

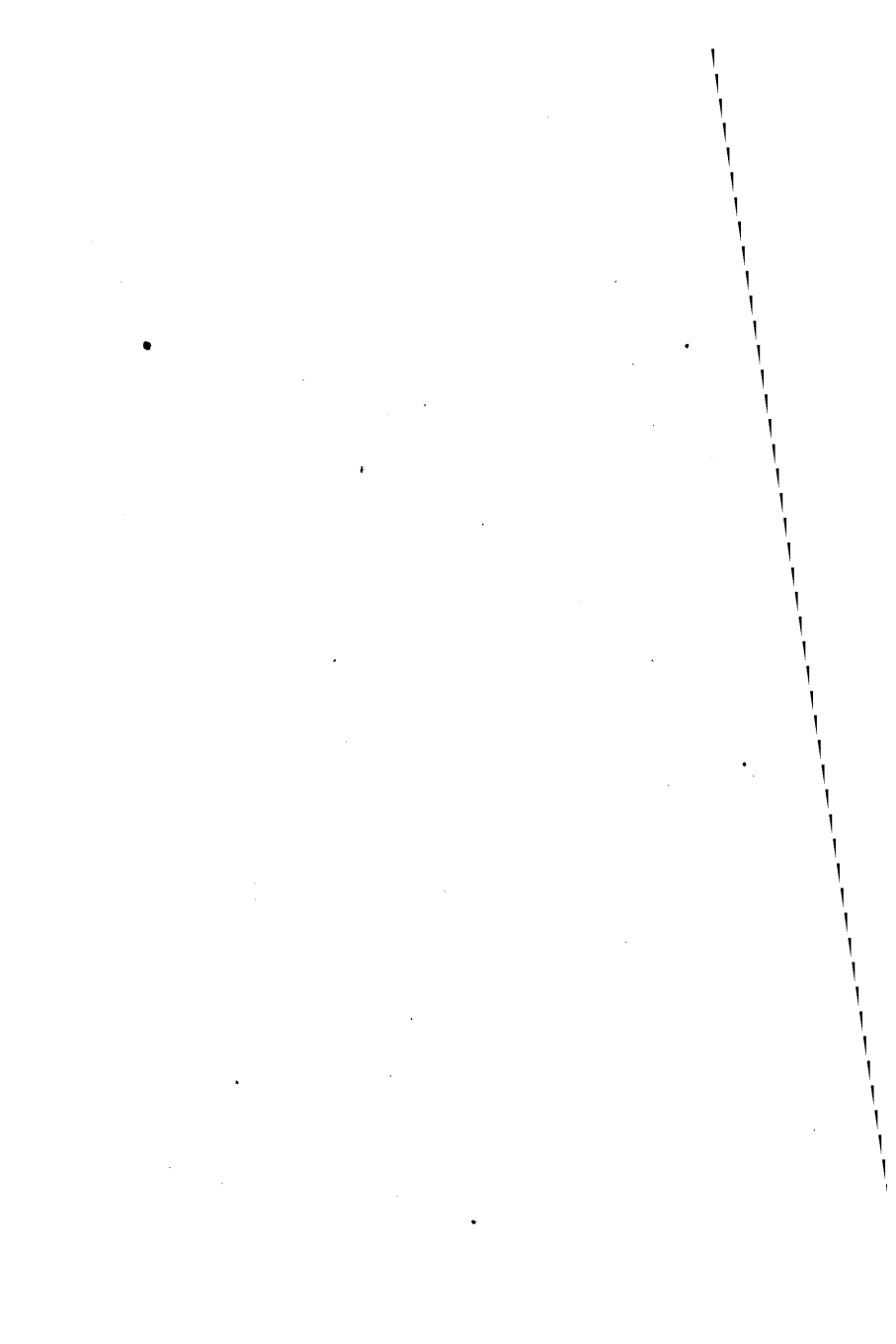
STONYHURST COLLEGE
OBSERVATORY.

RESULTS
OF
METEOROLOGICAL AND MAGNETICAL
OBSERVATIONS.

1876.

MANRESA PRESS, ROEHAMPTON,

1877.



INTRODUCTION.

IN the Meteorological department of this Observatory no alteration of any moment has taken place during the year 1876, either as regards instruments or observations, but, in addition to previous reports, observations of Cirrus clouds are now sent monthly to the Upsala Observatory.

The series of Magnetic curves, and the weekly and monthly observations of the absolute Magnetic elements have been carried on uninterruptedly; and the Declination and Horizontal Force Magnetograms have all been measured and reduced down to the end of 1876. A paper on the results of the last six years' observations of terrestrial Magnetism was read before the Royal Society, and also a short note on a probable connexion between the movements of the Barometer and those of the Declination Magnet.

Some experiments were made to test the various methods proposed for simultaneous observations of the Chromosphere and of the solar limb; the prism in front of the slit of a spectroscope was found to succeed admirably.

Bad weather has interfered very much with the observation of meteors, and somewhat with that of Jupiter's satellites. Double star measures have been almost sus-

pended on account of a change of computers, and the sickness of an assistant.

The Astronomical instruments have been increased during the year by the addition of a Chronograph, which will be used principally for the determination of small differences of A.R. in connexion with the coming opposition of Mars, and also in the accurate mapping of certain stellar regions. A Maclean spectroscope for a preliminary examination of the various classes of star spectra has also been procured.

A large altazimuth and a chronometer were purchased during the year, tested at Stonyhurst, and then despatched to the Manila Observatory in the Philippines. Other scientific work is at present in hand for the same Observatory.

Additional notes and tables of agricultural and horticultural results have been added to this year's report.

The Observatory has lately sustained a very severe loss in the death of Mr. Joseph Hostage, the chief assistant, who for many years has had almost the sole charge of the instruments and the photography, and who has also taken an active part in the observations and reductions.

S. J. PERRY.

Stonyhurst Observatory.

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

METEOROLOGICAL REPORT.

January, 1876.

Results of Observations taken during the month.	Mean for the last 29 years.	
Mean Reading of the Barometer	29·805	29·405
Highest ,, on the 15th.....	30·235	29·993
Lowest ,, on the 20th.....	29·230	28·544
Range of Barometer Readings	1·005	1·449
Highest Reading of a Max. Therm. on the 31st	53·0	51·5
Lowest Reading of a Min. Therm. on the 9th	17·3	21·0
Range of Thermometer Readings	35·7	30·5
Mean of all the Highest Readings	39·8	42·3
Mean of all the Lowest.....	33·6	33·2
Mean Daily Range	6·2	9·1
Deduced Monthly Mean (from Mean of Max. and Min.)	36·5	37·6
Mean Temperature from dry bulb	38·2	37·7
Adopted Mean Temperature	37·4	37·7
Mean Temperature of Evaporation.....	36·0	36·3
Mean Temperature of Dew Point	34·1	34·3
Mean elastic force of Vapour	0·196 in	0·200 in
Mean weight of Vapour in a cubic foot of air	2·3gr	2·3gr
Mean additional weight required for saturation.....	0·4gr	0·4gr
Mean degree of Humidity (saturation 1·00)	0·88	0·87
Mean weight of a cubic foot of air	555·7gr	547·9gr
Fall of Rain	3·089 in	4·174 in
Number of days on which Rain fell	19	21
Amount of Evaporation	0·987	0·830

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	7	3	0	10	11	0	0
Mean Velocity in miles per hour	0	7.0	7.7	0	8.1	8.8	0	0
Total No. of miles for each Direction	0	1182	556	0	1942	2332	0	0

The total number of miles registered during the month was 6012.

The max. Velocity of the wind was 30 miles per hour; direction S.W. on the 19th at midnight.

Mean amount of Cloud (an overcast sky being indicated by 10.0)... 7.8

In the month of January, the highest reading of the Barometer during 29 years, was on the 8th, in 1859, and was 30.310

The lowest " " 15th, 1865 27.939

The highest Temperature " " 30th, 1872 56.2

The lowest " " 13th, 1867 9.2

The highest adopted mean temperature of the month, 1875 42.5

The lowest " " 1871 32.0

The mean reading of the Barometer for this month is remarkably high, and the total range small. The Thermometer shows an extreme range somewhat in excess of former years, though the mean range of temperature is not great. The adopted mean temperature for the month agrees well with that of past years, but the amount of Rainfall, Wind, and Cloud, is far below the average.

There was frost on the 1st and 2nd, from the 6th to the 9th, and on the 11th, 13th, 14th, 15th, 21st, and 22nd. Snow fell on the 6th, 8th, 10th, and 12th; and sleet on the 7th. Storms occurred on the 7th and 24th, and fogs on the 16th and 17th. It was generally hazy during the whole month.

February, 1876.

Results of Observations taken during the month.	Mean for the last 29 years.	
Mean Reading of the Barometer	29'285	29'492
Highest " on the 2nd	29'720	30'091
Lowest " on the 18th.....	28'589	28'666
Range of Barometer Readings.....	1'131	1'425
Highest Reading of a Max. Therm. on the 1st	53'0	51'2
Lowest Reading of a Min. Therm. on the 11th.....	23'0	22'8
Range of Thermometer Readings	30'0	28'4
Mean of all the Highest Readings	45'7	44'0
Mean of all the Lowest.....	34'8	33'9
Mean Daily Range	10'9	10'1
Deduced Monthly Mean (from Mean of Max. and Min.)	39'9	38'6
Mean Temperature from dry bulb	39'5	38'5
Adopted Mean Temperature	39'7	38'6
Mean Temperature of Evaporation.....	38'2	36'6
Mean Temperature of Dew Point	36'3	34'7
Mean elastic force of Vapour	0'214 in	0'197 in
Mean weight of Vapour in a cubic foot of air	2'5 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	543'3 gr	548'6 gr
Fall of Rain	5'997 in	3'718 in
Number of days on which Rain fell	23	17'6
Amount of Evaporation	0'602	0'830

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	4	3	0	2	2	13	6
Mean Velocity in miles per hour	0	7'0	7'1	0	14'1	13'1	15'6	13'6
Total No. of miles for each Direction	0	674	508	0	676	4095	2244	327

The total number of miles registered during the month was 8524.
The max. Velocity of the wind was 37 miles per hour ; direction W. on the 23rd at noon.

