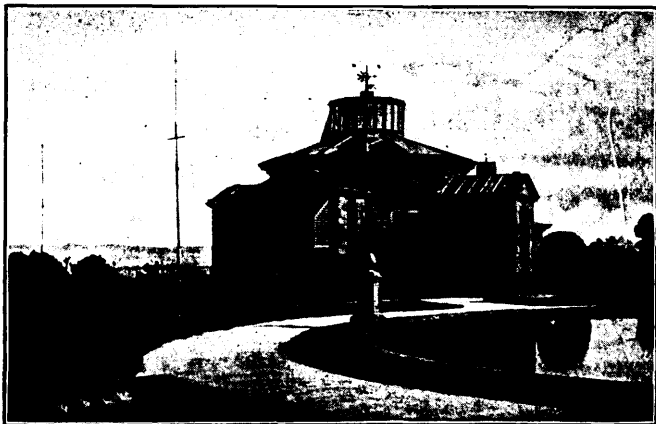




# STONYHURST COLLEGE OBSERVATORY.

Lat.  $53^{\circ} 50' 40''$  N. Long.  $9^{\text{m}} 52^{\text{s}}.68$  W.  
Height of the Barometer above the Sea, 381 feet.



(FOUNDED 1838)

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## Results of Meteorological and Magnetical Observations, 1919.

With Report and Notes of the Director,  
REV. A. L. CORTIE, S.J., F.R.A.S., F. Inst. P.

BLACKBURN:  
THOMAS BRIGGS (Blackburn) LTD., PRINTERS, 73, NORTHGATE.

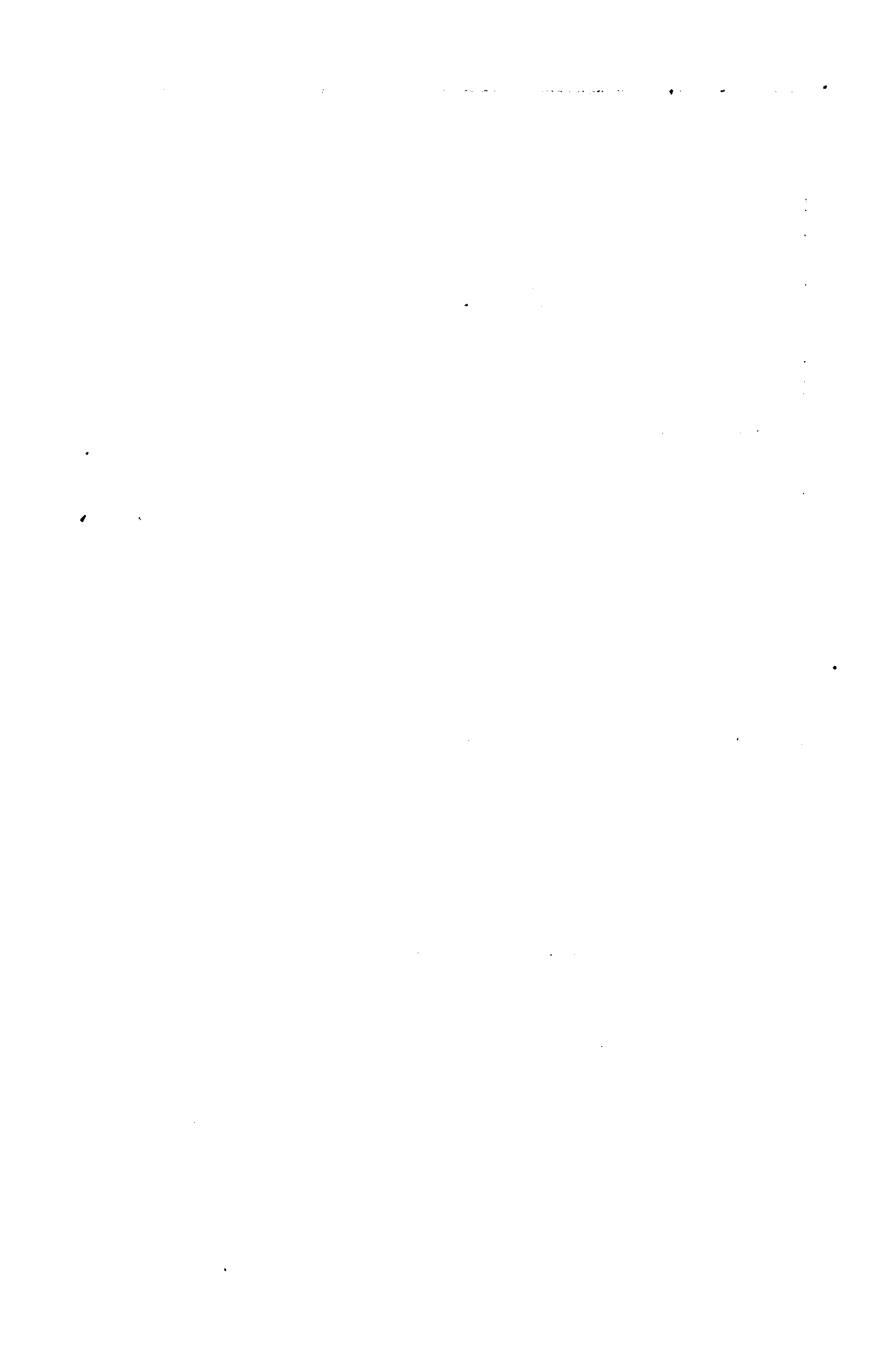
1920.



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REPORT AND NOTES.

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**Meteorological.**—The Meteorological continuous records have been uninterrupted during the year.

The Anemograph stands about 45 feet above the ground. A velocity of the wind of 37 miles per hour and over is called a gale.

Bright sunshine is recorded by a Campbell-Stokes Recorder.

The self-recording Rain Guage is of the Beckley pattern. Its receiving surface is 22 inches above the ground, and 377 feet above sea-level. The daily measures are taken at 10 a.m. for the preceding 24 hours. Heavy rain noted in the monthly tabulations, signifies a fall of  $\frac{1}{2}$  inch or over during the day. The rainfall values as printed in the monthly tables were registered not by the Beckley Self-Recorder but by the M.O. 8-inch gauge.

The Barometer is a standard barometer of the pattern approved by the Meteorological Office. It is mounted in the underground Magnetic Chamber. Its cup is 363 feet above sea-level. Its readings in the monthly tables are quoted for the density of mercury at 32° Fahr., and for the original position of the barometer at 381 feet above sea-level; and the mean pressures are corrected for diurnal range.

The Thermometers are the property of the Meteorological Office. They are mounted at 7 feet above the ground on the north side of the Observatory, enclosed in a Stevenson Screen. All the readings are corrected for index errors, as determined by the Office-standards.

The *monthly mean temperature* is derived in two ways: 1st, from the mean of the highest and lowest daily readings corrected by the average difference between this mean and the true mean of the hourly tabulations; and 2nd, from the mean of the readings at 9 a.m. and 9 p.m. corrected in the same manner. Both corrections have been furnished by the Greenwich records, and are taken from the well-known Glaisher's tables. The *Adopted mean temperature* is the mean of these two results.

The photographic barograph and thermograph were installed at Stonyhurst in the year 1866. In that year the Meteorological Office had been transferred from the Board of Trade to a Committee of the Royal Society. Seven observatories, among them Stonyhurst, were equipped with self-recording instruments of uniform pattern to provide materials for the scientific study of the weather. The experiment terminated in 1884. But the photographic instruments had been retained, and furnished continuous records until the middle of 1918, when they were supplanted by metallic-pen self-recording barograph and thermograph of the M.O. pattern, and a Richard hair hygrometer. The photographic barograph and thermograph were dismantled, and returned to the M.O. in September, 1919.

The weather of the year as a whole was drier and colder than the normal (*see Summary, p. 25*). The mean

deficiency of temperature was only one degree, but every individual month was colder than the normal, with the exception of May, which was  $4.6^{\circ}$ , and December, which was  $2.2^{\circ}$  above the average. February, March, and November were relatively the coldest months. The hours of bright sunshine were 25 hours less for the year than the normal. It was deficient in April by 31 hours; in July by 27 hours, with reference to the normal, but was in excess by 35 hours in October. Otherwise the departures from the means were small. The rainfall for the year was nearly 6 inches below the normal, or about 88 per cent. of the average, though the number of days on which rain fell was only two less. December was absolutely the wettest month of the year, followed by March and January. The three relatively wettest months were March, December and January; and October were relatively the driest, being  $2.5$  inches, or nearly 50 per cent. below the average.

Temperatures in the shade reached  $70^{\circ}$ , or over on 23 days, viz., 8 days in May, 4 in June, 3 in July, 6 in August, and 2 in September.

Heavy rains of 1 inch or over in 24 hours occurred on only 2 days of the year, viz., March 10th and October 23rd.

Fine dry periods are recorded as follows:—Jan. 28th—Feb. 15th; Feb. 23rd—March 3rd; March 12th—17th; April 1st—6th; 18th—22nd; May 11th—June 2nd; June 4th—18th; July 4th—30th; Aug. 5th—16th; Sept. 3rd—17th; 27th—30th; Oct. 2nd—12th; 14th—22nd; 25th—28th; Nov. 1st—11th; 26th—29th; Dec. 7th—12th; Total, 17 periods, average duration, 11 days.



Bright sunshine lasting 10 hours or over was recorded on 30 days of the year, viz., 1 day in March, 2 in April, 10 in May, 5 in June, 4 in July, 4 in August, and 4 in September. June 9th and 14th, and July 15th, were the sunniest days of the year, with 14 hours duration each.

The prevailing direction of the wind in all months of the year, except February, May, October, November, was westerly. Five gales were recorded, on January 2nd, January 9th, March 27th, December 11th, and December 18th.

**Magnetical.**—The Differential Photo-Magnetographs are of the same pattern as those at the Kew Observatory, except that the radial distances between the centres of the magnets and the surfaces of the respective cylinders are somewhat shorter. Time marks on the curves are now made at set hours by hand.

The scale values of the instruments are as follows :

For the Unifilar ...	11·28'	per Cm. of Ordinate.
„ Bifilar ...	·00050 C.G.S.	„ „

In connection with these, absolute measures of Horizontal Direction and Force have been made regularly ; of the former four times, and of the latter once in each month. These have been corrected by the difference between the curve ordinate at the time of observation and the monthly mean of the four daily readings, according to the rule stated on page xii. of our Report, 1908 ; but the month-means are now taken from the readings on the five quietest days of the month.

