 a.m.	N.W.	1	W.	2	W.
"	27	2.20 p.m.	N.E.	1	W.	3	W.
"	30	3 p.m.	E.	2	N.E.	2	N.E.
"	30	4 p.m.	N.E.	3	N.E.	2	N.E.
Sept.	3	10 a.m.	N.	2	N.E.	1	N.
"	9	10.30 a.m.	N.W.	1	E.N.E.	0	W.
"	9	1.20 p.m.	W.N.W.	2	N.E.	0	W.
"	16	Noon.	N.N.E.	3	N.	1	N.N.E.
"	16	2 p.m.	N.E.	2	N.	1	N.E.
"	30	2.45 p.m.	N. by W.	1	S.W.	1	W.
October	9	2 p.m.	S.	2	E.	2	S.E.
"	11	7.40 a.m.	W.N.W.	2	W.	4	W.
"	15	9.30 a.m.	N.	3	W.N.W.	4	W.
"	19	11.15 a.m.	S. by W.	1	E.S.E.	5	E.
"	31	0.30 p.m.	N.E.	1	N.	0	E.
Nov.	7	11.25 a.m.	N.	2	E.N.E.	0	S.W.
"	22	3 p.m.	W.S.W.	2	S.	4	S.W.
"	26	11 a.m.	N.E.	1	S.	2	S.S.W.
Dec.	3	2.45 p.m.	S.E.	1	S.	4	S.
"	8	11.15 a.m.	N.	2	W.	1	W.S.W.
"	10	1 p.m.	N.N.E.	1	N.N.E.	0	N.
"	19	3 p.m.	N. by E.	2	W.	3	S.W.
"	22	2 p.m.	W.	1	N.	0	N.E.
"	28	2.30 p.m.	S.	1	W.	0	W.S.W.

Monthly Magnetical Observations taken at the College Observatory, Stonghurst, 1881.

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° is the observed temperature and 35° Fahr. the adopted standard temperature. The values of the co-efficients q and q' are respectively .0001128 and 0.00000436.

The induction co-efficient μ 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 100 or 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 maximum value of the former having been 3^s.25, and the latter never over 50'.

The average deflection of the magnet caused by a twist of the torsion circle through 90°, has been about 6'.65 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 adopted value of the constant P is 0.005418.

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- pera- ture.	Observed Deflection.	$\frac{m}{X}$
	D.	H. M.				
January ...	23rd	0 3 p.m.	1'0	35'0	13 41 27	9'07539
	"	0 29 p.m.	1'3	35'6	6 11 5	9'07322
February...	25th	10 56 a.m.	1'0	34'5	13 38 35	9'07387
	"	11 21 a.m.	1'3	36'5	6 10 49	9'07412
March ...	15th	0 26 p.m.	1'0	55'8	13 38 45	9'07536
	"	0 44 p.m.	1'3	58'0	6 10 25	9'07510
April	18th	0 4 p.m.	1'0	50'4	13 39 47	9'07553
	"	0 22 p.m.	1'3	51'4	6 10 18	9'07451
May	23rd	11 11 a.m.	1'0	61'2	13 34 46	9'07367
	"	11 30 a.m.	1'3	62'7	6 9 9	9'07388
June	17th	11 44 a.m.	1'0	56'8	13 34 20	9'07311
	"	0 17 p.m.	1'3	57'8	6 8 48	9'07318
July.....	23rd	0 26 p.m.	1'0	61'4	13 33 53	9'07320
	"	0 35 p.m.	1'3	61'9	6 8 37	9'07321
August ...	21st	11 58 a.m.	1'0	58'3	13 34 47	9'07344
	"	0 17 p.m.	1'3	58'5	6 8 28	9'07295
September.	14th	10 57 a.m.	1'0	57'6	13 34 35	9'07330
	"	11 30 a.m.	1'3	58'8	6 8 29	9'07288
October ...	17th	11 27 a.m.	1'0	54'7	13 34 8	9'07287
	"	0 0	1'3	56'0	6 9 22	9'07373
November.	19th	9 51 a.m.	1'0	53'1	13 34 9	9'07377
	"	11 7 a.m.	1'3	55'1	6 8 5	9'07315
December .	27th	9 41 a.m.	1'0	45'3	13 35 14	9'07281
	"	10 56 a.m.	1'3	50'3	6 9 10	9'07324