Mean amount of Cloud (an overcast sky being indicated by 10'0)....	8'0
In the month of February, the highest reading of the Barometer during 29 years, was on the 11th, in 1849, and was	30'452
The lowest " " 6th, 1867	28'208
The highest Temperature " 5th, 1869	57'5
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 somewhat lower, and the Thermometer slightly higher than in previous years, but the Rainfall and Wind are greater in excess.

On the 5th, 9th, and 10th there was a frost. Snow fell on the 5th, 9th, 14th, 23rd, and 25th; hail on the 19th, 22nd, 23rd, and 26th; and sleet on the 6th, 7th, and 8th. Thunder was heard and lightning seen on the 3rd, and on the 21st and 23rd it was stormy.

An Aurora Borealis was observed on the evening of the 19th.

March, 1876.

Results of Observations taken during the month.		Mean for the last 29 years.						
Mean Reading of the Barometer	29'075	29'453						
Highest ,, on the 19th	29'730	30'066						
Lowest ,, on the 10th	28'100	28'697						
Range of Barometer Readings.....	1'630	1'369						
Highest Reading of a Max. Therm. on the 3rd.....	55'1	56'6						
Lowest Reading of a Min. Therm. on the 19th.....	24'4	23'3						
Range of Thermometer Readings	30'7	33'3						
Mean of all the Highest Readings	45'1	46'8						
Mean of all the Lowest.....	33'4	34'6						
Mean Daily Range.....	11'7	12'2						
Deduced Monthly Mean (from Mean of Max. and Min.)	38'3	39'7						
Mean Temperature from dry bulb	39'4	40'0						
Adopted Mean Temperature	38'9	39'9						
Mean Temperature of Evaporation	36'9	38'0						
Mean Temperature of Dew Point	34'2	35'6						
Mean elastic force of Vapour	0'198 in	0'206 in						
Mean weight of Vapour in a cubic foot of air	2'3gr	2'4gr						
Mean additional weight required for saturation.....	0'5gr	0'5gr						
Mean degree of Humidity, (saturation 1'00).....	0'85	0'85						
Mean weight of a cubic foot of air	540'4gr	546'2gr						
Fall of Rain	4'612 in	3'126 in						
Number of days on which Rain fell	21	18'2						
Amount of Evaporation	1'567	1'683						
No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	2	3	0	1	10	9	6
Mean Velocity in miles per hour	0	7'9	9'6	0	10'9	19'2	20'8	14'1
Total No. of miles for each direction	0	377	693	0	262	4598	4493	2027
The total number of miles registered during the month was 12450.								
The max. Velocity of the wind was 42 miles per hour; direction S. W. by W. on the 15th at 11 a.m.								

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	77
In the month of March, the highest reading of the Barometer during 29 years, was on the 6th, in 1852. Also on the 6th, in 1874, 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 mean Reading of the Barometer for this month is exceedingly low, the Wind high, and the Rainfall heavy; the Barometric Range is above the average.

The temperature results differ but slightly from those of previous years.

Hail fell on the 7th, 9th, 11th, 12th, 13th, 15th, 16th, and 17th. Snow on the 9th, 10th, 13th, 15th, 16th, 17th, 19th, and 21st. Sleet on the 18th and 27th. It was stormy on the 6th and 7th, and from the 9th to the 16th.

April, 1876.

Results of Observations taken during the month.	Mean for the last 29 years.	
Mean Reading of the Barometer.....	29'40I	29'495
Highest „ on the 5th	30'036	29'97I
Lowest „ on the 19th.....	28'490	28'780
Range of Barometer Readings	I'546	I'19I
Highest Reading of a Max. Therm. on the 8th.....	68'3	67'7
Lowest Reading of a Min. Therm. on the 11th.....	25'0	28'9
Range of Thermometer Readings	43'3	38'8
Mean of all the Highest Readings	54'0	54'2
Mean of all the Lowest.....	38'7	38'4
Mean Daily Range	15'3	15'8
Deduced Monthly Mean (from Mean of Max. and Min.)	44'9	44'8
Mean Temperature from dry bulb	45'1	44'9
Adopted Mean Temperature	45'0	44'9
Mean Temperature of Evaporation	42'9	42'1
Mean Temperature of Dew Point	41'1	39'0
Mean elastic force of Vapour	0'251 in	0'239 in
Mean weight of Vapour in a cubic foot of air	2'3gr	2'7gr
Mean additional weight required for saturation	0'5gr	0'7gr
Mean degree of Humidity (saturation 1'00)	0'84	0'80
Mean weight of a cubic foot of air	539'5gr	541'6gr
Fall of Rain	2'683 in	2'394 in
Number of days on which Rain fell	21	15'3
Amount of Evaporation	I'803	2'705

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		I	7	3	I	I	8	9
Mean Velocity in miles per hour	12.8	9'8	9'3	10'0	15'1	8'6	11'4	0
Total No. of miles for each Direction	306	1645	670	240	363	1644	2456	0

The total number of miles registered during the month was 7324.
 The max. Velocity of the wind was 30 miles per hour; direction S. W. on the 9th, at noon.

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	7.2
In the month of April, the highest reading of the Barometer during 29 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 " " 1841	40·8

The results this month agree remarkably closely with the means of the preceding 29 years.

There was thunder and also lightning on the 11th, and thunder only on the 21st. It was also stormy on the 25th. Snow fell on the 10th, 11th, 12th, and 13th. There was frost on the 1st, and fog prevailed on the 21st.

May, 1876.

Results of Observations taken during the month.		Mean for the last 29 years.						
Mean Reading of the Barometer	29'742	29'529						
Highest ,, on the 8th	30'074	29'943						
Lowest ,, on the 22nd	29'190	28'979						
Range of Barometer Readings.....	0'884	0'964						
Highest Reading of a Max. Therm. on the 6th	67'6	72'2						
Lowest Reading of a Min. Therm. on the 12th	29'9	31'6						
Range of Thermometer Readings	37'7	40'6						
Mean of all the Highest Readings	58'6	59'7						
Mean of all the Lowest.....	39'3	42'4						
Mean Daily Range	19'3	17'3						
Deduced Monthly Mean (from Mean of Max. and Min.)	47'3	49'4						
Mean Temperature from dry bulb	48'3	49'7						
Adopted Mean Temperature	47'8	49'6						
Mean Temperature of Evaporation	44'5	46'4						
Mean Temperature of Dew Point	40'9	43'0						
Mean elastic force of Vapour	0'256 in	0'278 in						
Mean weight of Vapour in a cubic foot of air	3'0gr	3'2gr						
Mean additional weight required for saturation	0'8gr	0'9gr						
Mean degree of Humidity (saturation 1'00)	0'78	0'76						
Mean weight of a cubic foot of air	542'8gr	536'8gr						
Fall of Rain	0'636 in	2'380 in						
Number of days on which Rain fell	8	15'2						
Amount of Evaporation	1'863	3'659						
No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	9	6	0	0	1	9	6
Mean Velocity in miles per hour	0	8'4	17'0	0	0	13'8	11'7	6'4
Total No. of miles for each Direction	0	1807	1614	0	0	331	2493	920
The total number of miles registered during the month was 7165.								
The max. Velocity of the wind was 25 miles per hour; direction E. on the 9th at 5 p.m., and W.N.W. on the 27th at 11 a.m.								

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	6'0
In the month of May, the highest reading of the Barometer during 29 years, was on the 22nd, in 1855, and was	30'124
The lowest " " 1st, 1858	28'564
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 Barometer for the Month was higher than usual, the temperature somewhat lower, and the Rainfall very slight. Hail fell on the 1st.

A solar halo was visible at 10.30 a.m. on the 31st; and a lunar halo at 9 p.m. on the 4th.

June, 1876.

Results of Observations taken during the month.		Mean for the last 29 years.						
Mean Reading of the Barometer	29'550	29'528						
Highest ,, on the 1st	29'820	29'907						
Lowest ,, on the 3rd	29'185	29'016						
Range of Barometer Readings.....	0'635	0'891						
Highest Reading of a Max. Therm. on the 20th	81'1	76'7						
Lowest Reading of a Min. Therm. on the 10th.....	39'0	39'2						
Range of Thermometer Readings	42'1	37'5						
Mean of all the Highest Readings	66'9	65'2						
Mean of all the Lowest	47'3	48'1						
Mean Daily Range	19'6	17'1						
Deduced Monthly Mean (from Mean of Max. and Min.)	55'3	54'9						
Mean Temperature from dry bulb	55'4	54'7						
Adopted Mean Temperature	55'4	54'8						
Mean Temperature of Evaporation.....	51'6	52'2						
Mean Temperature of Dew Point	48'0	49'0						
Mean elastic force of Vapour	0'336 in	358'9 in						
Mean weight of Vapour in a cubic foot of air	3'8gr	3'9gr						
Mean additional weight required for saturation.....	1'2gr	0'9gr						
Mean degree of Humidity (saturation 1'00)	0'76	0'79						
Mean weight of a cubic foot of air	530'7gr	531'0gr						
Fall of Rain	4'602 in	3'414 in						
Number of Days on which Rain fell	13	17'3						
Amount of Evaporation	5'059	3'821						
No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	0	2	3	1	3	9	11	1
Mean Velocity in miles per hour	0	9'0	13'5	6'9	9'8	10'4	9'3	10'3
Total No. of miles for each Direction	0	434	971	166	709	2250	2446	246
The total number of miles registered during the month was 7222.								
The Max. Velocity of the wind was 29 miles per hour; direction S. on the 17th at 1 p.m.								

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	6·6
In the month of June, the highest reading of the Barometer during 29 years, was on the 15th, in 1874, and was	30·219
The lowest ,, ,, 12th, 1862	28·632
The highest Temperature ,, 28th, 1857	84·6
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 range of the Barometer readings is considerably below the usually small average for June, and the Rainfall is heavy. Electric storms occurred on the 9th and 21st.

July, 1876.