The inclination, or Dip, has been observed once each month by two needles with Dover's circle No. 159.

The Vertical and Total Forces are deduced from the measures of the Horizontal Force, and the Angle of Inclination or Dip.

A new collimator magnet was obtained in March, to replace one that had been damaged. Its constants were determined at Kew by Dr. Chree.

In the table of magnetic disturbances (*page 38*) the intention is that a *calm* (c) shall mean a smooth curve; *small* (s) a disturbance noteworthy only as opposed to a calm; *moderate* (m) a disturbance not to be neglected for any comparison with other phenomena, solar or terrestrial, and worth a reference to the original curve; *greater* (g) a marked disturbance; and *very great* (v.g.) a decided storm.

Corresponding tabulations are sent quarterly to the Meteorological Institute at De Bilt (Holland), for the International Committee on Terrestrial Magnetism. In these the significant notes are restricted to three—0, 1, 2. The general returns from the Bureau show considerable discordance between the interpretations of different authorities; and it may be well to state the rule followed at this Observatory.

The astronomical day is now suppressed, and the civil day is used for both the international figures, 0, 1, 2, and our own characteristic letters.

From the measured ranges of D and H in minutes

of arc on the five quietest days of a month a mean value is obtained of D and H combined. Similarly for each day of the month a mean value in minutes of arc of the range of D and H combined is set down. The excess of this mean daily range over the mean for the five quietest days gives the magnetic character of the day. For instance, in December, 1919, the mean ranges in D and H for the five quietest days were 3·0 and 3·4 respectively; adopted mean 3·0. On December 5th the ranges in D and H were 11 and 6 respectively, adopted mean 9. The excess  $9 - 3 = 6$  gives the magnetic character figure of the day. The following values are then adopted for the table of magnetic disturbances:—Stonyhurst 0 to 2 calm, 2 to 7 small, 7 to 15 moderate, 15 to 20 great, above 20 very great; International, 0 to 5, 0; 5 to 15, 1; above 15, 2. The magnetic characters therefore depend on the excess amplitudes of the ranges of D and H combined, over the mean amplitude of the range derived from the five quietest days. Further, an inspection of the curves helps to discriminate the character of the disturbance, at numbers common to any two classes.

Judging by the mean daily ranges of the Declination and Horizontal Force Magnets, there was very little difference magnetically between the years 1918 and 1919. But on August 11th—12th there occurred a storm of exceptional violence, the greatest recorded at Stonyhurst since that of September 25th, 1909. The extreme range in D was 115 minutes of arc, and in H greater than 620 units, since the spot of light went beyond the limits of registration. A full description of this storm was communicated to *Nature* for August 21st, 1919.

**Astronomical.**—Through the kindly intervention of the Council R.A.S., and of the Astronomer Royal, our wireless installation was restored to us by the Postmaster-General in June, and was re-erected in its original form by the local post office engineers in September. The time-service is in charge of Father J. Rowland, S.J., who joined the staff as chief assistant in October.

Observations of the solar surface were made on 220 days, and include 223 drawings on 218 days, and notes on uncompleted drawings on two other days. Of these drawings 174, on 171 days, show all spots and faculæ visible, and the remaining 49 are complete for all spots, but lack the full record of the faculæ. Particular attention has been devoted to the faithful and exact reproduction of the faculæ, and to showing how the flow of the faculæ connects the several spot outbursts.

The mean daily disc-area of the spots (in units of  $\frac{1}{10000}$ th of the visible surface), stands at 8.35. In 1918 it was 7.90, and in 1917, the year of maximum, 12.10. A comparison of the mean disc-area of the spots with the mean daily range of magnetic Declination in minutes of arc, and of horizontal force in units  $10^{-5}$  C.G.S., is set forth as follows :—

Year.....	1914	1915	1916	1917	1918	1919
Spot Area .....	0.82	4.51	4.52	12.1	7.9	8.4
Declination range	10.2	11.7	12.1	11.8	12.4	12.7
Horizontal Force						
Range .....	47	58	63	59	69	56

The sun-spot activity which had steadily declined since August, 1917, and throughout 1918, revived in 1919. This is indicated not only by the mean daily

disc-area of the spots, but also by the magnitude of individual spots. On one day only in 1918 did the total spot area reach 21 units. In 1919 on sixteen days the average area was 24 units, and on two days, May 19th and 20th, it reached 32 units.

The months of greatest activity were February, May, June, and August. Two exceptionally large groups crossed the disc in February, both in N. latitude, and  $90^\circ$  apart in longitude. They were central on the 7th and 14th respectively. In May, two still greater groups crossed the disc, in N. latitude  $8^\circ$  and  $15^\circ$ , and  $135^\circ$  apart in longitude. They were central on the 9th and 19th respectively. One of these was on the E. limb on the day of the total solar eclipse, May 29th, the disturbance moving northwards at its second appearance.

Between June 12th—24th a fine large spot, visible to the naked eye, crossed the disc in the southern hemisphere, latitude— $16.5^\circ$ . It was central on June 18th—19th. It lasted but one rotation, but a new important group formed in its vicinity nearer the equator, July 10th—20th, and returned again August 3rd—15th. It was central on July 14th and August 9th in its successive appearances.

The most remarkable and extensive outburst of the year was the triple equatorial group of August 13th—25th, which was central about August 19th. This compound group extended  $20^\circ$  in longitude and  $17^\circ$  in latitude, and its appearance was heralded by the very violent magnetic storm of August 11th—12th. The two chief members of this group became regular in form early in their life-history (August 23rd—24th), and

lasted throughout 4 solar rotations, being last seen as a small single spot on the sun's west limb on December 7th. This spot was the more northern one of the two principal members of the original group. After the first appearance of this fine group the measured spot-area showed a steady and continuous decrease until the end of the year.

In our report for 1917, it was stated that a comparison had been instituted between our drawings of solar faculæ and some spectroheliograms in  $K_2$  and  $H_\alpha$  radiations, furnished through the courtesy of the directors of the Mount Wilson and the Yerkes observatories. A preliminary comparison of the drawings of the faculæ and the photographs of the flocculi showed an almost perfect agreement between the faculæ and the calcium flocculi, but no similarity with the hydrogen flocculi. A further comparison has been rendered possible, through the kindness of Professor Newall, in furnishing spectroheliograms in calcium light  $K_{12}$ , for dates in May, June, and September, on which we had particularly good drawings of the faculæ. In every single case the general agreement of the faculæ, and the flocculi, both in extent and in character, is most striking. It may be safely stated that no prominent calcium flocculus is shown on the photographs without a corresponding facula on the drawings. We are hoping to be able to follow up this subject, as also to chart the flow of the faculæ in certain areas of long-continued spot activity. A beginning has already been made with the group of spots that was on the sun's east limb on the day of the total solar eclipse, May 29th. This disturbance lasted from April 6th to August 24th. It has long been suspected that it is this flow of the faculæ, con-

necting several successive outbursts of sun-spots, increasing or decreasing in solar latitude, which is operative in causing the magnetic field in sun-spots. Such extended regions would each form a huge solar cyclone.

Not much work has been possible with our solar and stellar spectrographs. But photographs of the spectrum of Nova Aquilæ were secured in August, and the results of the measures have been communicated to the Royal Astronomical Society.

Several lectures on astronomical topics have been given by the Director in military hospitals and camps. He also delivered, on October 21st, the twenty-second annual Traill-Taylor Memorial lecture, "Photographic Evidence for the Formation of Stars from Nebulæ," before the Royal Photographic Society of Great Britain.

**Seismological.**—A short account of the Seismograph is given on page xiii of our Annual, 1909. It is of the Milne photographic pattern, and is mounted with horizontal pendulum, or boom, in the astronomical Meridian. A copy of its register is sent monthly to the Secretary of the Seismological Committee of the British Association for the Advancement of Science, and occasional bulletins are distributed amongst the Seismic Stations at home and abroad. Unfortunately, owing to depletion of staff and the increasing infirmities of the late Father Sidgreaves, the instrument was out of action during the greater part of the year, and no reports were sent out. It is now working satisfactorily and the normal service of information from its records will be at once resumed.

The following papers have been published during the year :—

1. The Spectrum of Nova Aquilæ, 1918, June 15th. Monthly Notices, R.A.S., 79, 171.
2. The Spectrum of Nova Aquilæ, 1918, July 29th. Ibid 79, 491.
3. The Spectrum of Nova Aquilæ, 1918, August 23rd to October 23rd. Ibid 79, 555.
4. The Progressive Spectra of Nova Aquilæ, 1918—19, The Observatory 42, 366.
5. Notes on the Progressive Spectra of Nova Aquilæ, 1918. Journal, B.A.A., 30, 23.
6. Photographic Evidence for the Formation of Stars from Nebulæ. The Photographic Journal, 59, 207.
7. Photographic Evidence for the Formation of Stars from Nebulæ. The Observatory, 42, 398.
8. The Spectrum of Nova Aquilæ, 1919, July, August. Monthly Notices, R.A.S., 80, 205.
9. Notes on a Disturbed Sun-spot Area on the Sun's Eastern Limb, 1919, May 29th. Ibid 80, 204.

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Our grateful thanks are tendered to those Institutions and individuals, who have kindly contributed, by presentations, to the Library during the year.



# METEOROLOGICAL REPORT.

## JANUARY, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.							
Mean Reading of the Barometer .....	inches 29·263	29·486							
Highest .. .. on the 24th...	.. 30·194	30·128							
Lowest .. .. on the 4th ...	.. 28·425	28·581							
Range of Barometer Readings.....	.. 1·769	1·547							
Highest Reading of a Max. Therm. on the 14th...	47·2	51·3							
Lowest Reading of a Min. Therm. on the 28th .....	22·8	21·4							
Range of Thermometer Readings .....	24·4	29·9							
Mean of Highest Daily Readings .....	40·2	42·3							
Mean of Lowest Daily Readings .....	32·6	33·0							
Mean Daily Range .....	7·6	9·3							
Deduced Mean Temp. (from mean of Max. and Min.)	36·2	37·4							
Mean Temperature from Dry Bulb .....	36·2	37·6							
Adopted Mean Temperature .....	36·2	37·5							
Mean Temperature of Evaporation .....	35·2	36·3							
Mean Temperature of Dew Point .....	33·7	34·1							
Mean elastic force of Vapour.....inches	0·195	0·198							
Mean weight of Vapour in a cub. ft. of air, grains	2·2	2·4							
Mean additional weight required for saturation ..	0·3	0·4							
Mean degree of Humidity (saturation 100) .....	91	87							
Mean weight of a cubic foot of air .....	546·9	549·6							
Mean amount of Cloud (0—10) .....	6·9	7·8							
Fall of Rain .. .. inches	5·265	4·221							
Greatest Rainfall in one day (3rd) .....	.. 0·800	0·826							
No. of days on which ·005 in. or more Rain fell...	26	19·2							
Wind :—Direction.....	N	NE	E	SE	S	SW	W	NW	
No. of days.....	3	1	6	0	13	3	2	3	
Mean Velocity in miles per hr.	2·9	6·7	8·0	0	10·4	6·4	19·9	3·8	
Total No. of miles .....	212	161	1155	0	3232	464	956	272	
Total No. of miles registered .....	6452							Mean*	
Greatest hourly velocity (2nd & 9th, Dir. W.S.W. and S.E. b S.) .....	40							8177·7	
								41·2	

\* For the last 52 years.