m 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.	Tempera- ture.	Time of one vibra- tion.	Log m X	Value of m.
January ...	D. H. M. 23rd...10 57 a.m.	31·6	5·69073	0·20421	0·43577
February...	24th...11 35 a.m.	45·2	5·70536	0·20281	0·43492
March	15th...11 26 a.m.	52·3	5·70958	0·20278	0·43552
April	18th...11 12 a.m.	49·0	5·70525	0·20296	0·43550
May.....	23rd... 9 43 a.m.	57·5	5·71250	0·20237	0·43459
June	17th...10 52 a.m.	55·3	5·72283	0·20074	0·43346
July.....	23rd...11 23 a.m.	60·4	5·71663	0·20192	0·43408
August ...	21st... 9 23 a.m.	56·8	5·71373	0·20216	0·43419
September.	14th... 0 23. pm.	57·8	5·72475	0·20068	0·43340
October ...	17th...10 26 a.m.	52·3	5·72463	0·20046	0·43339
November.	18th...11 23 a.m.	41·9	5·71493	0·20102	0·43375
December .	27th... 0 13 p.m.	38·4	5·72065	0·20017	0·43311

Dip Observations.				Magnetic Intensity.		
Month.	G. M. T.	Needle.	Dip.	X, or Horizontal Force.	Y, or Vertical Force.	Total Force.
January ...	D. H. M. 24th...11 55 a.m.	1	69 18 40	3'6725	9'7143	10'3852
	,, ... 0 20 p.m.	3	69 16 16			
February .	26th...10 48 a.m.	1	69 17 25	3'6678	9'7064	10'3762
	,, ...11 27 a.m.	3	69 18 32			
March ...	17th...11 40 a.m.	1	69 13 11	3'6625	9'6678	10'3383
	,, ... 0 30. pm.	3	69 17 0			
April	19th...10 56 a.m.	1	69 15 15	3'6642	9'6690	10'3400
	,, ...11 39 a.m.	3	69 14 9			
May	24th...10 47 a.m.	1	69 15 41	3'6669	9'6794	10'3507
	,, ...11 43 a.m.	3	69 14 30			
June	18th...11 47 a.m.	1	69 18 7	3'6627	9'6808	10'3505
	,, ... 0 20 p.m.	3	69 15 1			
July	25th...11 36 a.m.	1	69 13 11	3'6674	9'6812	10'3526
	,, ... 0 15 p.m.	3	69 17 8			
August ...	23rd...11 20 a.m.	3	69 12 4	3'6685	9'6842	10'3660
	,, ... 0 10 p.m.	1	69 14 47			
September	15th...11 55 a.m.	1	69 18 29	3'6627	9'6812	10'3510
	,, ... 0 30 p.m.	3	69 14 46			
October...	18th...11 25 a.m.	1	69 13 34	3'6609	9'6580	10'3286
	,, ... 0 15 p.m.	3	69 15 18			
November	24th...11 15 a.m.	1	69 14 15	3'6626	9'6692	10'3395
	,, ...11 55 a.m.	3	69 16 11			
December	28th...11 15 a.m.	1	69 18 10	3'6608	9'6728	10'3424
	,, ...11 40 a.m.	3	69 14 13			
Means			69 15 40	3'6641	9'6804	10'3518

DECLINATION OBSERVATIONS.