Results of Observations taken during the month.		Mean for the last 29 years.
Mean Reading of the Barometer.....	29·616	29·515
Highest „ on the 15th.....	30·032	29·883
Lowest „ on the 28th.....	29·124	29·017
Range of Barometer Readings.....	0·908	0·866
Highest Reading of a Max. Therm. on the 16th	87·2	79·1
Lowest Reading of a Min. Therm. on the 11th.....	42·1	42·1
Range of Thermometer Readings	45·1	37·0
Mean of all the Highest Readings	70·3	68·2
Mean of all the Lowest.....	52·2	51·1
Mean Daily Range	18·1	17·1
Deduced Monthly Mean (from Mean of Max. and Min.)	59·4	57·8
Mean Temperature from dry bulb	60·1	58·1
Adopted Mean Temperature	59·8	58·0
Mean Temperature of Evaporation.....	56·4	55·2
Mean Temperature of Dew Point	53·4	52·6
Mean elastic force of Vapour	0·409 in	0·397 in
Mean weight of Vapour in a cubic foot of air	4·6gr	4·7gr
Mean additional weight required for saturation	1·2gr	1·0gr
Mean degree of Humidity (saturation 1·00)	0·80	0·82
Mean weight of a cubic foot of air	526·9gr	527·1gr
Fall of Rain	5·324 in	3·997 in
Number of days on which Rain fell	14	17
Amount of Evaporation	4·414	4·108

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		0	1	0	0	1	14	14
Mean Velocity in miles per hour	0	6·8	0	0	9·0	11·0	10·1	3·8
Total No. of miles for each Direction	0	164	0	0	215	3712	3389	92

The total number of miles registered during the month was 7572.
 The max. Velocity of the wind was 32 miles per hour; direction S. W.
 by W. on the 10th, at 11 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	6'5
In the month of July, the highest reading of the Barometer during 29 years, was on the 24th, in 1868, and was	30'112
The lowest " " " 14th, 1853	28'670
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 " " " " 1851 and 1853	55'5

The mean height of the Barometer, the range of both Barometer and Thermometer, the adopted mean temperature, the force of the wind and the Rainfall, are all in excess of the mean of preceding years. Storms occurred on the 10th and 26th. Thunder was heard on the 3rd and 23rd, lightning seen on the 22nd, and both were observed on the 31st.

August, 1876.

Results of Observations taken during the month.		Mean for the last 29 years.						
Mean Reading of the Barometer	29'478	29'498						
Highest " on the 10th	29'936	29'895						
Lowest " on the 31st	28'555	28'960						
Range of Barometer Readings.....	1'381	0'935						
Highest Reading of a Max. Therm. on the 13th	84'1	77'1						
Lowest Reading of a Min. Therm. on the 23rd	38'1	41'4						
Range of Thermometer Readings	46'0	35'7						
Mean of all the Highest Readings	68'8	67'2						
Mean of all the Lowest.....	51'2	50'9						
Mean Daily Range.....	17'6	16'3						
Deduced Monthly Mean (from Mean of Max. and Min.)	58'3	57'4						
Mean Temperature from dry bulb	59'4	57'5						
Adopted Mean Temperature	58'9	57'5						
Mean Temperature of Evaporation.....	55'4	54'7						
Mean Temperature of Dew Point	52'3	52'2						
Mean elastic force of Vapour	0'393 in	0'393 in						
Mean weight of Vapour in a cubic foot of air	4'3gr	4'3gr						
Mean additional weight required for saturation.....	1'2gr	0'9gr						
Mean degree of Humidity (saturation 1'00)	0'79	0'83						
Mean weight of a cubic foot of air	525'6gr	527'4gr						
Fall of Rain	4'313 in	4'765 in						
Number of days on which Rain fell	18	19'4						
Amount of Evaporation	2'688	3'429						
No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	1	6	1	0	1	11	9	2
Mean Velocity in miles per hour	6'8	10'3	8'1	0	12'9	11'9	10'8	12'6
Total No. of miles for each Direction	162	1487	195	0	310	3153	2066	607
The total number of miles registered during the month was 7980.								
The max. Velocity of the wind was 38 miles per hour; direction S.E. on the 3rd, at 2, 4, and 6 a.m.								

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	6'1
In the month of August, the highest reading of the Barometer during 29 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 low reading of the Barometer on the 31st has increased the range, without much affecting the mean for the month.

The range of temperature is greatly in excess of the average for August, but the mean height of the thermometer is not much altered.

Thunder and lightning were observed on the 1st, 16th, 24th, and 30th, and lightning only on the 20th. Fog prevailed on the 8th and 14th, and the weather was stormy on the 1st, 3rd, 24th, 29th, 30th, and 31st.

September, 1876.

Results of Observations taken during the month.	Mean for the last 29 years.	
Mean Reading of the Barometer	29'327	29'499
Highest " on the 20th.....	29'939	30'045
Lowest " on the 5th	28'995	28'853
Range of Barometer Readings.....	0'944	1'192
Highest Reading of a Max. Therm. on the 21st	72'4	72'3
Lowest Reading of a Min. Therm. on the 16th	39'5	36'9
Range of Thermometer Readings	32'9	35'4
Mean of all the Highest Readings	60'8	62'3
Mean of all the Lowest.....	47'4	47'2
Mean Daily Range.....	13'4	15'1
Deduced Monthly Mean (from Mean of Max. and Min.)	54'2	53'5
Mean Temperature from dry bulb	54'9	54'0
Adopted Mean Temperature	54'6	53'8
Mean Temperature of Evaporation.....	51'0	51'2
Mean Temperature of Dew Point	47'6	48'6
Mean elastic force of Vapour	0'327 in	0'343 in
Mean weight of Vapour in a cubic foot of air	3'7gr	3'9gr
Mean additional weight required for saturation.....	1'1gr	0'8gr
Mean degree of Humidity (saturation 1'00)	0'76	0'83
Mean weight of a cubic foot of air	527'6gr	531'4gr
Fall of Rain	5'378 in	4'613 in
Number of days on which Rain fell	23	18'7
Amount of Evaporation	2'530	2'284

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		1	8	2	0	1	3	8
Mean Velocity in miles per hour	5'3	6'5	5'3	0	8'2	12'5	8'7	7'4
Total No. of miles for each Direction	128	1254	252	0	173	902	1671	712

The total number of miles registered during the month was 5092.
The max. Velocity of the wind was 25 miles per hour; direction S. on the 25th, at 5 a.m.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	74
In the month of September, the highest reading of the Barometer during 29 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 Rainfall for the month is a little in excess.

There was thunder with lightning on the 24th, and thunder was heard on the 23rd.

N.B.—The Anemometer was out of order and being cleaned on the 16th, 17th, and 18th, and consequently the total number of miles registered for the wind includes only the results for 27 days.

October, 1876.

Results of Observations taken during the month.		Mean for the last 29 years.						
Mean Reading of the Barometer.....	29'479	29'402						
Highest " on the 26th.....	29'910	29'975						
Lowest " on the 11th.....	28'642	28'650						
Range of Barometer Readings.....	1'268	1'325						
Highest Reading of a Max. Therm. on the 4th.....	67'6	64'5						
Lowest Reading of a Min. Therm. on the 30th.....	32'1	30'1						
Range of Thermometer Readings	35'5	34'4						
Mean of all the Highest Readings	57'7	54'8						
Mean of all the Lowest.....	47'2	42'4						
Mean Daily Range	10'5	12'4						
Deduced Monthly Mean (from Mean of Max. and Min.)	51'3	47'6						
Mean Temperature from dry bulb	51'9	48'2						
Adopted Mean Temperature	51'6	47'8						
Mean Temperature of Evaporation.....	49'1	45'8						
Mean Temperature of Dew Point	46'6	43'4						
Mean elastic force of Vapour	0'318 in	0'283 in						
Mean weight of Vapour in a cubic foot of air	3'6gr	3'2gr						
Mean additional weight required for saturation	0'8gr	0'6gr						
Mean degree of Humidity (saturation 1'00)	0'83	0'85						
Mean weight of a cubic foot of air	533'5gr	536'0gr						
Fall of Rain	3'028 in	5'363 in						
Number of days on which Rain fell ..	16	21'6						
Amount of Evaporation	2'132	1'593						
No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	1	9	3	4	3	8	1	2
Mean Velocity in miles per hour	3'3	7'7	8'8	9'9	12'6	10'1	11'1	8'6
Total No. of miles for each Direction	79	1672	634	947	904	1941	266	413
The total number of miles registered during the month was 6856.								
The max. Velocity of the wind was 42 miles per hour; direction S. on the 11th at 2 p.m.								

Mean amount of Cloud (an overcast sky being indicated by 10·0)...	8·6
In the month of October, the highest reading of the Barometer during 29 years, was on the 29th, in 1849, and was	30·238
The lowest " " 19th, 1862	28·139
The highest Temperature " 9th, 1869	72·8
The lowest " " 21st, 1859	25·2
The highest adopted mean temperature of the month, 1861 and 1876	51·6
The lowest " " 1850	44·8

The high adopted mean temperature, and the moderate Rainfall, are quite exceptional for October. Fog was more prevalent than usual, having occurred every day from the 24th to the 28th. A lunar halo was seen at 6 p.m. on the 26th. It was stormy on the 9th, with lightning and thunder. Lightning was also seen on the 10th, 11th, and 14th, and thunder heard on the 4th and 6th.

The Fieldfare was first seen on the 24th, and the Redwing on the 28th.

November, 1876.

Results of Observations taken during the month.		Mean for the last 29 years.						
Mean Reading of the Barometer.....	29'424	29'461						
Highest „ on the 1st	29'966	30'060						
Lowest „ on the 27th.....	28'875	28'601						
Range of Barometer Readings.....	1'091	1'459						
Highest Reading of a Max. Therm. on the 9th.....	58'9	55'4						
Lowest Reading of a Min. Therm. on the 9th	24'3	25'4						
Range of Thermometer Readings	34'6	30'0						
Mean of all the Highest Readings	50'0	46'8						
Mean of all the Lowest	37'0	36'2						
Mean Daily Range	13'0	10'6						
Deduced Monthly Mean (from Mean of Max. and Min.)	43'1	41'1						
Mean Temperature from dry bulb	42'7	41'2						
Adopted Mean Temperature	42'9	41'2						
Mean Temperature of Evaporation.....	41'3	38'7						
Mean Temperature of Dew Point	39'4	37'6						
Mean elastic force of Vapour	0'242 in	0'225 in						
Mean weight of Vapour in a cubic foot of air	2'9gr	2'6gr						
Mean additional weight required for saturation	0'4gr	0'4gr						
Mean degree of Humidity (saturation 1'00)	0'87	0'87						
Mean weight of a cubic foot of air	542'2gr	544'7gr						
Fall of Rain	2'180 in	3'997 in						
Number of days on which Rain fell	19	19'0						
Amount of Evaporation	1'301	1'301						
No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
	1	10	5	2	3	3	4	2
Mean Velocity in miles per hour	1'7	6'0	13'8	9'3	10'6	8'6	6'6	7'1
Total No. of miles for each Direction	40	1442	1656	447	765	622	638	339
The total number of miles registered during the month was 5949.								
The max. Velocity of the wind was 31 miles per hour; direction E. on the 12th at 3 a.m.								