## JANUARY, 1919.

### DIFFERENCES.

The signs + and — mean respectively above and below the MONTHLY average.

Mean barometric pressure	... ..	—	0·223 in.
Monthly range	... ..	+	0·222 in.
Mean of highest daily temperatures	... ..	—	2·1°
Mean of lowest	... ..	—	0·4°
Mean daily range	... ..	—	1·7°
Adopted mean temperature	... ..	—	1·3°
Total rainfall	... ..	+	1·044 in.

Ground Frost on 1st, 3rd—7th, 10th—14th, 18th—20th, 27th—31st. Snow on 1st, 4th, 6th, 19th, 27th, 28th. Hail on 1st, 3rd, 17th, 26th, 31st. Heavy Rainfall on 3rd, 9th, 26th. Fog on 5th, 8th, 11th, 21st. Hoar Frost on 12th, 13th, 19th, 20th, 23rd, 24th. Gales of Wind on 2nd and 9th. Solar Halo on 28th.

### EXTREME READINGS FOR JANUARY, During 72 Years.

Highest reading of Barometer	... 1896 (9th)	.....	30·597 in.
Lowest	... .. 1884 (26th)	.....	27·803 in.
Highest temperature	... .. 1877 (7th)	.....	59·9°
Lowest	... .. 1881 (15th)	.....	4·6°
Highest adopted mean temperature	1916	.....	44·7°
Lowest	... .. 1881	.....	29·2°
Greatest fall of rain	... .. 1910	.....	8·403 in.
Least	... .. 1881	.....	0·472 in.
Greatest fall of rain in one day	... 1914 (8th)	.....	2·074 in.
Greatest No. of days on which			
·005 in. or more rain fell	... 1890	.....	30
Least	... .. †1850	.....	8
*Greatest hourly velocity of wind	1899 (12th)	.....	63 mls.
*Greatest No. of miles registered	... 1890	.....	11661
*Least	... .. 1881	.....	4352

\* Since 1867 only.

† And in other years.

## FEBRUARY, 1919.

Results of Observations taken during the Month.	Mean for the last 72 years.																																				
Mean Reading of the Barometer ..... inches	29·401																																				
Highest       "       "       on the 9th ...       "	30·297																																				
Lowest       "       "       on the 22nd...       "	28·599																																				
Range of Barometer Readings.....       "	1·698																																				
Highest Reading of a Max. Therm. on the 22nd	49·0																																				
Lowest Reading of a Min. Therm. on the 9th ..	19·4																																				
Range of Thermometer Readings .....	29·6																																				
Mean of Highest Daily Readings .....	39·0																																				
Mean of Lowest Daily Readings .....	31·6																																				
Mean Daily Range .....	7·4																																				
Deduced Mean Temp. (from mean of Max. & Min.)	34·9																																				
Mean Temperature from Dry Bulb .....	34·5																																				
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Mean Temperature of Evaporation .....	33·1																																				
Mean Temperature of Dew Point .....	30·5																																				
Mean elastic force of Vapour ..... inches	0·170																																				
Mean weight of Vapour in a cub. ft. of air, grains	2·0																																				
Mean additional weight required for saturation ..	0·4																																				
Mean degree of Humidity (saturation 100) .....	84																																				
Mean weight of a cubic foot of air ..... grains	551·2																																				
Mean amount of Cloud (0—10) .....	6·8																																				
Fall of Rain .....	1·295																																				
Greatest Rainfall in one day (19th) .....	0·490																																				
No. of days on which ·005 in. or more Rain fell...	12																																				
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Wind :—Direction.....</th> <th style="text-align: center;">N</th> <th style="text-align: center;">NE</th> <th style="text-align: center;">E</th> <th style="text-align: center;">SE</th> <th style="text-align: center;">S</th> <th style="text-align: center;">SW</th> <th style="text-align: center;">W</th> <th style="text-align: center;">NW</th> </tr> </thead> <tbody> <tr> <td>No. of days.....</td> <td style="text-align: center;">8</td> <td style="text-align: center;">10</td> <td style="text-align: center;">7</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">1</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Mean Velocity in miles per hr.</td> <td style="text-align: center;">4·4</td> <td style="text-align: center;">6·1</td> <td style="text-align: center;">6·6</td> <td style="text-align: center;">7·2</td> <td style="text-align: center;">0</td> <td style="text-align: center;">2·4</td> <td style="text-align: center;">9·3</td> <td style="text-align: center;">0</td> </tr> <tr> <td>Total No. of miles.....</td> <td style="text-align: center;">839</td> <td style="text-align: center;">1466</td> <td style="text-align: center;">1117</td> <td style="text-align: center;">173</td> <td style="text-align: center;">0</td> <td style="text-align: center;">57</td> <td style="text-align: center;">223</td> <td style="text-align: center;">0</td> </tr> </tbody> </table>		Wind :—Direction.....	N	NE	E	SE	S	SW	W	NW	No. of days.....	8	10	7	1	0	1	1	0	Mean Velocity in miles per hr.	4·4	6·1	6·6	7·2	0	2·4	9·3	0	Total No. of miles.....	839	1466	1117	173	0	57	223	0
Wind :—Direction.....	N	NE	E	SE	S	SW	W	NW																													
No. of days.....	8	10	7	1	0	1	1	0																													
Mean Velocity in miles per hr.	4·4	6·1	6·6	7·2	0	2·4	9·3	0																													
Total No. of miles.....	839	1466	1117	173	0	57	223	0																													
								Mean*																													
Total No. of Miles registered .....						3875	7540·1																														
Greatest hourly velocity (11th. Noon, Dir. E.) ...						20	41·5																														

\* For the last 52 years.

## FEBRUARY, 1919.

### DIFFERENCES.

The signs + and — mean respectively above and below the MONTHLY average.

Mean barometric pressure	...	...	...	—	0·089 in
Monthly range	..	..	..	+	0·250 in
Mean of highest daily temperatures	...	...	...	—	4·9°
Mean of lowest	..	..	..	—	1·9°
Mean daily range	...	...	...	—	3·0°
Adopted mean temperature	...	...	...	—	3·6°
Total rainfall	...	...	...	—	2·220 in.

Ground Frost on 1st—5th, 7th—14th, 18th, 19th, 24th—28th  
Hoar Frost on 13th, 24th, 25th. Snow on 1st, 2nd, 4th, 6th, 19th,  
27th. Hail on 3rd. Fog on 20th and 22nd. Solar Halo on 18th.

### EXTREME READINGS FOR FEBRUARY,

During 72 Years.

Highest reading of Barometer	...	1902 (1st)	.....	30·476 in.
Lowest	..	1900 (19th)	.....	27·870 in.
Highest temperature	.....	1877 (8th)	.....	58·3°
Lowest	..	1902 (11th)	.....	5·0°
Highest adopted mean temperature	.....	1869	.....	44·0°
Lowest	..	1855	.....	28·6°
Greatest fall of rain	.....	1848	.....	8·882 in.
Least	..	1858	.....	0·306 in.
Greatest fall of rain in one day	...	1909 (3rd)	.....	2·000 in.
Greatest No. of days on which ·005 or more rain fell	.....	1910	.....	27
Least	..	1855	.....	4
*Greatest hourly velocity of wind	...	1903 (27th)	.....	60 mls.
*Greatest No. of miles registered	...	1868	.....	12577
*Least	..	1917	.....	3160

\* Since 1867 only.

## MARCH, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.						
Mean Reading of the Barometer .....	inches 29·391	29·446						
Highest                   "                   "                   on the 17th ...	30·192	30·044						
Lowest                   "                   "                   on the 27th ...	28·811	28·645						
Range of Barometer Readings .....	" 1·381	1·399						
Highest Reading of a Max. Therm. on the 1st ...	51·5	56·7						
Lowest Reading of a Min. Therm. on the 23rd...	25·3	23·2						
Range of Thermometer Readings .....	26·2	33·5						
Mean of Highest Daily Readings .....	42·4	46·9						
Mean of Lowest Daily Readings .....	31·5	34·2						
Mean Daily Range .....	10·9	12·7						
Deduced Mean Temp. (from mean of Max. & Min.)	36·0	39·6						
Mean Temperature from Dry Bulb .....	37·2	40·2						
Adopted Mean Temperature .....	36·6	39·9						
Mean Temperature of Evaporation .....	35·4	38·1						
Mean Temperature of Dew Point .....	33·7	35·6						
Mean elastic force of Vapour .....	inches 0·194	0·208						
Mean weight of Vapour in a cub. ft. of air, grains	2·3	2·4						
Mean additional weight required for saturation ,,	0·3	0·5						
Mean degree of Humidity (saturation 100).....	90	85						
Mean weight of a cubic foot of air .....	grains 548·8	546·2						
Mean amount of Cloud (0—10) .....	6·7	7·5						
Fall of Rain .....	inches 5·570	3·401						
Greatest Rainfall in one day (10th) .....	" 1·375	0·777						
No. of days on which ·005 or more Rain fell...	18	16·8						
<b>Wind :—Direction .....</b>	<b>N</b>	<b>NE</b>	<b>E</b>	<b>SE</b>	<b>S</b>	<b>SW</b>	<b>W</b>	<b>NW</b>
No. of Days.....	3	6	2	1	1	6	10	2
Mean Velocity in miles per hr.	7·8	8·2	10·3	7·5	17·0	8·3	11·9	7·7
Total No. of miles.....	564	1174	493	180	409	1198	2862	369
Total No. of Miles registered .....	7249						<b>Mean*</b>	
Greatest hourly velocity (27th at Noon, Dir. W. b S.)	38						8472·5	40·7

\* For the last 52 years.