		Uncorrected.			Corrected.		
Month.	G. M. T.	Observation.	Monthly Mean.	Observation.	Monthly Mean.		
	D. H. M.	° ' "	° ' "	° ' "	° ' "	° ' "	
January ...	4th... 8 59 a.m.	20 16 25	° ' "	20 16 9	° ' "		
	11th... 9 9	16 59		17 50			
	18th... 9 4	18 18		18 52			
	24th... 9 8	17 6		18 15			
	31st... 8 59	18 2	20 17 26	20 9	20 18 15		
February..	8th... 9 1	19 12		21 30			
	14th... 9 5	16 11		18 45			
	21st... 9 6	10 36		13 19			
	28th... 9 2	13 30	20 14 52	15 30	20 17 16		
March ...	7th... 8 50	12 42		13 34			
	14th... 9 8	14 34		15 26			
	21st... 9 7	9 25		17 50			
	28th... 8 54	10 16	20 11 44	15 43	20 15 38		
April	4th... 9 12	7 49		10 58			
	11th... 9 5	14 42		12 24			
	19th... 9 12	12 10		13 19			
	25th... 9 6	11 47	20 11 37	16 39	20 13 20		
May	2nd.. 9 7	12 45		12 28			
	10th... 8 49	5 44		6 53			
	16th... 9 5	11 43		10 42			
	23rd... 9 1	7 28		10 3			
	30th... 9 7	8 6	20 9 9	13 33	20 10 45		
June	7th... 9 1	5 26		8 35			
	13th... 9 5	5 16		6 59			
	20th... 9 4	7 56		12 14			
	28th... 9 3	5 44	20 6 6	12 19	20 10 2		

DECLINATION OBSERVATIONS (*Continued*).

		Uncorrected.			Corrected.		
Month.	G. M. T.	Observation.	Monthly Mean.	Observation.	Monthly Mean.		
July	D. H. M. 4th... 9 10 a.m.	20 7 25	0 ' "	20 9 8	0 ' "		
	11th... 9 0	8 46		8 29			
	18th... 9 6	6 46		7 37			
	26th... 8 59	3 15	20 6 33	7 16	20 8 8		
August	2nd... 9 4	4 58		7 50			
	8th... 9 10	3 25		5 25			
	15th... 9 6	3 58		6 0			
	22nd... 9 3	2 0		6 1			
September	29th... 8 57	1 35	20 3 11	7 10	20 6 29		
	5th... 9 3	9 4		10 30			
	12th... 9 9	4 58		8 24			
	19th... 8 54	11 18		13 1			
October	26th... 9 9	6 15	20 7 54	6 15	20 9 33		
	4th... 9 1	7 21		7 38			
	11th... 9 6	2 5		6 6			
	17th... 9 2	0 38		6 21			
November	24th... 9 2	3 20		6 12			
	31st... 9 20	10 30	20 4 47	8 13	20 6 54		
	7th... 9 9	1 52		3 52			
	14th... 9 16	8 4		(8 4)			
December	22nd... 9 16	3 51		5 34			
	29th... 9 17	11 30	20 6 19	6 8	20 5 55		
	5th... 9 11	7 54		8 11			
	12th... 9 4	8 28		8 45			
Yearly mean	19th... 9 15	16 33		15 59			
	26th... 9 16	10 45	20 10 55	(10 45)	20 10 55		
			20 9 13		20 11 6		

MAGNETIC DISTURBANCES.

JANUARY.—The Vertical Force magnet showed a slight increase of force, and the Horizontal Force magnet a decrease, at 4 p.m. on the 10th, but the first irregularity of any considerable extent this year was a decrease of the Declination at about 6 p.m. on the 15th; this was repeated between 8 and 10 p.m. on the following day. This disturbance was not felt much by the Vertical Force magnet, and still less by the Horizontal Force. On the 22nd, towards 4 a.m., a storm commenced which lasted with occasional interruptions until the evening of the 27th. The Horizontal Force and Vertical Force magnets were both frequently irregular during this period, but not to any great extent. The disturbance was well marked on the Horizontal Force curve between 6 and 8 p.m. on the 21st.

A slight action of the disturbing force at 7.40 p.m. on the 30th was the first indication of the approach of one of the two principal storms of the year, and during five hours on the 31st, *i.e.*, from 3.35 p.m. to 8.30, the oscillations of the Declination needle were exceedingly rapid and of great extent. At 7.43 p.m. the ordinate of the curve was 0.48 inches below the mean line, and at 8 p.m. it had reached a point 2.88 inches above the mean, showing a movement of the needle towards the West of $1^{\circ} 36' 15''$ in 17 minutes of time. Many of the movements during this short, but very violent, storm were among the most rapid ever recorded. The Vertical Force magnet swung very violently during this period, and towards 8 p.m. the movement was too rapid for satisfactory photographic record. Shortly after midnight the Vertical Force reaches its minimum, and the recorded range is 4.02 inches, which equals 0.0100 in British units. The movements of the Horizontal Force magnet are less extended on account of the largeness of the co-efficient, but there was a diminution of 2.12 inches in the ordinate of its curve between 6.30 and 6.40, a range which is equivalent to 0.0695 in English measure.