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	8'6
In the month of November, the highest reading of the Barometer during 29 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, 1857 and 1863	43'8
The lowest ,, ,, 1851.....	36'7

The range of Barometric readings is small, and the Rainfall scarcely more than half the average, although it is distributed over the usual number of days.

There was a fog on the 30th. Snow fell on the 9th, 10th, and 24th, and there was frost on the 8th and 21st.

December, 1876.

Results of Observations taken during the month.		Mean for the last 29 years.
Mean Reading of the Barometer	29'002	29'440
Highest " on the 26th.....	29'744	30'045
Lowest " on the 5th	28'028	28'596
Range of Barometer Readings.....	1'716	1'449
Highest Reading of a Max. Therm. on the 9th	58'1	53'0
Lowest Reading of a Min. Therm. on the 23rd	26'5	20'6
Range of Thermometer Readings	31'6	32'4
Mean of all the Highest Readings	47'1	43'3
Mean of all the Lowest.....	37'8	33'8
Mean Daily Range.....	9'3	9'5
Deduced Monthly Mean (from Mean of Max. and Min.)	42'5	38'6
Mean Temperature from dry bulb	42'5	39'2
Adopted Mean Temperature	42'5	38.9
Mean Temperature of Evaporation.....	40'8	37'8
Mean Temperature of Dew Point	38'8	36'0
Mean elastic force of Vapour	0'236 in	0'213 in
Mean weight of Vapour in a cubic foot of air	2'7gr	2'5gr
Mean additional weight required for saturation.....	0'4gr	0'4gr
Mean degree of Humidity (saturation 1'00)	0'87	0'88
Mean weight of a cubic foot of air	535'2gr	546'8gr
Fall of Rain	5'393 in	4'421 in
Number of days on which Rain fell.....	24	20'3
Amount of Evaporation	0'952	0'910

No. of days in the month on which the prevailing wind was	N	NE	E	SE	S	SW	W	NW
		1	5	4	6	1	10	4
Mean Velocity in miles per hour	4'0	8'1	9'3	12'0	13'5	12'0	8'4	0
Total No. of miles for each Direction	95	972	891	1561	323	2872	760	0

The total number of miles registered during the month was 7474.

The max. Velocity of the wind was 34 miles per hour; direction E. on the 3rd, at 1 a. m. and S.W. by W. on the 6th, at 4 a. m.

Mean amount of Cloud (an overcast sky being indicated by 10'0)...	7'9
In the month of December, the highest reading of the Barometer during 29 years, was on the 22nd, in 1849, and was	30'376
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 ,, ,, 1874	31'0

This month is remarkable from its containing the lowest Barometric pressure and the highest temperature in December during the last 29 years. The mean reading of the Barometer is also exceedingly low, and the Range large. The adopted mean Temperature and the Rainfall are above the average.

There was a very heavy fall of snow during the night of the 22nd, it had fallen on Pendle Hill on the 21st. Snow also fell on the 23rd, 26th, and 27th. There was frost on the 13th; and fog on the 2nd, 9th, and 10th. Thunder was heard on the 4th, and it was stormy on the 6th.

Summary of the Observations

FOR 1876.

	Mean for the last 29 years.
Mean Reading of the Barometer	29'432
Highest " on January 15th...	30'235
Lowest " on December 5th ..	28'028
Range of Barometer Readings	2'207
Highest Reading of a Max. Therm. on July 16th	87'2
Lowest Reading of a Min. Therm. on January 9th ...	17'3
Range of Thermometer Readings	69'9
Mean of all the Highest Readings	55'4
Mean of all the Lowest	41'7
Mean Daily Range	13'7
Deduced Yearly Mean (from Mean of Max. and Min.)	47'6
Mean Temperature of dry bulb	48'1
Adopted Mean Temperature	47'9
Mean Temperature of Evaporation	45'3
Mean Temperature of Dew Point	42'7
Mean elastic force of Vapour	0'281 in
Mean weight of Vapour in a cubic foot of air	3'2gr
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	537'0gr
Total Fall of Rain in the Year	47'235 in
Number of days per Month on which Rain fell.....	18'3
Amount of Evaporation	25'898
	27'241

The Maximum monthly mean height of the Barometer was in
March, 1854, and was

The Minimum " " in December, 1868, and was ...

The Maximum yearly mean height of the Barometer was in 1858,
and was

The Minimum " " " " in 1866, and was ...

The greatest monthly range of the Barometer was in November, 1859, and was	2'290
The least ,, ,, in July, 1852, and was	0'505
In 1859, on November 1st, at 1 p.m., the Barometer stood at 28'035, and on November 2nd, at 1 p.m., it stood at 29'263, this was the greatest range of the Barometer, in 24 hours, and was	1'228
The highest reading of the Barometer, during 29 years, was on February 11th, 1849, and on March 4th, 1854, and was	30'452
The lowest, January 14, 1865, and 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 ,, ,, December 24th, 1860	6'7
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 ,, ,, ,, ,, 1855	44'6
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 13'357 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 3'1
The least ,, ,, March, 1852	3

The extreme range of both Barometer and Thermometer is considerably in excess of the mean of previous years, and the adopted mean Temperature and Rainfall only slightly so.

The monthly mean readings of the Barometer differ very largely in 1876, being 29'805 for January, and only 29'002 for December.

AGRICULTURAL NOTES.

MARCH.—This month, as well as the preceding one, was unfavourable for agriculture. This was mainly due to the rain in the early part of the month, and to the severe frosts at both middle and end. Grass and wheat were only middling. The last few days were excellent for sowing oats. Season late.

APRIL.—The month started well, but a sudden change in the second week retarded both the potato planting and the preparation of the soil for the green crops. At the end of the month the grass looked very well. Frost interfered with the prospect of a plentiful crop of stone fruit and pears.

MAY.—The rain at the end of the month improved the crops. Oats still want rain. Green crops sown in very favourable weather.

JUNE.—Hay is below the average crop in quantity. Oats short. Wheat looking well. Green crops backward.

JULY.—Weather very favourable for the hay crop; quantity below average, quality excellent. Mangels look well, turnips less so from want of moisture. Gooseberries a complete failure owing to spring frosts. Fruit generally poor.

AUGUST.—The bad weather for the first ten days of the month damaged the cereals. Early crop of potatoes good; later ones small owing to insufficiency of moisture, but on the whole fully an average crop. Oats and barley below the average, wheat fair. Green crops excellent, especially the mangel-wurtzel. Fruit poor, apples fair. The after grass very good.

SEPTEMBER.—Early part of month fine. The wet weather at the middle and end helped the green crops. Potatoes doing very well.

OCTOBER.—First week very bad weather, the rest excellent. Potatoes lifted and wheat sown under the most favourable circumstances. Grass still growing well.

NOVEMBER.—The early frost impeded the harvesting of the mangel-wurtzel and the sowing of wheat. Grass also affected. Ploughing done early this month, and at end of last. Beet and turnips being harvested, season very favourable.

DECEMBER.—The wet weather interferes with ploughing.

OBSERVATIONS OF CROPS AND FLOWERS IN 1876.

GRAIN, ETC.					GREEN CROPS.				FLOWERS.	
Name.	When sown.	In Flower.	In Ear.	When cut.	Name.	When sown.	Above grnd.	Stored.	Name.	In Flower.
Wheat		July	July	Aug. 10th	Potatoes	Ap. 1st	Ap. 30th	June	Anemone	Ap. 10th
Oats	Mar. 25th	July	July 1st	Aug. 15th	Turnips.	May 15th	June 1st	Oct. 15th	Wild Hyacinth	Ap. 29th
Beans	Feb. 17th	May 15th		July	Swedes	May 15th	June 1st	Oct. 31st	Primrose	Feb. 14th
Peas	Feb. 17th	May 27th		June	Beet	May 5th	June 10th	Oct. 31st	Daisy	Ap. 6th
					Cabbage	Ap. 30th			Renunculus	Ap. 15th
					Carrots	Ap. 15th	May 10th	Nov. 9th	Meadow Sweet	May 20th
					Mangel	May 8th	June 4th	Oct. 31st	Crane's Bill	June 1st
					Onions	Mar. 23rd	Ap. 26th	Sept. 5th.		

OBSERVATIONS OF TREES AND SHRUBS IN 1876.

FOREST TREES, ETC.				FRUIT TREES, ETC.			SHRUBS.		
Name	In Bud:	In Leaf.	Divested of Leaves.	Name.	In Blossom.	Ripe.	Name	In Blossom.	Divested of Leaves.
Field Elm	Ap. 18th	Ap. 27th	Oct. 25th	Apple	May 25th	Aug. 15th	Lilac	May 25th	Nov. 4th
Oak	Ap. 30th	May 20th	Oct. 20th	Pear	Ap. 20th	Aug. 5th	Privet	May 10th	Oct. 31st
Lime	Ap. 15th	May 1st	Oct. 15th	Cherry	Ap. 15th	July 1st	Honeysuckle	July 20th	Oct. 27th
Sycamore	Ap. 10th	Ap. 25th	End of Oct.	Peach	Ap. 4th	Sept. 10th	Mountain Ash	May 24th	Oct. 31st
Horse Chesnut	Ap. 15th	Ap. 29th	Oct. 26th	Plum	Ap. 25th	Sept. 10th	Syringa	May 20th	Nov. 4th
Occidental Plane	Ap. 10th	Ap. 27th	Nov. 5th	Red Currant	Ap. 20th	July 20th	Laburnum	May 28th	Nov. 6th
Oriental Plane	Ap. 10th	Ap. 27th	Nov. 5th	Black Currant	Ap. 28th	July 15th			
Hawthorn	Mar. 28th	Ap. 3rd	Nov. 10th	White Currant	Ap. 20th	July 20th			
Hazel	Ap. 2nd	Ap. 25th	Oct. 30th	Strawberry	May 25th	June 10th			
Ash	May 20th	June 5th	Oct. 25th	Gooseberry	Ap. 10th	Aug. 20th			
Beech	Ap. 22nd	May 4th	Nov. 10th	Apricot	Ap. 4th	none			

THERMOMETER READINGS.