## MARCH, 1919.

### DIFFERENCES.

The signs + and — mean respectively above and below the MONTHLY average.

Mean barometric pressure	...	...	...	—	0·057 in.
Monthly range	„	...	...	—	0·018 in.
Mean of highest daily temperatures	...	...	...	—	4·5°
Mean of lowest	„	„	...	—	2·7°
Mean daily range	...	...	...	—	1·8°
Adopted mean temperature	...	...	...	—	3·3°
Total rainfall	...	...	...	+	2·169 in.

Ground Frost on 1st, 3rd, 4th, 6th, 7th, 10th, 13th—18th, 21st—26th, 28th—31st. Snow on 3rd, 4th, 5th, 11th, 12th, 18th, 26th, 28th, 30th, 31st. Heavy Rain on 6th, 10th, 11th, and 26th. Gale of Wind on 27th. Fog on 1st and 4th. Solar Halo on 1st, 2nd, and 9th.

### EXTREME READINGS FOR MARCH, During 72 Years.

Highest reading of Barometer	...	1854 (4th)	.....	30·452 in.
Lowest	„	1876 (10th)	.....	28·100 in.
Highest temperature	.....	1871 (25th)	.....	68·0°
Lowest	„	1874 (10th)	.....	11·1°
Highest adopted mean temperature	.....	1871	.....	44·0°
Lowest	„	1883	.....	34·4°
Greatest fall of rain	.....	1912	.....	7·205 in.
Least	„	1852	.....	0·352 in.
Greatest fall of rain in one day	...	1898 (17th)	.....	1·540 in.
Greatest No. of days on which				
·005 in. or more rain fell	...	†1861	.....	28
Least	„	1852	.....	3
*Greatest hourly velocity of wind	...	1905 (15th)	.....	57 mls.
*Greatest No. of miles registered	...	1903	.....	12773
*Least	„	1892	.....	5725

\* Since 1867 only. † And 1914.

## APRIL, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.
Mean Reading of the Barometer .....	inches 29·507	29·490
Highest " " on the 21st ... "	30·302	29·959
Lowest " " on the 14th ... "	28·250	28·795
Range of Barometer Readings .....	" 2·052	1·164
Highest Reading of a Max. Therm. on the 19th...	58·5	64·9
Lowest Reading of a Min. Therm. on the 2nd ...	28·4	28·1
Range of Thermometer Readings .....	30·1	36·8
Mean of Highest Daily Readings .....	51·3	54·6
Mean of Lowest Daily Readings .....	39·5	37·8
Mean Daily Range .....	11·8	16·8
Deduced Mean Temp. (from mean of Max. & Min.)	43·9	44·0
Mean Temperature from Dry Bulb .....	44·0	44·7
Adopted Mean Temperature .....	44·0	44·4
Mean Temperature of Evaporation .....	41·5	41·6
Mean Temperature of Dew Point .....	38·6	38·2
Mean elastic force of Vapour .....	inches 0·234	0·235
Mean weight of Vapour in a cub. ft. of air, grains	2·7	2·7
Mean additional weight required for Saturation ..	0·6	0·7
Mean degree of Humidity (saturation 100).....	81	80
Mean weight of a cubic foot of air .....	grains 542·6	542·2
Mean amount of Cloud (0—10) .....	8·4	6·7
Fall of Rain .....	inches 3·075	2·545
Greatest Rainfall in one day (17th) .....	" 0·380	0·586
No. of days on which ·005 in. or more Rain fell...	19	14·7

Wind :—Direction .....	N	NE	E	SE	S	SW	W	NW
No. of days.....	3	3	0	0	2	7	15	0
Mean Velocity in miles per hr.	10·0	5·2	0	0	11·2	10·4	10·1	0
Total No. of Miles.....	723	371	0	0	538	1747	3651	0

	Mean*
Total No. of Miles registered .....	7030
Greatest hourly velocity (16th. 3 p.m., Dir. W.N.W. ....	28
	36·4

\* For the last 52 years.

## APRIL, 1919.

### DIFFERENCES.

The signs + and — mean respectively above and below the MONTHLY average.

Mean barometric pressure	...	...	...	+	0·017 in.
Monthly range	..	..	..	+	0·888 in.
Mean of highest daily temperatures	...	...	...	—	3·3°
Mean of lowest	..	..	..	+	1·7°
Mean daily range	...	...	...	—	5·0°
Adopted mean temperature	...	...	...	—	0·4°
Total rainfall	...	...	...	+	0·530 in.

Ground Frost on 1st—3rd, 9th, 10th, 13th, 17th, 21st, 22nd, 25th, 27th—29th. Snow on 1st, 26th, and 27th. Hail on 14th, 26th, 27th. Thunder on 10th and 11th. Solar Halo on 21st.

### EXTREME READINGS FOR APRIL,

During 72 Years.

Highest reading of Barometer	...	1906 (8th)	.....	30·317 in.
Lowest	..	1919 (14th)	.....	28·250 in.
Highest temperature	.....	1852 (14th)	.....	74·1°
Lowest	..	1917 (2nd)	.....	13·6°
Highest adopted mean temperature	.....	1865	.....	48·5°
Lowest	..	1917	.....	39·8°
Greatest fall of rain	.....	1867	.....	5·672 in.
Least	..	1852	.....	0·478 in.
Greatest fall of rain in one day	...	1913 (26th)	.....	1·180 in.
Greatest No. of days on which ·005 in. or more rain fell	.....	1867	.....	24
Least	..	1852	.....	4
*Greatest hourly velocity of wind	...	1911 (19th)	.....	53 mls.
*Greatest No. of miles registered	.....	1904	.....	11016
*Least	..	1884	.....	5047

\* Since 1867 only.



## MAY, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.						
Mean Reading of the Barometer .....	inches 29·638	29·542						
Highest " " on the 27th ... "	29·913	29·991						
Lowest " " on the 2nd ... "	28·882	28·955						
Range of Barometer Readings .....	" 1·031	1·036						
Highest Reading of a Max. Therm. on the 15th ...	74·2	71·9						
Lowest Reading of a Min. Therm. on the 3rd & 8th	40·1	32·0						
Range of Thermometer Readings .....	34·1	39·9						
Mean of Highest Daily Readings .....	63·7	59·5						
Mean of Lowest Daily Readings .....	46·9	42·5						
Mean Daily Range .....	16·8	17·0						
Deduced Mean Temp. (from mean of Max. & Min.)	53·6	49·2						
Mean Temperature from Dry Bulb .....	54·8	50·0						
Adopted Mean Temperature .....	54·2	49·6						
Mean Temperature of Evaporation .....	51·0	46·4						
Mean Temperature of Dew Point .....	47·9	42·9						
Mean elastic force of Vapour .....	inches 0·332	0·280						
Mean weight of Vapour in a cub. ft. of air, grains	3·8	3·1						
Mean additional weight required for saturation ..	1·0	0·9						
Mean degree of Humidity (saturation 100).....	79	77						
Mean weight of a cubic foot of air .....	533·6	537·0						
Mean amount of Cloud (0—10).....	5·2	7·0						
Fall of Rain .....	inches 2·055	2·647						
Greatest Rainfall in one day (1st) .....	" 0·710	0·634						
No. of days on which ·005 in. or more Rain fell...	11	14·4						
Wind:—Direction .....	N	NE	E	SE	S	SW	W	NW
No. of days.....	3	4	7	2	5	4	6	0
Mean Velocity in miles per hr.	5·3	7·2	8·3	7·8	7·1	6·0	7·6	0
Total No. of miles.....	382	691	1359	373	846	578	1094	0
Total No. of Miles registered .....	5353						Mean* 6930·1	
Greatest hourly velocity (1st, Midnight, Dir. S.W. b W. ....	31						32·6	

\* For the last 52 years.

## MAY, 1919.

## DIFFERENCES.

The signs + and — mean respectively above and below the MONTHLY average.

Mean barometric pressure	...	...	...	+	0·096 in.
Monthly range	..	...	...	—	0·005 in.
Mean of highest daily temperatures	...	...	...	+	4·2°
Mean of lowest	..	..	...	+	4·4°
Mean daily range	...	...	...	—	0·2°
Adopted mean temperature	...	...	...	+	4·6°
Total rainfall	...	...	...	—	0·592 in.

Heavy Rain on 1st. Thunder on 10th and 11th. Lightning on 10th. Solar Halo on 9th.

## EXTREME READINGS FOR MAY,

During 72 Years.

Highest reading of Barometer	...	1881 (10th)	.....	30·332 in.
Lowest	..	1887 (28th)	.....	28·559 in.
Highest temperature	.....	1864 (19th)	.....	82·5°
Lowest	..	1855 (4th)	.....	23·5°
Highest adopted mean temperature	.....	1848	.....	55·1°
Lowest	..	1855	.....	45·0°
Greatest fall of rain	.....	1886	.....	6·178 in.
Least	..	1859	.....	0·249 in.
Greatest fall of rain in one day	...	1881 (5th)	.....	1·647 in.
Greatest No. of days on which .005 in. or more rain fell	...†	1860	.....	22
Least	..	1848	.....	4
*Greatest hourly velocity of wind	.....	1888 (2nd)	.....	49 mls.
*Greatest No. of miles registered	...	1888	.....	9648
*Least	..	1918	.....	5113

\* Since 1867 only. † And in other years.