FEBRUARY.—The storm which closed the month of January was abating when February opened, but midnight was passed during a rapid Western oscillation of the Declination needle, which only gradually came to rest during the morning hours. The Vertical Force attained its recorded minimum about the same time, and the Horizontal Force was also considerably diminished. The afternoon and night of the sixth were rather disturbed, as were also the two following nights, and a third slightly. The next rapid movements of the Declination magnet occurred between 6 and 7 p.m. on the 15th, and between 2 and 3 a.m. on the 16th. The former was accompanied by a fair rise of the ordinate of the Vertical Force curve, whilst there was much irregularity in the Horizontal Force on the first day, with a modified repetition on the second. Between 7 and 8 p.m. on the 20th and 21st a similar movement took place, and it re-appeared between 8 and 9 p.m. on the 22nd. Disturbances commenced between 6 and 7 p.m. on the 26th, and continued until the end of the month. During the afternoon of the 27th the Vertical Force increased rapidly, and remained higher than the mean during the remainder of the day.

MARCH.—A storm of some extent commenced on the evening of the 2nd, but only reached its height about noon on the following day; the needle did not return to its normal state until 10 p.m. on the 4th. The Vertical Force decreased at 2.40 a.m. on the 3rd, but rose more rapidly to a maximum at 4.40 p.m. An irregular movement, which attained its maximum at 6 p.m. on the 12th, was reproduced on the two succeeding days, and there was a considerable resemblance between the curves for the afternoons of the 18th and 19th. On the evening of the 30th a disturbing action began to manifest itself, and the month closed with an irregular curve. The Horizontal Force offers no remarkable irregularity during this month, and it is very steady towards the close. The Vertical Force was more irregular than usual on several days on either side of the middle of the month.

APRIL.—The disturbance which closed the month of March continued until about 7 a.m. on the 2nd, the two large waves of the Vertical Force curve between 11 p.m. and 4 a.m. on the 1st being very extraordinary. The needle was again in an abnormal state on the 14th, but the principal irregularities of the month began at 8.55 a.m. on the 20th for the Declination and Vertical Force, but two hours later for the Horizontal Force. The Vertical Force curve shows a very rapid descent, but it returned to its mean position soon after 2 a.m. The morning of the 28th was also disturbed, and this was manifested principally by the Declination and Horizontal Force magnetograms.

MAY.—Between 8 and 10 p.m. on the 6th there was some sign of a disturbing force, and shortly after 2 a.m. on the 9th the magnet became irregular in its movements, and the irregularity lasted during the whole of this and part of the succeeding day. This was followed by a tremour in the needle on the 11th, 12th, 13th, and 14th during the morning hours. The early hours of the 17th were also somewhat disturbed. The rest of the month was remarkably quiet.

JUNE.—A disturbance began about noon on the 4th and continued for more than two days. The most rapid and extended movement of the Declination made was a Westerly excursion at midnight on the 4th. The Vertical Force increased quickly until 4 p.m., and there was a diminution of this component of the intensity during the early hours of the 5th, 6th, and 8th. The Horizontal Force rose at first with the Vertical Force, but reached its maximum shortly after 2 p.m.; the remainder of the disturbance was only a series of oscillations. During the afternoon hours of the 23rd and 24th the Horizontal Force magnet was very irregular in its movements.

JULY.—The Horizontal Force magnet was unsteady during most of the afternoon of the 1st. The storm of the 3rd was preceded by a tremulousness which became strongly marked about 4 p.m. on the 2nd. The greatest movements occurred between midnight and 8 a.m. The Vertical Force increased steadily until 6 hours 57 minutes p.m., and then diminished more and more rapidly, attaining its minimum at 2.20 a.m. The Declination magnet was tremulous from 6 a.m. until noon on the 8th, and during the night of the 10th there were signs of a disturbing action. Most of the month was remarkably quiet.