HOURS OF MINIMA.

IN the report of 1875 the civil day was used throughout in reckoning the hours of both the maxima and the minima of the Thermometric curves, and the double inflexion of the curves of lowest temperatures was strongly marked, whilst the curves of highest readings had only a single inflexion. It was kindly pointed out by a reviewer that the double inflexion must be due solely to the arbitrary starting point chosen for the day. It is obvious that, as the hour of midnight is almost invariably on a descending curve, the division, according to the civil day, would induce a false minimum at midnight, whenever the temperature of the preceding 24 hours was higher throughout than that recorded at midnight; and this will not unfrequently happen when the true minimum falls very early in the morning. It would certainly be more correct to choose the civil day for the maxima, and the astronomical day for the minima, as then each division of 24 hours would include a true maximum, or a true minimum, and these only should be taken into account. In the tables and curves of last year's report the absolute times of the maxima and minima were taken, but in the following tables and curves the minima of the hourly readings of the thermometer are chosen instead.

Adopting the astronomical, in lieu of the civil, day, we now find that there is only one inflexion in the time curve of the Maxima Readings, the hour of lowest temperature falling in the annual curve, between 4 and 5 a.m. The dotted curves refer to the year 1875 alone, and the continuous lines represent the mean results of eight years' observations.

The minima curves for 1875 differ more widely from the mean of the eight years, than do the corresponding maxima curves. In the winter months the minimum temperature is distributed more evenly throughout the hours of the day, but in the summer time the hour of lowest reading is very decided.

The monthly progression of the time of lowest temperature corresponds exactly with that of the sun's meridian altitude. Thus in January we find the lowest temperature at 9 a.m., in February from 7 to 8, at 6 in March, between 5 and 6 in April, at 4 in May, June, and July, at 5 in August, at 6 in September, from 6 to 7 in October, at 7 in November, and between 8 and 9 in December.

Monthly Tables of Hours of Minimum Readings of Thermometer during eight years.

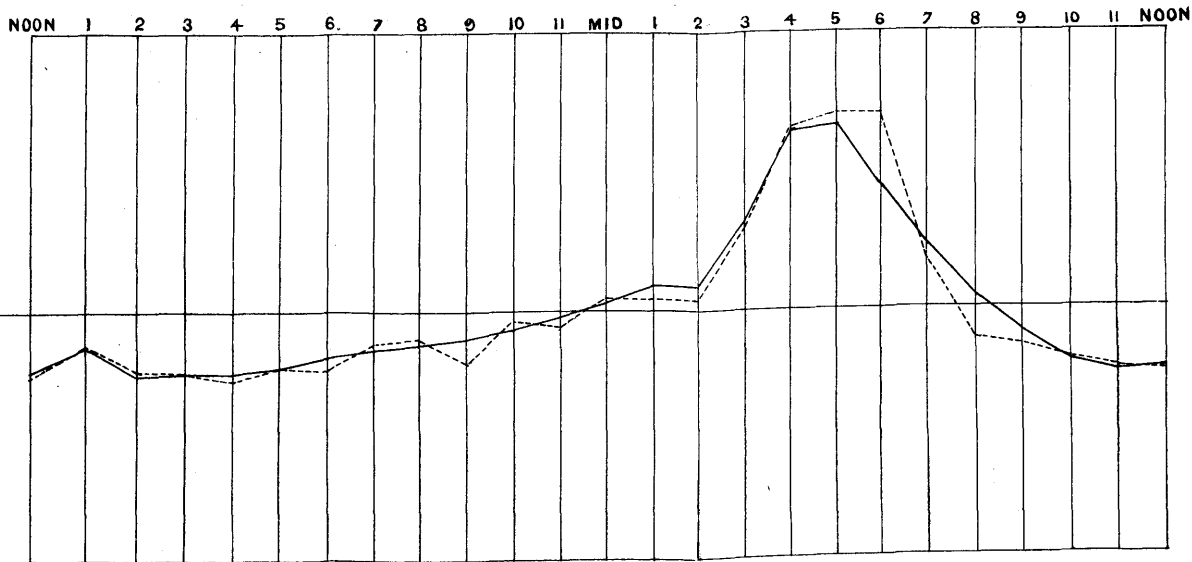
	1	2	3	4	5	6	7	8	9	10	11	Mid.	1	2	3	4	5	6	7	8	9	10	11	Noon
Jan.	13	3	6	2	6	8	6	6	13	8	4	9	10	15	9	9	12	9	17	22	29	11	9	7
Feb.	9	2	2	4	2	4	3	11	6	12	9	16	10	13	9	19	14	16	28	27	10	5	0	3
Mar.	4	1	2	3	1	2	5	7	5	7	12	16	10	15	14	19	29	45	36	11	3	0	1	0
April.	3	1	0	0	1	0	2	1	4	5	12	12	7	12	29	34	51	52	3	6	4	1	0	0
May.	0	0	0	0	0	2	0	1	1	4	9	10	20	17	35	72	60	10	4	1	0	0	0	1
June.	0	0	0	0	0	0	0	1	0	10	10	13	18	14	46	80	35	8	4	0	0	0	0	0
July.	1	0	0	0	0	0	2	1	1	5	5	12	20	15	29	86	55	9	2	1	0	0	1	1
Aug.	0	0	0	0	0	1	1	2	6	5	14	7	11	13	29	32	74	39	9	4	0	0	1	1
Sept.	2	0	0	2	0	2	3	7	8	12	6	12	11	17	15	21	41	59	18	3	0	0	1	0
Oct.	4	0	2	0	1	2	10	4	9	9	6	13	16	10	12	20	28	39	43	11	2	1	3	3
Nov.	7	0	2	0	6	6	9	10	6	11	11	7	10	11	14	14	13	24	35	27	10	3	2	0
Dec.	14	7	3	4	4	14	11	12	10	2	10	5	14	4	9	12	11	19	20	20	26	12	1	5
Sums.	57	14	17	15	21	41	52	63	69	90	108	132	157	156	250	418	423	329	219	133	84	33	18	21

	1	2	3	4	5	6	7	8	9	10	11	Mid.	1	2	3	4	5	6	7	8	9	10	11	Room
Jan.	2	1	2	0	0	0	2	1	0	1	1	3	0	2	0	1	3	0	5	1	3	2	0	1
Feb.	0	1	0	1	0	0	0	1	0	2	0	1	1	0	3	2	4	4	1	2	2	2	0	1
Mar.	1	0	0	0	0	0	2	0	0	2	1	3	0	1	3	3	5	6	2	1	1	0	0	0
April.	0	0	0	0	0	0	0	1	0	0	2	3	0	1	1	3	5	14	0	0	0	0	0	0
May.	0	0	0	0	0	0	0	0	0	0	2	0	3	4	3	6	10	3	0	0	0	0	0	0
June.	0	0	0	0	0	0	0	0	0	2	1	1	2	4	6	8	5	0	1	0	0	0	0	0
July.	0	0	0	0	0	0	0	0	0	1	1	1	3	1	1	12	9	2	0	0	0	0	0	0
Aug.	0	0	0	0	0	0	0	0	0	0	1	1	2	2	4	7	8	6	0	0	0	0	0	0
Sept.	0	0	0	0	0	0	0	1	2	0	1	1	1	1	4	4	3	9	2	1	0	0	0	0
Oct.	0	0	0	0	0	1	2	2	0	2	0	2	2	1	2	1	1	5	8	1	0	0	1	0
Nov.	1	0	0	0	3	1	0	0	1	2	0	1	2	0	4	3	1	4	4	2	0	0	1	0
Dec.	3	1	0	0	0	1	2	3	1	0	2	1	1	0	1	2	2	3	3	2	2	1	0	0
Sums.	7	3	2	1	3	3	8	9	4	12	12	18	17	17	32	52	56	56	26	10	8	5	2	2
Means	.58	.25	.17	.01	.25	.25	.67	.75	.33	1.0	1.0	1.50	1.42	1.42	2.67	4.33	4.67	4.67	2.17	0.83	0.67	0.47	0.17	0.17

Summary of Hours of Minimum Readings of Thermometer during eight years.

	1	2	3	4	5	6	7	8	9	10	11	Mid.	1	2	3	4	5	6	7	8	9	10	11	Noon	
1868	3	4	2	1	3	7	6	9	7	12	20	13	24	19	37	55	46	38	26	21	4	4	4	1	4
1869	17	0	4	3	2	2	9	5	11	9	10	21	24	21	25	51	51	36	19	24	14	4	1	6	6
1870	11	1	0	0	5	6	8	3	11	8	10	20	15	17	32	52	50	42	31	14	13	8	5	1	1
1871	4	2	2	2	0	4	8	7	7	11	10	19	16	28	33	54	52	37	34	16	13	2	2	1	1
1872	6	2	2	3	2	5	4	12	2	18	18	14	18	11	28	47	53	49	29	20	13	3	4	3	3
1873	4	0	3	5	3	8	2	7	15	8	9	19	22	21	31	45	60	42	26	16	11	4	2	2	2
1874	5	2	2	0	3	6	7	11	12	12	19	8	21	22	32	62	55	29	28	12	8	3	1	2	2
1875	7	3	2	1	3	3	8	9	4	12	12	18	17	17	32	52	56	56	26	10	8	5	2	2	2
Sums	57	14	17	15	21	41	52	63	69	90	108	132	157	156	250	418	423	329	219	133	84	33	18	21	21
Means	7.1	1.8	2.1	1.9	2.6	5.1	6.5	7.9	8.6	11.3	13.5	16.5	19.6	19.5	31.3	52.3	52.9	41.1	27.4	16.6	10.5	4.1	2.2	2.6	2.6

YEARLY MEANS OF HOURS OF MINIMUM READINGS.



Mean

HOURS OF MINIMUM READINGS.