## JUNE, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.						
Mean Reading of the Barometer .....	inches 29.659	29.556						
Highest " " on the 10th ... "	30.070	29.935						
Lowest " " on the 12th ... "	29.168	29.037						
Range of Barometer Readings .....	" 0.902	0.898						
Highest Reading of a Max. Therm. on the 11th...	76.5	76.8						
Lowest Reading of a Min. Therm. on the 3rd...	41.8	39.1						
Range of Thermometer Readings .....	34.7	37.7						
Mean of Highest Daily Readings .....	63.1	65.3						
Mean of Lowest Daily Readings .....	49.6	48.1						
Mean Daily Range .....	13.5	17.2						
Deduced Mean Temp. (from mean of Max. & Min.)	54.6	54.9						
Mean Temperature from Dry Bulb .....	55.1	55.3						
Adopted Mean Temperature .....	54.9	55.1						
Mean Temperature of Evaporation .....	51.2	51.9						
Mean Temperature of Dew Point .....	47.7	48.4						
Mean elastic force of Vapour .....	inches 0.329	0.349						
Mean weight of Vapour in a cub. ft. of air, grains	3.8	3.9						
Mean additional weight required for saturation ..	1.1	1.0						
Mean degree of Humidity (saturation 100) .....	76	78						
Mean weight of a cubic foot of air .....	grains 533.3	531.2						
Mean Amount of Cloud (0—10).....	7.4	7.2						
Fall of Rain .....	inches 1.788	3.376						
Greatest Rainfall in one day (20th) .....	" 0.330	0.809						
No. of days on which .005 in. or more Rain fell...	16	15.3						
<b>Wind :—Direction .....</b>	<b>N</b>	<b>NE</b>	<b>E</b>	<b>SE</b>	<b>S</b>	<b>SW</b>	<b>W</b>	<b>NW</b>
No. of days.....	3	0	0	0	6	4	16	1
Mean Velocity in miles per hr.	5.1	0	0	0	8.6	9.3	11.9	10.8
Total No. of miles.....	369	0	0	0	1244	892	4573	259
Total No. of Miles registered .....	7337	<b>Mean*</b>						
Greatest hourly velocity (13th, 1 p.m. Dir. W.)...	31	6169.1	29.4					

\* For the last 52 years

## JUNE, 1919.

### DIFFERENCES.

The signs + and — mean respectively above and below the  
MONTHLY average.

Mean barometric pressure	...	...	...	+	0·103 in.
Monthly range	"	"	"	+	0·004 in.
Mean of highest daily temperatures	...	...	...	—	2·2°
Mean of lowest	"	"	"	+	1·5°
Mean daily range	...	...	...	—	3·7°
Adopted mean temperature	...	...	...	—	0·2°
Total rainfall	...	...	...	—	1·588 in.

Thunder and Lightning on 12th. Solar Halo on 2nd, 6th and 10th.

### EXTREME READINGS FOR JUNE,

During 72 Years.

Highest reading of the Barometer	1874 (15th)	30·219 in.
Lowest	" " 1862 (12th)	28·632 in.
Highest temperature	..... 1893 (18th)	88·7°
Lowest	" " ..... 1902 (9th)	32·0°
Highest adopted mean temperature	1896	59·3°
Lowest	" " ..... 1907	51·5°
Greatest fall of rain	..... 1907	8·705 in.
Least	" " ..... 1887	0·525 "
Greatest fall of rain in one day	... 1857 (8th)	2·093 "
Greatest No. of days on which ·005 in. or more rain fell	..... †1907	27
Least	" " " ..... 1887	4
*Greatest hourly velocity of wind	1897 (16th)	45 mls.
*Greatest No. of miles registered...	1877	8384
*Least	" " " ..... 1915	3967

\* Since 1867 only.

† And 1912.

# JULY, 1919.

Results of Observations taken during the Month.	Mean for the last 72 years.	
Mean Reading of the Barometer ..... inches	29.623	29.527
Highest       "       "       on the 10th ... "	29.838	29.904
Lowest       "       "       on the 1st ... "	29.120	29.020
Range of Barometer Readings .....	0.718	0.884
Highest Reading of a Max. Therm. on 25th & 26th	70.0	78.4
Lowest Reading of a Min. Therm. on the 30th..	45.6	42.5
Range of Thermometer Readings .....	24.4	35.9
Mean of Highest Daily Readings .....	63.9	67.5
Mean of Lowest Daily Readings .....	50.0	51.1
Mean Daily Range .....	13.9	16.4
Deduced Mean Temp. (from mean of Max. & Min.)	55.1	57.7
Mean Temperature from Dry Bulb .....	57.1	57.9
Adopted Mean Temperature .....	56.1	57.8
Mean Temperature of Evaporation .....	51.8	54.7
Mean Temperature of Dew Point .....	47.7	51.9
Mean elastic force of Vapour ..... inches	0.334	0.388
Mean weight of Vapour in a cub. ft. of air, grains	3.7	4.4
Mean additional weight required for saturation ..	1.3	1.1
Mean degree of Humidity (saturation 100) .....	74	81
Mean weight of a cubic foot of air ..... grains	531.4	527.6
Mean amount of Cloud (0—10) .....	7.4	7.4
Fall of Rain .....	1.900	3.954
Greatest Rainfall in one day (31st)..... "	0.640	0.868
No. of days on which .005 in. or more Rain fell...	10	16.4

Wind :—Direction .....	N	NE	E	SE	S	SW	W	NW
No. of days.....	7	2	1	0	2	5	12	2
Mean Velocity in miles per hr.	7.8	4.1	3.9	0	6.4	7.9	7.7	8.9
Total No. of miles.....	1315	198	93	0	305	946	2222	425

Total No. of Miles registered .....	5504	Mean*
Greatest hourly velocity (22nd, Midnight, Dir. W.S.W.).....	25	6372.8
		28.4

\* For the last 52 years.

## JULY, 1919.

### DIFFERENCES.

The signs + and — mean respectively above and below the  
MONTHLY average.

Mean barometric pressure	...	...	...	+	0·096 in.
Monthly range	..	...	...	—	0·166 in.
Mean of highest daily temperatures	...	...	...	—	3·6°
Mean of lowest	..	..	...	—	1·1°
Mean daily range	...	...	...	—	2·5°
Adopted Mean temperature	...	...	...	—	1·7°
Total rainfall	...	...	...	—	2·054 in.

Heavy Rain on 3rd and 31s

### EXTREME READINGS FOR JULY,

During 72 Years.

Highest reading of Barometer	...	1911 (10th)	.....	30·203 in.
Lowest	..	1877 (15th)	.....	28·564 in.
Highest temperature	.....	1901 (20th)	.....	89·0°
Lowest	..	1857 (1st)	.....	36·0°
Highest adopted mean temperature	.....	1901	.....	63·2°
Lowest	..	1862	.....	54·3°
Greatest fall of rain	.....	1888	.....	8·475 in.
Least	..	1868	.....	0·669 in.
Greatest fall of rain in one day	...	1888 (2nd)	.....	2·482 in.
Greatest No. of days on which				
·005 in. or more rain fell	.....	†1861	.....	27
Least	..	†1863	.....	8
*Greatest hourly velocity of wind	.....	1892 (8th)	.....	44 mls.
*Greatest No. of miles registered	...	1877	.....	8288
*Least	..	1913	.....	4577

\* Since 1867 only.

† And in other years.

## AUGUST, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.						
Mean Reading of the Barometer .....	inches 29·543	29·493						
Highest " " on the 11th ... "	29·877	29·885						
Lowest " " on the 26th ... "	28·722	28·944						
Range of Barometer Readings .....	" 1·155	0·941						
Highest Reading of a Max. Therm. on the 15th...	76·0	76·5						
Lowest Reading of a Min. Therm. on the 31st...	40·6	41·8						
Range of Thermometer Readings .....	35·4	34·7						
Mean of Highest Daily Readings .....	63·8	66·6						
Mean of Lowest Daily Readings .....	51·7	50·7						
Mean Daily Range .....	12·1	15·9						
Deduced Mean. Temp. (from Mean of Max. & Min.)	56·1	57·0						
Mean Temperature from Dry Bulb .....	57·2	57·7						
Adopted Mean Temperature .....	56·7	57·4						
Mean Temperature of Evaporation .....	53·9	54·5						
Mean Temperature of Dew Point .....	51·3	51·8						
Mean elastic force of Vapour .....	inches 0·379	0·387						
Mean weight of Vapour in a cub. ft. of air, grains	4·2	4·3						
Mean additional weight required for saturation "	0·9	0·9						
Mean degree of Humidity (saturation 100) .....	82	82						
Mean weight of a cubic foot of air .....	grains 529·0	527·4						
Mean amount of Cloud (0—10).....	7·2	7·3						
Fall of Rain .....	inches 4·045	5·004						
Greatest Rainfall in one day (26th) .....	" 0·940	1·056						
No. of days on which .005 in. or more Rain fell...	18	18·4						
<b>Wind:—Direction .....</b>	<b>N</b>	<b>NE</b>	<b>E</b>	<b>SE</b>	<b>S</b>	<b>SW</b>	<b>W</b>	<b>NW</b>
No. of days.....	1	0	0	0	2	8	19	1
<b>Mean Velocity in miles per hr.</b>	8·8	0	0	0	4·8	7·1	8·8	2·9
<b>Total No. of miles.....</b>	210	0	0	0	230	1361	4026	69
<b>Total No. of Miles registered .....</b>	5896	<b>Mean*</b>		6357·7				
<b>Greatest hourly velocity (27th, 11 a.m., Dir. W.) ...</b>	27			30·9				

\* For the last 52 years.

## AUGUST, 1919.

### DIFFERENCES.

The signs + and — mean respectively above and below the  
MONTHLY average.

Mean barometric pressure	...	...	...	...	+	0·050 in.
Monthly range	..	..	..	..	+	0·214 in.
Mean of highest daily temperatures	...	...	...	...	—	2·8°
Mean of lowest	..	..	..	..	+	1·0°
Mean daily range	...	...	...	...	—	3·8°
Adopted mean temperature	...	...	...	...	—	0·7°
Total rainfall	...	...	...	...	—	0·959 in.

Heavy Rain on 17th, 25th, 26th and 28th Thunder and  
Lightning on 16th. Solar Halo on 19th. Aurora Borealis on  
19th.

### EXTREME READINGS FOR AUGUST,

During 72 Years.

Highest reading of Barometer	...	1874 (21st)	.....	30·114 in.
Lowest	..	1917 (28th)	.....	28·156 in.
Highest temperature	.....	1868 (2nd)	.....	88·0°
Lowest	..	1887 (13th)	.....	33·4°
Highest adopted mean temperature	.....	1911	.....	62·1°
Lowest	..	1848	.....	52·5°
Greatest fall of rain	.....	1891	.....	9·869 in.
Least	..	1871	.....	2·085 in.
Greatest fall of rain in one day	...	1857 (7th)	.....	2·333 in.
Greatest No. of days on which ·005 in. or more rain fell	...	1891	.....	27
Least	..	1880	.....	6
*Greatest hourly velocity of wind	.....	1903 (31st)	.....	45 mls.
*Greatest No. of miles registered...	.....	1903	.....	8486
*Least	..	1915	.....	3918

\* Since 1867 only.