AUGUST.—Nothing occurred worthy of note before the 12th, when a movement of the needle towards the East, which began shortly before 8 p.m., was repeated a quarter of an hour later on the following day. During the night of the 24th a slight disturbance began, but the whole month was very free from abnormal readings.

SEPTEMBER.—The Declination needle became unsteady at 10.25 p.m. on the 8th, but was again quiet on the 11th, and remained so during the morning of the 12th. At 45 minutes after noon on the 12th a violent storm commenced, which continued until 4 a.m. on the 15th. The first minimum of the Declination was reached at 8.7 p.m. on the 12th, the maximum at about 7 a.m. the next morning, and the principal minimum just twelve hours later. The whole range of the magnet was 3°155

inches, equivalent to $1^{\circ} 30' 23''$, but there was an almost instantaneous diminution of the Declination to the extent of $1^{\circ} 0' 10''$ between 6.55 and 7 p.m. on the 16th. The movements of the Vertical Force indicated a much less active disturbing force than that which caused the storm of January, but the disturbance lasted a much longer time. The Vertical Force curve consisted mainly of quiet departures from the mean. A gradual rise and then a broken fall, the maximum occurring at 6.34 p.m., and the chief minimum 33 minutes after midnight; the variation being 0.0080 in British units. The absolute maximum during the storm was at 6 p.m. on the 13th, and this made the extreme range of the Vertical Force ordinate 3.78 inches, or 0.0094 in units of force. The greatest movement of the Horizontal Force magnet was between 5.28 and 7.35 a.m. on the 13th, when it diminished 0.68 inches, or 0.0223 in British units. The needle was moving rapidly towards the East at 8 p.m. on the 25th, but it regained its normal position in a few hours.

OCTOBER.—A disturbance between 8 and 10 p.m. on the 3rd was repeated rather earlier on the 4th, but neither was of any great extent, The night of the 8th was also irregular. At 1.40 a.m. the North end of the needle moved rather quickly towards the West, and this was followed by a tremulous movement. Between 5 and 10 p.m. the magnet made two extended excursions Eastward. At 10.20 p.m. the Vertical Force ordinate fell quickly for half-an-hour, and there was another rapid fall from 2 to 2.30 a.m. on the 17th. The Horizontal Force magnet was also unsteady between 1 and 3 a.m. on the same day.

NOVEMBER.—The morning of the 3rd started with a considerable diminution of the Horizontal Force, and the first days of the month were generally disturbed, but no very marked irregularities are noticeable in the curves previous to the storm on the 9th. This commenced about 5.27 a.m., and continued until 10.30 p.m. The needle moved most rapidly between 2 and 3 p.m., and it was still very tremulous throughout the following morning. The principal movement of the Horizontal Force magnet caused a diminution of the curve ordinate from 7 a.m. to noon, and between 8 a.m. and 8 p.m. the Vertical Force was much increased by the action of the disturbing force, maxima occurring at 2.20 and 3.30 p.m. The magnet was again irregular in its movements on the 15th, and during the night hours of the 16th, 18th, 19th, and 23rd. The Horizontal Force curve was very abnormal on the 23rd, and there was a long wave in the Vertical Force trace, the maximum occurring at 7.55 p.m., and minima at 2.35 and at 5 a.m. the next day. The month closed with some days of disturbances similar in magnitude to those at its opening.

DECEMBER.—The disturbance of November gradually subsided, but considerable irregularities are noticeable in the curves until the 5th. On the afternoon of the 6th the Declination was again abnormal, and similar disturbances were reproduced on the four following days. At 4 a.m. on the 11th the magnet came finally to rest, and remained in its mean position for about 23 hours. Daily irregularities then appeared in all the curves until the 22nd, but a day and a half of quiet was followed on the afternoon of the 23rd by the principal storm of the month. At 8 p.m. the Declination magnet was moving very rapidly, and the minimum was reached at 1.2 a.m. on the 24th. The Horizontal Force was more irregular during this night than at any other date of the month, and was still very tremulous throughout the 24th. The Vertical Force increased to a maximum at 7.45 p.m., and then decreased very slowly, only reaching its minimum at 1.15 a.m., with a range of only 0.0028 in English measure. The Declination needle was again at rest at 10 p.m. on the 24th, but there were irregularities daily until the end of the month.

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