NOON 1 2 3 4 5 6 7 8 9 10 11 MID 1 2 3 4 5 6 7 8 9 10 11 NOON

JANUARY

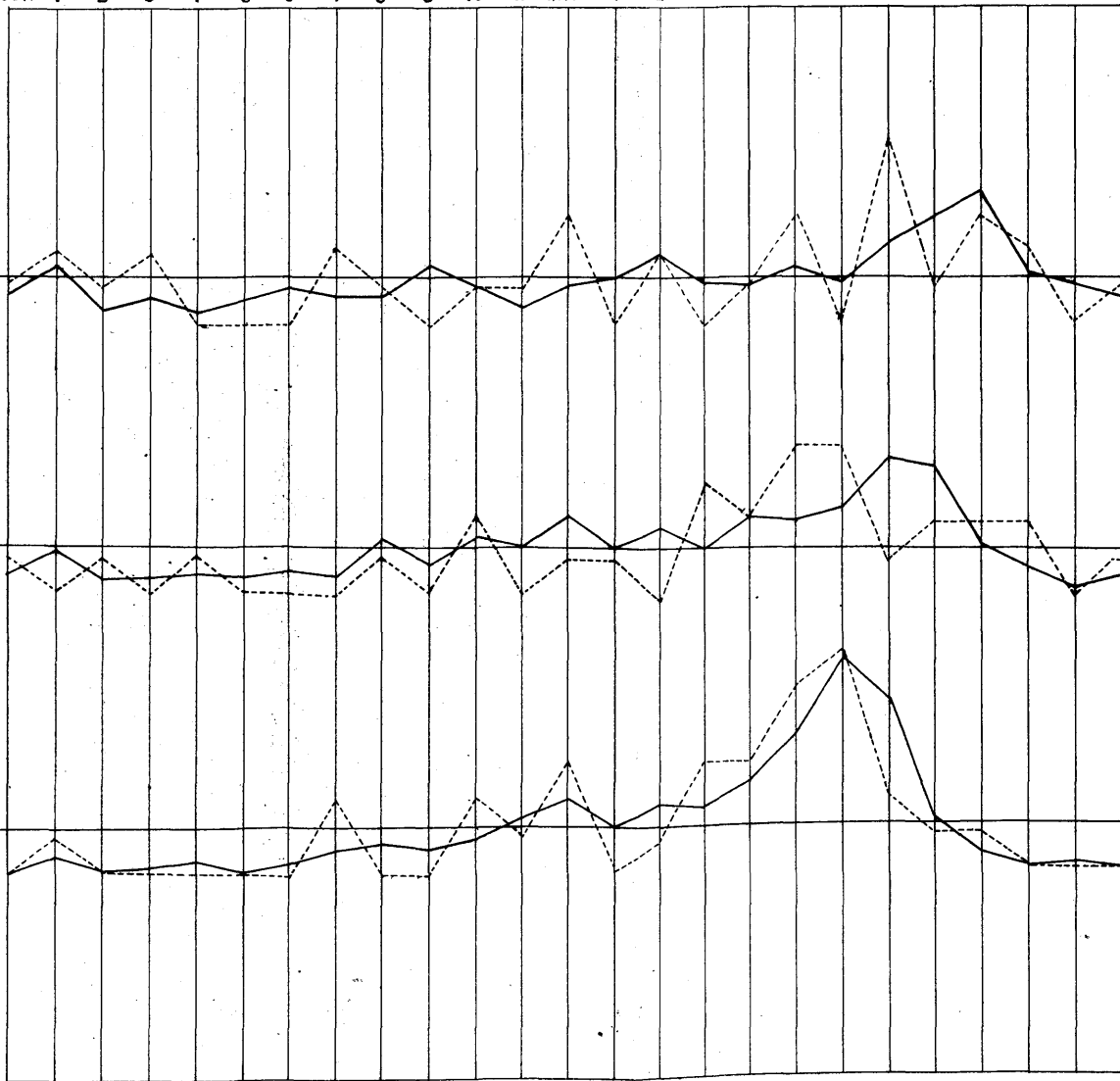
Mean

FEBRUARY

Mean

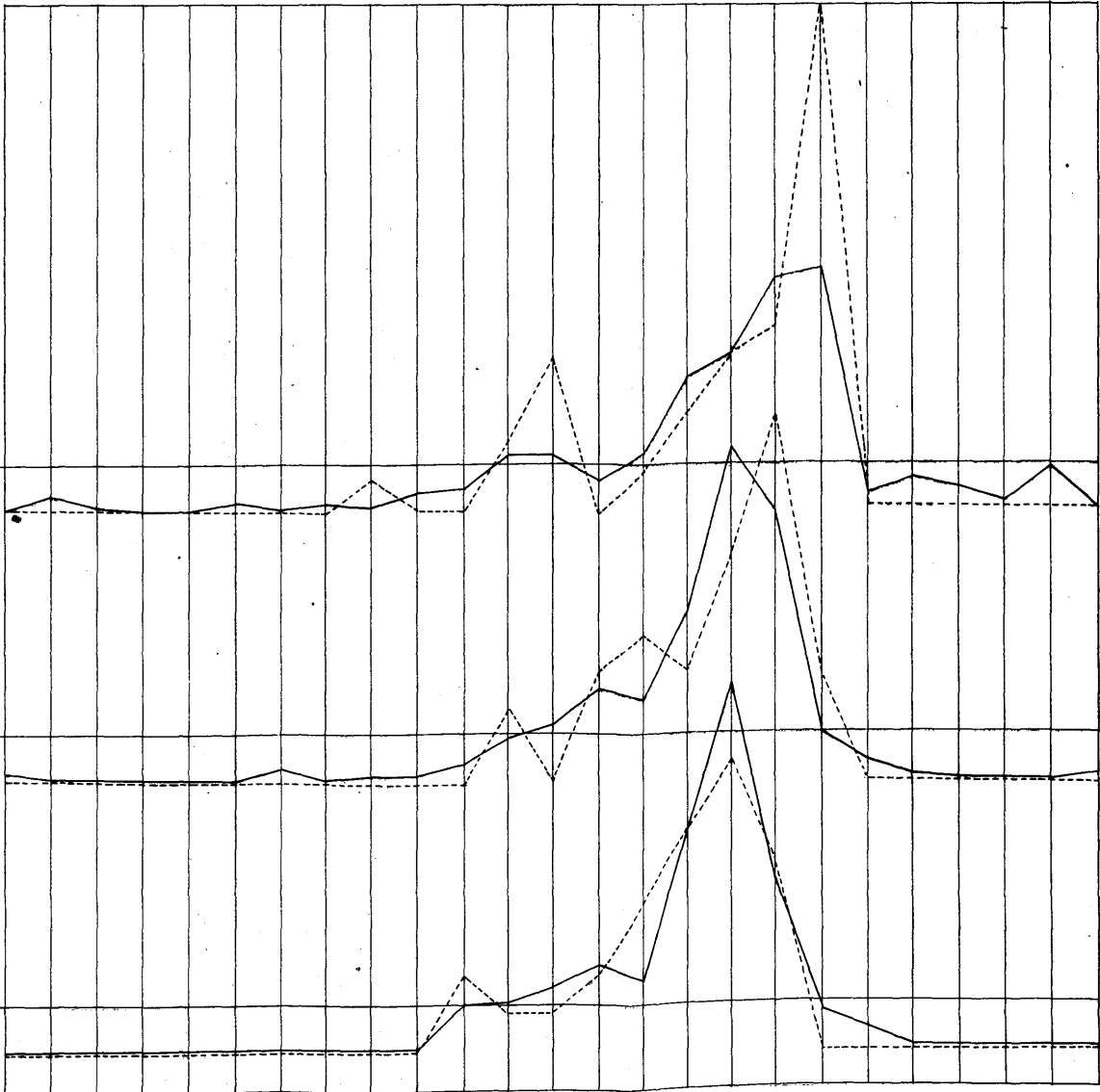
MARCH

Mean



HOURS OF MINIMUM READINGS.

NOON 1 2 3 4 5 6 7 8 9 10 11 MID 1 2 3 4 5 6 7 8 9 10 11 NOON



APRIL

Mean

MAY

Mean

JUNE

Mean

Monthly Magnetical Observations taken at the College Observatory, Stonghurst, 1876.

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 0.000000436.

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 former having been always under 2s., and the latter always under 80'.

The average deflection of the magnet caused by a twist of the torsion circle through 90° , has been about $9'4$ 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 $-0'0042776$.

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.	$\frac{m}{X}$ Log—
	D. H. M.	FOOT.	°	° ′ ″	
January ...	18th...10 33 a.m.	1'0	55'9	14 6 8	9'08888
	„ ...11 0 a.m.	1'3	56'5	6 22 55	9'08905
February...	11th...10 44 a.m.	1'0	46'9	14 7 6	9'08875
	„ ...11 11 a.m.	1'3	47'1	6 23 30	9'08906
March ...	18th...11 6 a.m.	1'0	43'0	14 9 1	9'08953
	„ ...11 24 a.m.	1'3	43'5	6 23 41	9'08903
April	14th...12 8 p.m.	1'0	46'3	14 7 25	9'08888
	„ ...12 28 p.m.	1'3	48'0	6 23 7	9'08870
May	26th...12 1 p.m.	1'0	59'0	14 5 10	9'08862
	„ ...12 21 p.m.	1'3	59'4	6 22 27	9'08873
June	26th...11 17 a.m.	1'0	74'1	14 2 34	9'08843
	„ ...11 48 a.m.	1'3	76'1	6 20 52	9'08821
July.....	27th...11 45 a.m.	1'0	61'0	14 3 21	9'08784
	„ ...12 5 p.m.	1'3	62'4	6 21 33	9'08793
August ...	25th... 8 22 a.m.	1'0	50'8	14 2 56	9'08792
	„ ... 8 48 a.m.	1'3	50'8	6 21 33	9'08712
September.	29th... 9 44 a.m.	1'0	49'2	14 6 0	9'08836
October ...	27th...11 7 a.m.	1'0	47'7	14 3 42	9'08710
	„ ...11 28 a.m.	1'3	48'5	6 21 37	9'08704
November.	20th...11 8 a.m.	1'0	58'0	13 59 37	9'08575
	„ ...11 39 a.m.	1'3	60'7	6 19 57	9'08559
December .	19th...11 11 a.m.	1.0	41'2	14 3 55	9'08678
	„ ...11 33 a.m.	1.3	42'1	6 21 56	9'08697

m represents the Magnetic moment of the Deflecting Magnet.
 X represents the Earth's Horizontal Magnetic Intensity.