## SEPTEMBER, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.						
Mean Reading of the Barometer .....	inches 29.538	29.542						
Highest " " on the 16th ... "	30.027	30.009						
Lowest " " on the 22nd ... "	28.880	28.887						
Range of Barometer Readings .....	1.147	1.122						
Highest Reading of a Max. Therm. on the 11th..	75.6	72.1						
Lowest Reading of a Min. Therm. on the 28th...	32.6	36.5						
Range of Thermometer Readings .....	43.0	35.6						
Mean of Highest Daily Readings .....	60.2	62.0						
Mean of Lowest Daily Readings .....	47.7	47.2						
Mean Daily Range .....	12.5	14.8						
Deduced Mean Temp. (from mean of Max. & Min.)	52.7	53.4						
Mean Temperature from Dry Bulb .....	53.3	54.2						
Adopted Mean Temperature .....	53.0	53.8						
Mean Temperature of Evaporation .....	49.1	51.0						
Mean Temperature of Dew Point .....	45.2	48.3						
Mean elastic force of Vapour .....	inches 0.301	0.338						
Mean weight of Vapour in a cub. ft. of air, grains	3.4	3.9						
Mean additional weight required for saturation ..	1.1	0.9						
Mean degree of Humidity (saturation 100).....	75	81						
Mean weight of a cubic foot of air.....grains	533.3	532.6						
Mean amount of Cloud (0—10) .....	6.2	6.7						
Fall of Rain .....	inches 3.380	4.309						
Greatest Rainfall in one day (22nd) .....	" 0.690	0.962						
No. of days on which .005 in. or more Rain fell...	17	16.4						
Wind :—Direction .....	N	NE	E	SE	S	SW	W	NW
No. of days.....	2	4	0	0	5	5	10	4
Mean Velocity in miles per hr.	5.0	7.5	0	0	11.0	8.5	9.9	8.7
Total No. of miles.....	242	723	0	0	1315	1019	2365	839
								Mean*
Total No. of Miles registered .....							6503	
Greatest hourly velocity (26th, Noon, Dir. W. ....							25	
								6099.1
								32.2

\* For the last 52 years.

## SEPTEMBER, 1919.

### DIFFERENCES.

The signs + and — mean respectively above and below the MONTHLY average.

Mean barometric pressure	...	...	...	—	0·004 in.
Monthly range	"	"	"	+	0·025 in.
Mean of highest daily temperatures	...	...	...	—	1·8°
Mean of lowest	"	"	"	+	0·5°
Mean daily range	...	...	...	—	2·3°
Adopted mean temperature	...	...	...	—	0·8°
Total rainfall	...	...	...	—	0·929 in.

Ground Frost on 20th, 21st, 28th. Hail on 19th, 20th. Heavy Rain on 2nd, 22nd, and 24th. Hoar Frost on 28th. Thunder on 12th. Lightning on 20th. Fog on 10th. Solar Halo on 3rd and 27th.

### EXTREME READINGS FOR SEPTEMBER,

During 72 Years.

Highest reading of Barometer	...	1851 (15th)	30·247 in.
Lowest	"	1918 (23rd)	28·210 in.
Highest temperature	.....	1868 (6th)	85·0°
Lowest	"	†1885 (25th)	29·8°
Highest adopted mean temperature	.....	1865	59·1°
Lowest	"	1863	50·9°
Greatest fall of rain	.....	1918	12·620 in.
Least	"	1910	0·652 in.
Greatest fall of rain in one day	...	1889 (26th)	2·060 in.
Greatest No. of days on which			
·005 in. or more rain fell	...	1918	29
Least	"	†1851	6
*Greatest hourly velocity of wind	...	1875 (26th)	53 mls.
*Greatest No. of miles registered	...	1869	9053
*Least	"	1888	3261

\* Since 1867 only.

† And in other years.

## OCTOBER, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.						
Mean Reading of the Barometer .....	inches 29·767	29·442						
Highest " " on the 7th ..	" 30·156	30·017						
Lowest " " on the 13th ..	" 29·009	28·679						
Range of Barometer Readings.....	" 1·147	1·338						
Highest Reading of a Max. Therm. on the 5th ...	63·0	64·0						
Lowest Reading of a Min. Therm. on the 15th ...	28·8	29·6						
Range of Thermometer Readings .....	34·2	34·4						
Mean of Highest Daily Readings .....	51·3	54·4						
Mean of Lowest Daily Readings .....	39·5	41·9						
Mean Daily Range .....	11·8	12·5						
Deduced Mean Temp. (from Mean. of Max. and Min.)	44·4	47·2						
Mean Temperature from Dry Bulb .....	45·9	47·9						
Adopted Mean Temperature .....	45·2	47·6						
Mean Temperature of Evaporation .....	42·8	45·4						
Mean Temperature of Dew Point .....	40·0	42·9						
Mean elastic force of Vapour.....inches	0·247	0·278						
Mean weight of vapour in a cub. ft. of air, grains	2·8	3·2						
Mean additional weight required for saturation ..	0·6	0·6						
Mean degree of Humidity (saturation 100).....	82	84						
Mean weight of a cubic foot of air .....	546·0	537·6						
Mean amount of Cloud (0—10) .....	5·1	7·3						
Fall of Rain .....	inches 2·435	4·983						
Greatest Rainfall in one day (23rd) .....	" 1·060	0·98 ;						
No. of days on which ·005 in. or more Rain fell...	10	18·8						
Wind :—Direction.....	N	NE	E	SE	S	SW	W	NW
No. of days.....	9	7	0	0	5	1	6	3
Mean Velocity in miles per hr.	8·6	4·9	0	0	3·5	4·8	6·8	9·8
Total No. of miles.....	1860	825	0	0	421	114	975	707
Total No. of miles registered .....	4902						Mean*	
Greatest hourly velocity (27th, Noon, Dir. N.N.W.)	25						6914·1	
							37·5	

\* For the last 52 years.

## OCTOBER, 1919.

## DIFFERENCES.

The signs + and — mean respectively above and below the MONTHLY average.

Mean barometric pressure	...	...	...	+	0.325 in.
Monthly range	..	...	...	—	0.191 in.
Mean of highest daily temperatures	...	...	...	—	3.1°
Mean of lowest	..	..	...	—	2.4°
Mean daily range	..	...	...	—	0.7°
Adopted Mean temperature	...	...	...	—	2.4°
Total rainfall	...	...	...	—	2.548 in.

Ground Frost on 3rd, 8th—10th, 26th, 28th, 29th. Fog on 5th and 6th. Lightning on 13th and 14th. Lunar Halo 7th. Solar Halo on 3rd and 29th.

## EXTREME READINGS FOR OCTOBER,

During 72 Years.

Highest reading of Barometer	...	1884 (5th)	.....	30.306 in.
Lowest	..	1862 (19th)	.....	28.139 in.
Highest temperature	.....	1890 (12th)	.....	74.0°
Lowest	..	1895 (28th)	.....	17.8°
Highest adopted mean temperature	.....	1908	.....	52.5°
Lowest	..	1895	.....	42.8°
Greatest fall of rain	.....	1870	.....	13.437 in.
Least	..	1915	.....	1.180 in.
Greatest fall of rain in one day	...	1870 (8th)	.....	2.529 in.
Greatest No. of days on which				
.005 in. or more rain fell	...	1903	.....	29
Least	..	†1864	.....	10
*Greatest hourly velocity of wind	.....	1877 (15th)	.....	52 mls.
*Greatest No. of miles registered...	.....	1874	.....	9818
*Least	..	1915	.....	3965

\* Since 1867 only. † And 1919.

## NOVEMBER, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.						
Mean Reading of the Barometer .....	inches 29.349	29.461						
Highest " " on the 1st ... "	30.075	30.065						
Lowest " " on the 25th ... "	28.813	28.566						
Range of Barometer Readings.....	" 1.262	1.499						
Highest Reading of a Max. Therm. on the 23rd ...	55.0	55.7						
Lowest Reading of a Min. Therm. on the 16th ...	20.6	25.4						
Range of Thermometer Readings .....	34.4	30.3						
Mean of Highest Daily Readings .....	41.6	47.2						
Mean of Lowest Daily Readings .....	33.4	36.7						
Mean Daily Range .....	8.2	10.5						
Deduced Mean. Temp. (from Mean of Max. and Min.)	37.1	41.6						
Mean Temperature from Dry Bulb.....	38.2	42.0						
Adopted Mean Temperature .....	37.7	41.8						
Mean Temperature of Evaporation .....	36.4	39.7						
Mean Temperature of Dew Point .....	34.7	38.2						
Mean elastic force of Vapour.....inches	0.201	0.231						
Mean weight of Vapour in a cub. ft. of air, grains	2.4	2.7						
Mean additional weight required for saturation "	0.3	0.4						
Mean degree of Humidity (saturation 100) .....	89	87						
Mean weight of a cubic foot of air .....	grains 546.7	544.6						
Mean amount of Cloud (0—10) .....	8.1	7.4						
Fall of Rain .....	inches 3.675	4.423						
Greatest Rainfall in one day (17th).....	" 0.865	0.972						
No. of days on which .005 in. or more Rain fell...	21	18.1						
Wind :—Direction .....	N	NE	E	SE	S	SW	W	NW
No. of days.....	6	10	2	0	2	2	8	0
Mean Velocity in miles per hr.	3.9	5.8	3.4	0	7.1	15.2	15.0	0
Total No. of miles.....	565	1392	163	0	339	730	2887	0
Total No. of miles registered .....	6076	Mean*		7264.9				
Greatest hourly velocity (23rd and 24th, at 10 p.m., and 3 a.m., Dir. W.) .....	33	41.2						

\* For the last 52 years.

## NOVEMBER, 1919.

### DIFFERENCES.

The signs + and — mean respectively above and below the  
MONTHLY average.

Mean barometric pressure	...	...	...	—	0·112 in.
Monthly range	..	..	..	—	0·237 in.
Mean of highest daily temperatures	...	...	...	—	5·6°
Mean of lowest	..	..	..	—	3·3°
Mean daily range	..	..	..	—	2·3°
Adopted mean temperature	...	...	...	—	4·1°
Total rainfall	...	...	...	—	0·748 in.

Ground Frost on 1st, 2nd, 5th, 9th, 11th—17th, 20th, 21st, 26th—30th. Hoar Frost on 12th, 29th, 30th. Snow on 10th—12th, 15th, 20th. Hail on 20th, 23rd. Fog on 17th, 21st, 28th. Thunder and Lightning on 20th. Solar Halo on 30th.

### EXTREME READINGS FOR NOVEMBER,

During 72 Years.