HOURS OF MINIMUM READINGS.

NOON 1 2 3 4 5 6 7 8 9 10 11 MID 1 2 3 4 5 6 7 8 9 10 11 NOON

OCTOBER

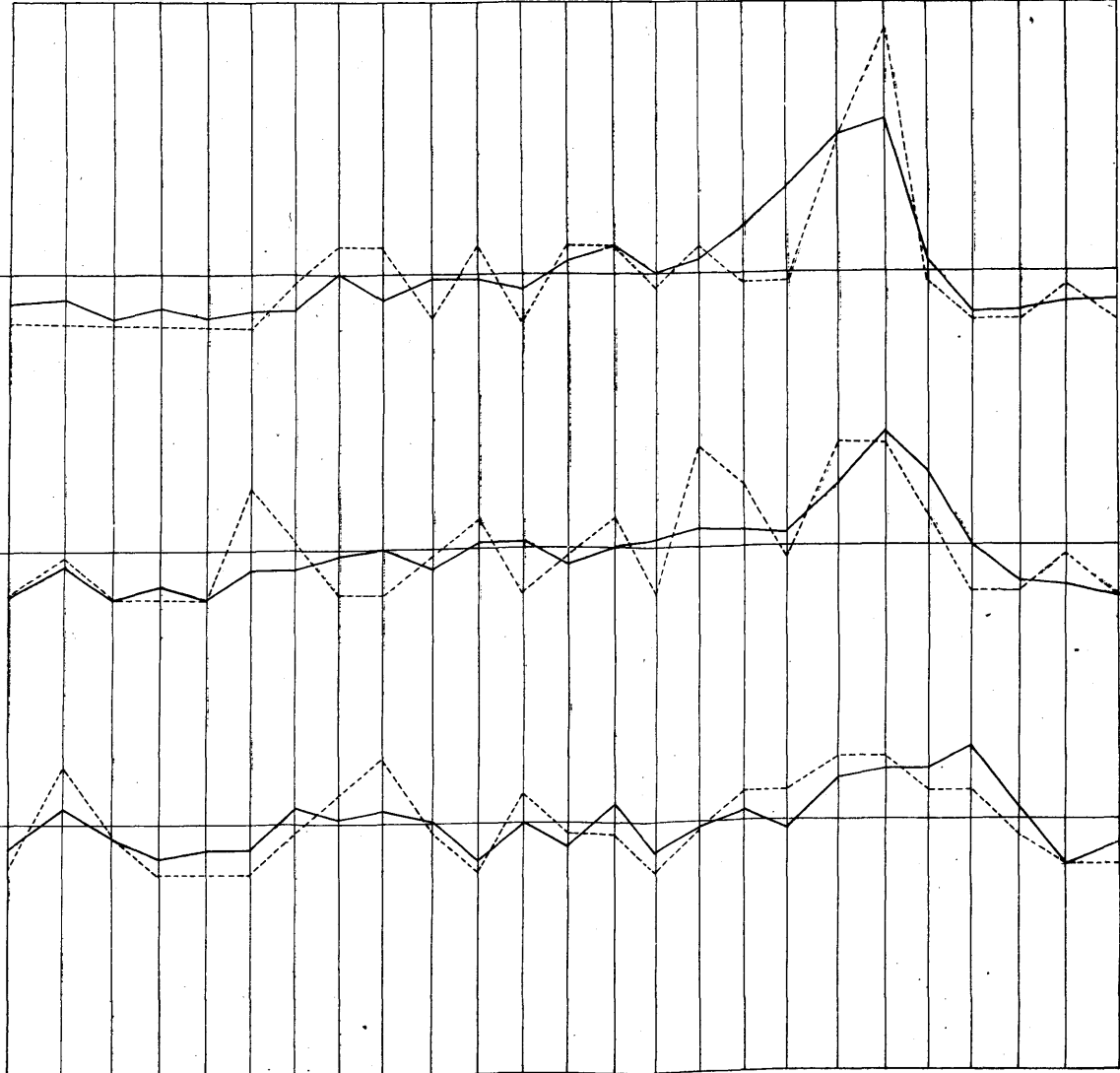
Mean

NOVEMBER

Mean

DECEMBER

Mean



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. 18th... 9 12 a.m.	45·4	5·63904	0·21317	0·44779
February...	11th...12 42 p.m.	51·7	5·64171	0·21305	0·44769
March	18th... 9 59 a.m.	42·2	5·63385	0·21250	0·44760
April	14th...11 27 a.m.	44·5	5·63710	0·21290	0·44756
May.....	26th...10 54 a.m.	56·1	5·64392	0·21259	0·44733
June	26th...10 0 a.m.	62·5	5·64783	0·21249	0·44762
July.....	21st...12 6 p.m.	72·8	5·65169	0·21257	0·44692
August ...	25th...11 8 a.m.	51·3	5·64992	0·21143	0·44615
September.	29th... 8 45 a.m.	51·0	5·64640	0·21193	0·44683
October ...	27th... 9 36 a.m.	46·4	5·65204	0·21080	0·44559
November.	20th... 9 3 a.m.	43·8	5·64883	0·21320	0·44610
December .	15th...11 20 a.m.	40·9	5·65015	0·21082	0·44550

Dip Observations.				Magnetic Intensity.		
Months.	G. M. T.	Needle.	Dip.	X, or Horizontal Force.	Y, or Vertical Force.	Total Force.
January ...	D. H. M.					
	18th... I 49 a.m.	I	69° 27' 14"	3'6485	9'7217	10'3838
" ...	I 2 33 p.m.	3	69 24 16			
February*	12th at I 1 a.m.	I } 3 }	69 24 25	3'6482	9'7095	10'3722
March ...	20th... I 13 a.m.	I	69 26 38	3'6443	9'6991	10'3611
	" ... I 56 a.m.	3	69 22 11			
April	14th... I 30 a.m.	I	69 22 15	3'6480	9'6744	10'3394
	" ... I 15 a.m.	3	69 18 30			
May	26th... I 30 a.m.	I	69 20 9	3'6472	9'6644	10'3297
	" ... I 2 5 p.m.	3	69 18 45			
June	26th... 9 45 a.m.	I	69 19 15	3'6483	9'6603	10'3263
	" ... I 0 a.m.	3	69 18 0			
July	27th... I 45 a.m.	I	69 21 45	3'6504	9'6957	10'3602
	" ... I 45 a.m.	3	69 22 30			
August ...	28th... I 40 a.m.	I	69 20 8	3'6472	9'6569	10'3226
	" ... I 30 a.m.	3	69 17 0			
September	29th... I 55 a.m.	I	69 23 16	3'6457	9'6754	10'3395
	" ... I 45 a.m.	3	69 19 9			
October...	27th... I 30 a.m.	I	69 19 45	3'6464	9'6478	10'3139
	" ... I 2 20 p.m.	3	69 15 45			
November	20th... I 10 a.m.	I	69 22 15	3'6627	9'7074	10'3754
	" ... I 45 a.m.	3	69 17 7			
December	15th... I 30 a.m.	I	69 20 30	3'6473	9'6534	10'3195
	" ... I 2 15 p.m.	3	69 15 45			
	Means. ...		69 20 52	3'6487	9'6805	10'3453

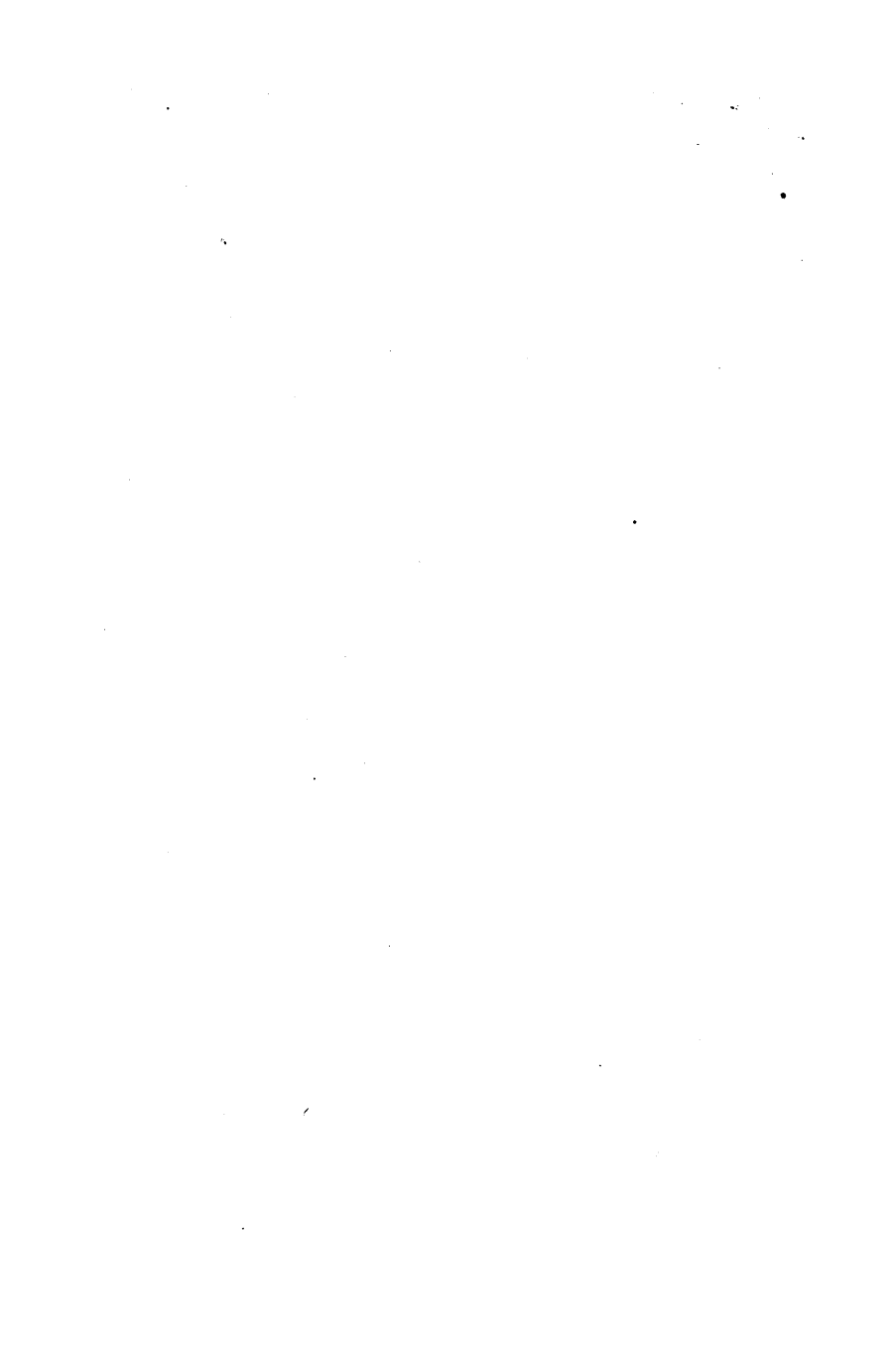
* The date is probable, and the amount the mean of needles 1 and 3.

DECLINATION OBSERVATIONS.

		Uncorrected.			Corrected.		
Month.	G. M. T.	Observation.	Monthly Mean.	Observation.	Monthly Mean.		
January ...	D. H. M. 3rd... 9 4 a.m.	20 52 38w.	o ' "	20 52 12	o ' "		
	10th... 8 57	51 47		53 39			
	17th... 9 9	52 45		54 2			
	25th... 9 5	56 25		59 8			
February..	31st... 9 16	52 35	20 53 14	55 1		20 54 48	
	7th... 8 56	57 23		58 13			
	14th... 8 53	54 17		53 7			
	21st... 9 2	54 46		55 53			
March	29th... 9 4	51 19	20 54 26	53 35		20 55 12	
	7th... 9 6	58 35		59 45			
	13th... 8 57	53 8		(53 8)			
	20th... 9 11	50 17		55 11			
April	28th... 8 58	48 35	20 52 39	(48 35)		20 54 10	
	3rd... 9 3	57 1		59 20			
	11th... 9 5	52 22		56 24			
	17th... 8 59	48 11		53 22			
May	24th... 9 10	54 2	20 52 54	58 21		20 56 52	
	2nd... 9 2	51 17		52 34			
	9th... 8 58	48 41		51 59			
	15th... 9 10	54 9		57 9			
June	23rd... 9 3	50 54		53 54			
	29th... 9 1	53 28	20 51 42	58 12		20 54 46	
	5th... 9 8	48 51		50 10			
	12th... 9 7	46 25		51 10			
	19th... 8 53	50 28		52 39			
	26th... 9 6	44 15	20 47 30	48 9		20 50 32	

DECLINATION OBSERVATIONS (*Continued*).

		Uncorrected.		Corrected.	
Month.	G. M. T.	Observation.	Monthly Mean.	Observation.	Monthly Mean.
	D. H. M.	° ' " w.	° ' "	° ' "	° ' "
July	3rd... 9 12 a.m.	20 45 7w.		20 45 36	
	10th... 9 2	49 9		53 39	
	17th... 8 53	46 14		46 26	
	25th... 9 5	48 31		53 1	
	31st... 9 4	41 55	20 46 11	44 59	20 48 44
August ...	14th... 9 8	48 1		50 37	
	21st... 9 9	52 22		53 32	
	29th... 9 2	54 14	20 51 32	57 25	20 53 51
September	4th... 9 3	20 43 37		(43 37)	
	11th... 9 6	21 0 38		21 1 57	
	18th... 8 57	20 50 1		20 52 12	
	25th... 9 7	20 59 5	20 53 41	21 2 59	20 55 11
October ...	2nd... 8 59	21 0 24		21 3 7	
	10th... 9 10	20 46 34		20 49 17	
	16th... 9 4	20 51 48		20 54 14	
	23rd... 9 9	21 3 5		(21 3 5)	
	30th... 9 1	20 57 17	20 55 50	20 58 34	20 57 39
November	6th... 8 59	20 52 41		(52 41)	
	20th... 9 6	46 38		47 19	
	28th... 9 12	43 7	20 47 43	44 57	20 48 19
December .	5th... 9 0	42 11		(42 11)	
	11th... 9 2	43 31		(43 31)	
	18th... 9 8	47 15		(47 15)	
	26th... 8 59	37 24	20 42 35	(37 24)	20 42 35
Yearly mean			20 50 50		20 52 43



MAGNETIC DISTURBANCES.

JANUARY.—Frequent slight diminutions of Declination occurred about 8 or 10 p.m., and on the morning of the 20th there was a similar increase at 1 and 4 o'clock. A storm commenced on the 14th immediately after midnight, and increased in violence from 6 p.m. until 2 a.m. on the 15th; the magnets continued disturbed until the morning of the 17th. On the 22nd, between 7 and 9 p.m., and a little later on the following day, there was a considerable diminution of the Declination, the most rapid movement occurring between 5 and 7 p.m. on the 23rd, when the Declination decreased $42' 58''$ in less than 30 minutes, and then increased almost as rapidly. This was accompanied by a slight augmentation of both the H.F. and V.F. components of the Intensity.

FEBRUARY.—A storm commenced a little before 6 a.m. on the 5th, and lasted for about 24 hours. The irregular movements consisted chiefly of rapid small oscillations of the Declination needle. There was a quick movement of the needle towards the East between 10 and 12 p.m. on the 10th, and a similarly rapid return Westward during the following two hours, and the magnet remained in a rather unsteady condition during the whole of the 11th. From 5 p.m. on the 13th until 2 a.m. on the 14th, the Declination was considerably disturbed, as also on the four next evenings. There were irregular movements in the forenoon of the 17th, and also of the 18th, and at 3.45 a.m. on the 19th the greatest storm of the year commenced, and continued until mid-day on the 20th. The first indication of the disturbance was a rapid Westerly movement of the Declination magnet, accompanied by a slight but well marked increase of the H.F., the change on the V.F. curve being scarcely discernible. A lull occurred in the storm between 8 a.m. and 5.15 p.m. on the 19th. The movements were generally bold, but rapid short oscillations were

frequent during the morning hours of the 19th and 20th. The Declination needle reached its minimum at midnight on the 19th, and the maximum was attained two hours later, the increase of Declination during this short interval being $1^{\circ} 8' 2''$. The H.F. magnet was also moving quickly during this interval and the two following hours. The rapid decrease of the V.F. began at 10 p.m. on the 19th, and continued until the magnet was thrown completely off its balance between 2 and 3 a.m. The night of the 19th was unfortunately very cloudy, but the Auroral light was clearly visible at 10.30 p.m. On the 21st and 22nd, and still more from the 24th to the 27th, the irregular movements before midnight were well marked on the photographic curves.

MARCH.—The Declination magnet was slightly disturbed throughout the greater part of the day on the 4th and 5th and on the morning of the 7th. The disturbances during the early hours of the 12th and 13th were remarkably similar, but in opposite directions. The storm of the 25th began with a sudden increase of Declination shortly after 2 a.m., followed by a tremulous movement between 6 and 7 a.m. There was a lull on the 26th, but the magnet remained much disturbed until the end of the month. A considerable increase of the V.F. occurred about 6.40 p.m. on the 25th, and a decrease, but less marked, both at 5 a.m. on the 27th and at 11 p.m. on the 30th. On the H.F. curve the storm of the 25th was recorded by only a slight continued irregularity, but the movements on the evening of the 30th were more decided.

APRIL.—A slight disturbance began about 6 p.m. on the 8th, and another shortly after 1 a.m. on the 19th, but the magnets were exceedingly quiet during the whole month. The curves of the V.F. on account of their extreme regularity showed most clearly the daily range, with its maximum near 9 p.m.

MAY.—On the evening of the 5th an irregular movement commenced, but never attained any considerable amplitude. The same happened between 9 and 10 p.m. on the 24th. The frequent recurrence of a diminution of West Declination about 8 p.m. is very noticeable this month; the magnet quickly regains its normal position. The small disturbances are more distinctly traceable on the H.F. than on the V.F. curves.

JUNE.—At 9 p.m. on the 4th the Declination magnet became a little irregular in its movements, but soon returned to its usual state. Shortly after 10 p.m. on the 16th, a disturbing force began to make itself felt by the magnets; and there was a considerable amount of tremulous motion throughout the 28th, the H.F. and Declination Magnetograms being equally affected. There was also a little disturbance on the 30th.

JULY.—At the beginning of the month, and also from the 17th to the 21st, the needle was unsteady. There were several irregular movements between the evening of the 26th and the morning of the 28th, and also on the morning of the 30th. Throughout the month the magnet was much less steady than during the previous three months.

AUGUST.—This month commenced with three disturbed days. The magnets were also irregular in their movements on the 12th and 13th before mid-day, and throughout the 30th and 31st.

SEPTEMBER.—There is a rather striking similarity on the 13th and 14th in the curves traced between noon and the following morning, and a slight trace of the same movements is observable on the 15th. A remarkable diminution of the Declination lasted from 9 p.m. on the 22nd until 7 a.m. on the 23rd. This was accompanied by a similar diminution of the H.F. and V.F., the latter only slight. The curves of the 26th and 27th were rather irregular.

OCTOBER.—The disturbance towards the beginning of the month increased until the 6th, and then the magnets rapidly regained their normal tranquil state. The V.F. reached its minimum on the 6th at about 11.30 p.m. The H.F. was also slightly diminished. On the 11th the magnets were somewhat unsteady, and a storm occurred on the 23rd with a very decided minimum of the V.F. at 11.20 p.m.

NOVEMBER.—The irregular inflexions of the curves between 10 p.m. on the 10th and 2 a.m. on the 11th, consisted mainly in a diminution of the horizontal Deflection. On other days the magnets were fairly quiet, except on the morning of the 13th.

DECEMBER.—A slight disturbance of the Declination on the evening of the 11th, which was followed by a similar movement the following day, had been preceded by irregular oscillations of the magnets throughout the 10th. A continued disturbance that commenced about 6 p.m. on the 21st is the last recorded for 1876.

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