Highest reading of Barometer	...	1857 (12th)	.....	30·350 in.
Lowest	..	1891 (11th)	.....	27·938 in.
Highest temperature	.....	1900 (1st)	.....	62·4°
Lowest	..	1901 (15th)	.....	17·5°
Highest adopted mean temperature	↑	1881	.....	47·0°
Lowest	..	1915	.....	36·3°
Greatest fall of rain	.....	1866	.....	9·026 in.
Least	..	1855	.....	1·158 in.
Greatest fall of rain in one day	...	1866 (16th)	.....	3·700 in.
Greatest No. of days on which				
·005 in. or more rain fell	...	1913	.....	28
Least	..	1848	.....	6
*Greatest hourly velocity of wind	..	1887 (1st)	.....	62 mls.
*Greatest No. of miles registered	...	1888	.....	12813
*Least	..	1915	.....	4893

\* Since 1867 only.

† And in other years.

## DECEMBER, 1919.

Results of Observations taken during the Month.		Mean for the last 72 years.						
Mean Reading of the Barometer .....	inches 29.278	29.427						
Highest " " on the 19th ..	" 29.835	30.057						
Lowest " " on the 29th ..	" 28.830	28.533						
Range of Barometer Readings.....	" 1.005	1.524						
Highest Reading of a Max. Therm. on the 2nd...	49.6	52.9						
Lowest Reading of a Min. Therm. on the 26th ...	25.7	21.2						
Range of Thermometer Readings.....	23.9	31.7						
Mean of Highest Daily Readings .....	44.8	43.4						
Mean of Lowest Daily Readings .....	36.7	33.6						
Mean Daily Range .....	8.1	9.8						
Deduced Mean Temp. (from Mean. of Max. and Min.)	40.8	38.5						
Mean Temperature from Dry Bulb .....	41.1	39.1						
Adopted Mean Temperature .....	41.0	38.8						
Mean Temperature of Evaporation .....	39.4	37.2						
Mean Temperature of Dew Point .....	37.4	35.2						
Mean elastic force of Vapour .....	inches 0.223	0.207						
Mean weight of Vapour in a cub. ft. of air, grains	2.6	2.4						
Mean additional weight required for saturation ..	0.4	0.4						
Mean degree of Humidity (saturation 100) .....	87	87						
Mean weight of a cubic foot of air .....	grains 541.9	547.0						
Mean amount of Cloud (0—10) .....	8.3	7.6						
Fall of Rain .....	inches 6.645	4.713						
Greatest Rainfall in one day (22nd) .....	" 0.950	0.857						
No. of days on which .005 in. or more Rain fell...	25	20.0						
Wind:—Direction .....	N	NE	E	SE	S	SW	W	NW
No. of days.....	1	0	1	3	3	5	16	2
Mean Velocity in miles per hr.	10.3	0	3.9	9.3	18.1	7.7	14.7	12.4
Total No. of miles.....	247	0	93	671	1305	926	5632	594
Total No. of miles registered .....	9468	*Mean						
Greatest hourly velocity (11th, at 2 a.m., Dir. S. by E.) .....	40	7834.7						
		42.2						

\* For the last 52 years.

## DECEMBER, 1919.

## DIFFERENCES.

The signs + and — mean respectively above and below the  
MONTHLY average.

Mean barometric pressure	...	...	...	—	0·149 in.
Monthly range	„	...	...	—	0·519 in.
Mean of highest daily temperatures	...	...	...	+	1·4°
Mean of lowest	„	„	...	+	3·1°
Mean daily range	„	...	...	—	1·7°
Adopted mean temperature	...	...	...	+	2·2°
Total rainfall	...	...	...	+	1·932 in.

Ground Frost on 1st, 2nd, 8th—10th, 13th, 14th, 17th, 22nd, 25th, 27th, 31st. Snow and Hail, 6th, 21st, 24th, 25th. Heavy Rain, 20th, 22nd, 24th. Gales of Wind on 11th and 18th.

## EXTREME READINGS FOR DECEMBER,

During 72 Years.

Highest reading of Barometer	...	1905 (12th)	.....	30·484 in.
Lowest	„	1886 (8th)	.....	27·350 in.
Highest temperature	.....	1876 (9th)	.....	58·1°
Lowest	„	1860 (24th)	.....	6·7°
Highest adopted mean temperature	.....	1857	.....	44·6°
Lowest	„	1878	.....	30·3°
Greatest fall of rain	.....	1918	.....	10·595 in.
Least	„	1890	.....	0·550 in.
Greatest fall of rain in one day	...	1870 (19th)	.....	1·962 in.
Greatest No. of days on which				
·005 in. or more rain fell	...	1918	.....	30
Least	„	†1853	.....	8
*Greatest hourly velocity of wind	...	1894 (22nd)	.....	72 mls.
*Greatest No. of miles registered	...	1898	.....	11265
*Least	„	1916	.....	4517

\* Since 1867 only.

† And in other years.



## Summary of Observations, 1919.

Results of Observations taken during the Year.	Mean for the last 72 Years.	
<i>Readings of Barometer in inches.</i>		
Mean of the Year .....	29·496	29·492
Highest Monthly Mean (October).....	29·767	29·744
Lowest     "     "     (January) .....	29·263	29·221
Highest Reading (April).....	30·302	30·291
Lowest     "     (April) .....	28·250	28·202
Range .....	2·052	2·089
<i>Thermometer, Fahrenheit.</i>		
Highest Monthly Mean Temperature (August) ...	56·7	58·6
Lowest     "     "     "     (February)....	34·7	35·5
Highest Reading of a Max. Therm. (June 11th)...	76·5	81·4
Lowest     "     Min.     "     (February 9th)	19·4	16·0
Range of Thermometer Readings .....	57·1	65·4
Mean of Highest Daily     "     .....	52·1	54·5
Mean of Lowest Daily     "     .....	40·9	40·9
Mean Daily Range .....	11·2	13·6
Deduced Mean Temp. (from mean of Max. and Min.)	45·5	46·7
Mean Temperature from Dry Bulb .....	46·2	47·1
Adopted Mean Temperature of the Year .....	45·9	46·9
Mean Temperature of Evaporation .....	43·4	44·6
Mean Temperature of Dew Point .....	40·7	42·1
Mean elastic force of Vapour ..... inches	0·262	0·274
Mean weight of Vapour in a cub. ft. of air...grns.	3·0	3·2
Mean additional weight required for saturation ..	0·7	0·7
Mean degree of Humidity (saturation 100).....	83	83
Mean weight of a cubic foot of air.....grns.	540·4	539·1
Mean amount of Cloud (0—10) .....	7·0	7·3
Total fall of Rain .....	41·128	47·067
Greatest Monthly Rainfall (December) .....	6·645	7·605
Least     "     "     "     (February).....	1·295	1·236
Greatest Rainfall in one day (March 10th) ..	1·375	1·625
No. of days per Month on which ·005 inch or more Rain fell .....	16·9	17·1

## SUMMARY OF WIND, 1919.

Prevailing Direction	N	NE	E	SE	S	SW	W	NW
No. of days for each	49	47	26	7	46	51	121	18
Mean Velocity in miles per hour...	6.4	6.2	7.2	8.3	9.2	8.2	10.8	8.2
Total No. of miles for each Direction	7528	7001	4503	1397	10184	10032	31466	3534

		Mean for the last 52 years.
Total No. of miles registered .....	75645	85664.5
Greatest Monthly Total (December).....	9468	9981.8
Least " " (February) .....	3875	4955.5
Greatest hourly velocity (Jan. 2nd, 9th & Dec. 11th)	40	50.9
Prevailing Direction of Wind .....	W.	W

## DIFFERENCES, 1919.

The signs + and — mean respectively above and below the  
YEARLY average.

Mean barometric pressure...	...	...	...	...	+	0.004 in.
Yearly range	"	...	...	...	—	0.037 in.
Mean of highest daily temperatures	...	...	...	...	—	2.4°
Mean of lowest " "	"	"	...	...	—	0.0°
Mean daily range	...	...	...	...	—	2.4°
Adopted mean temperature	...	...	...	...	—	1.0°
Total rainfall	...	...	...	...	—	5.939 in.

**ABSOLUTE EXTREMES  
FOR THE LAST 72 YEARS.**

*Readings of Barometer, in inches.*

Highest monthly mean .....	1891 (Feb.) .....	29·997
Lowest " " .....	1868 (Dec.) .....	28·984
Highest yearly " .....	1896 .....	29·584
Lowest " " .....	1872 .....	29·319
Greatest monthly range .....	1886 (Dec.) .....	2·795
Least " " .....	1852 (July) .....	0·505
Highest reading .....	1896 (Jan. 9th) .....	30·597
Lowest " .....	1886 (Dec. 8th) .....	27·350
Extreme range .....		3·247

*Thermometer, Fahrenheit.*

Highest monthly mean temperature ...	1901 (July) .....	63·2
Lowest " " " .....	1855 (Feb.) .....	28·6
Highest yearly " " .....	1868 .....	49·1
Lowest " " " .....	1879 .....	44·1
Highest reading " .....	1901 (July 20th) .....	89·0
Lowest " " " .....	1881 (Jan. 15th.) .....	4·6

*Weight of Vapour in a cubic foot of air (grains).*

Greatest monthly mean .....	1852 (July) .....	5·1
Least " " .....	†1855 (Feb.) .....	1·4

† And on other dates.

**ABSOLUTE EXTREMES**  
**FOR THE LAST 72 YEARS—Continued.**

*Rainfall, in inches.*

Greatest Rainfall in one day .....	1866 (Nov. 16) ..	3·700
Greatest " " month .....	1870 (Oct.) .....	13·437
Least " " " .....	1859 (May) .....	0·249
Greatest " " year .....	1866 .....	62·093
Least " " " .....	1887 .....	31·250
Days on which ·005 in. or more Rain fell :		
Greatest No. in one month .....	1890 (Jan.) ... } and 1918 (Dec.) ... }	30
Least " " .....	1852 (Mar.) .....	3
Greatest " year .....	1872 .....	281
Least " " .....	1855 .....	135

\* *Wind.*

Greatest hourly velocity, in miles .....	1894 (Dec. 22)...	72
Greatest No. of miles registered in a month .....	1888 (Nov.) .....	12813
Least " " .....	1917 (Feb.) ...	3160
Greatest Mean No. " " .....	March .....	8473
Least " " .....	September .....	6099
Greatest No. " " year .	1868 .....	102395
Least " " " " .....	1915 .....	70623

\* Record dates from 1867 only.

## DATES OF OCCASIONAL PHENOMENA.

1919	Frost	Hoar Frost	Snow	Hail	Heavy Rain
January	1, 3-7, 10-14, 18-20, 27-31	12, 13, 19, 20, 23	1, 4, 6, 19, 27, 28	1, 3, 17, 26, 31	3, 9, 26
February	1-5, 7-14, 18-19, 24-28	13, 24, 25 [24, 1, 2, 4, 6, 19, 27		3	
March	1, 3, 4, 6, 7, 10, 13-18, 21-26, 28-31		3, 4, 5, 11, 12, 18, 26		6, 10, 11, 26
April	1-3, 9, 10, 13, 17, 21, 22, 25, 27-29		1, 26, 27 [28, 30, 31	14, 26, 27	1
May					
June					
July					
August					3, 31
September	20, 21, 28			19, 20	17, 25, 26, 28
October	3, 8-10, 26, 28, 29	28			2, 22, 24
November	1, 2, 5, 9, 11-17, 20-21, 26, 30	12, 29, 30	10, 11, 12, 15, 20	20, 23	
December	1, 2, 8-10, 13, 14, 17, 22, 25-27, 31		6, 21, 24, 25	6, 21, 24, 27	20, 22, 24

1919	Gales of Wind	Fog	Thunder	Lightning	*Lunar Halo	Solar Halo	Aurora Borealis
January	2, 9	5, 8, 11, 21				28	
February		20, 22				18	
March	27	1, 4				1, 2, 9	
April			10, 11			21	
May				10		9	
June			12	12		2, 6, 10	
July							
August			16	16		19	19
September		10	12	20		3, 27	
October		5, 6		13, 14	7	3, 29	
November		17, 21, 28	20	20		30	
December	11, 18						

## MONTHLY TOTALS FOR EACH HOUR OF RECORDED SUNSHINE.

1919. 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 ...	...	...	...	...	0.1	2.0	5.0	5.6	6.2	5.0	3.7	0.9	...	...	...	...	...
February ...	...	...	...	0.5	3.6	6.5	8.5	9.4	7.5	6.4	5.6	3.7	2.3	0.1	...	...	...
March ...	...	...	2.4	6.3	7.9	12.6	12.5	10.9	8.6	10.6	9.9	8.4	4.7	1.4	...	...	...
April ...	...	1.0	2.2	4.8	7.4	8.8	8.6	9.1	12.3	13.0	12.5	12.6	13.2	9.9	2.3	...	...
May ...	...	5.5	12.4	16.8	18.6	18.3	18.6	18.0	17.1	17.6	14.5	11.9	9.4	9.3	5.0	0.3	...
June ...	0.9	6.9	11.3	12.1	11.5	14.6	15.5	15.4	15.7	17.0	16.1	16.9	14.0	10.5	9.0	5.2	...
July ...	0.1	0.8	5.2	8.2	8.9	11.2	11.5	12.5	13.8	12.6	13.7	15.3	13.8	11.8	6.2	2.4	...
August ...	...	1.3	3.2	6.2	7.7	9.2	10.9	12.7	12.4	15.9	17.9	16.0	13.5	12.3	7.6	0.9	...
September ...	...	...	1.0	4.9	10.4	12.4	14.1	12.0	12.6	14.2	15.8	13.7	12.2	4.1	0.1	...	...
October ...	...	...	...	3.1	8.6	13.3	16.2	14.9	16.3	15.6	15.8	11.3	4.0	...	...	...	...
November ...	...	...	...	...	1.2	4.5	6.2	6.9	6.5	6.2	6.2	3.4	...	...	...	...	...
December ...	...	...	...	...	0.1	2.1	3.1	5.4	7.2	6.5	2.6	0.8	...	...	...	...	...
Sums ...	1.0	15.5	37.7	62.9	86.0	115.5	130.7	132.8	136.2	140.6	134.3	114.9	87.1	59.4	30.2	8.8	...

**TOTAL AMOUNT OF SUNSHINE RECORDED ON EACH DAY.**

1919	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
January	...	...	...	...	2.7	...	...	0.2	...	2.9	3.5	...	0.7	...	1.6	0.2	1.0
February	...	0.3	0.4	0.1	...	...	1.5	4.6	4.6	4.2	1.0	4.7	3.0	...	...	...	...
March	...	1.2	6.1	0.1	4.5	...	...	0.1	1.0	...	...	...	4.1	3.7	2.0	7.3	2.8
April	7.2	9.2	...	4.6	0.4	2.7	0.1	6.2	6.5	...	2.1	6.5	6.5	2.1	0.2	1.7	...
May	1.2	9.1	6.5	...	0.8	...	5.4	...	10.4	9.2	4.0	0.5	12.0	12.7	10.1	0.5	3.3
June	9.3	5.8	7.8	1.4	1.3	3.6	9.4	8.9	14.1	10.3	6.5	5.1	6.9	13.9	7.8	9.2	0.5
July	1.8	3.6	3.1	0.2	6.6	0.6	0.6	6.3	8.1	8.0	1.3	4.6	5.3	10.3	13.7	...	0.9
August	0.2	1.4	4.6	0.7	4.2	7.5	6.5	0.8	9.8	8.7	10.3	12.7	0.2	8.1	4.4	5.8	8.3
September	...	2.1	0.2	2.3	3.0	4.0	5.4	3.9	5.4	8.3	10.2	...	...	0.6	10.7	8.0	8.2
October	...	4.6	6.5	8.4	6.3	...	6.2	7.0	4.4	0.9	4.7	0.8	4.5	6.7	7.0	8.5	...
November	3.8	0.9	...	...	...	...	...	0.7	...	3.3	4.5	...	6.7	2.8	3.0	...	...
December	0.4	0.9	...	...	...	1.1	5.7	5.4	...	...	...	4.4	...	1.4	...	...	...

**TOTAL AMOUNT OF SUNSHINE RECORDED ON EACH DAY—(continued).**

1919	18	19	20	21	22	23	24	25	26	27	28	29	30	31	MONTHLY	
															Total	Percent.
January ...	6.3	...	...	...	1.3	...	...	...	3.7	...	2.6	1.8	...	...	28.5	11.5
February ...	5.4	...	...	...	...	5.2	7.5	3.7	1.1	...	6.8	...	...	...	54.1	19.9
March ...	...	...	...	4.3	6.7	2.3	7.5	1.8	6.9	4.3	8.9	11.3	2.8	6.5	96.2	26.3
April ...	0.1	3.8	12.6	10.5	8.9	4.0	1.8	0.6	2.9	3.2	4.7	6.5	2.1	...	117.7	28.1
May ...	0.5	12.0	8.9	0.2	8.5	11.3	7.0	1.6	3.8	11.2	9.3	10.2	12.0	11.1	193.3	39.2
June ...	12.0	0.2	7.1	7.8	0.2	1.9	7.8	5.3	11.5	2.9	2.5	8.6	3.1	...	192.7	37.9
July ...	1.5	5.1	0.1	7.7	8.2	2.5	5.0	11.0	7.1	0.7	1.6	7.5	11.0	4.0	148.0	29.1
August ...	4.9	4.3	2.7	11.3	...	2.1	10.4	0.1	0.2	2.6	...	0.8	6.3	8.2	148.1	32.4
September ...	1.1	1.6	3.3	10.2	...	6.4	...	...	3.5	8.5	10.1	2.8	7.0	...	127.0	33.5
October ...	0.5	6.3	1.2	3.8	1.1	...	...	2.6	7.2	7.6	5.0	...	2.1	5.2	119.1	36.5
November ...	3.2	...	1.0	5.0	...	...	1.4	0.6	0.3	0.4	3.0	0.5	...	...	41.1	16.1
December ...	...	2.1	...	0.1	...	0.1	0.2	3.0	...	2.3	...	0.7	...	...	27.8	12.0



## SUMMARY OF SUNSHINE.

	BRIGHT SUNSHINE RECORDED					
	1919			Mean for the last 39 years		
	Number of		Percentage of Possible Sunshine	Number of		Percentage of Possible Sunshine
	Days	Hours		Days	Hours	
January ...	13	28·5	11·5	14·2	32·6	13·1
February ...	16	54·1	19·9	17·7	58·1	21·2
March ...	22	96·2	26·3	24·1	103·4	28·2
April ...	27	117·7	28·1	26·4	148·8	35·5
May ...	28	193·3	39·2	27·6	186·4	37·8
June ...	30	192·7	37·9	28·0	185·3	36·5
July ...	30	148·0	29·1	28·4	174·5	34·3
August ...	29	148·1	32·4	27·6	150·1	32·8
September ...	24	127·0	33·5	25·6	124·5	32·9
October ...	25	119·1	36·5	23·4	84·1	25·8
November ...	17	41·1	16·1	17·4	45·8	17·9
December ...	14	27·8	12·0	13·4	25·7	11·1
<b>Year ...</b>	<b>275</b>	<b>1293·6</b>	<b>29·0</b>	<b>273·8</b>	<b>1319·2</b>	<b>29·5</b>

**SUMMARY OF SUNSHINE—Continued.**  
**EXTREMES FOR THE LAST 39 YEARS.**

MONTH	Number of Days				Number of Hours				Percentage of Possible Sunshine			
	on which Sunshine was recorded											
	Greatest		Least		Greatest		Least		Greatest		Least	
Jan.	21	1881	8	1898	64.2	1881	12.3	1913	25.9	1881	5.0	1913
Feb.	24	1895	11	1882	89.3	1887	29.6	1882	32.8	1887	10.9	1882
Mar.	28	*1894	17	1904	168.6	1907	56.8	1912	46.1	1907	15.5	1912
Apr.	30	*1909	22	1905	223.7	1893	94.0	1913	53.4	1893	22.3	1913
May	30	*1880	22	1886	266.6	1881	79.7	1906	54.1	1881	16.2	1906
June	30	*1896	24	*1888	272.5	1887	85.2	1912	53.6	1887	16.8	1912
July	31	*1882	25	*1888	263.4	1911	98.0	1888	51.7	1911	19.3	1888
Aug.	31	*1886	23	1894	235.2	1899	74.1	1912	51.5	1899	16.2	1912
Sept.	30	1914	21	1897	176.5	1914	62.9	1896	46.6	1914	16.6	1896
Oct.	28	*1891	17	1889	134.9	1899	50.0	1889	41.4	1899	15.3	1889
Nov.	23	*1883	9	1897	86.6	1915	18.5	1891	33.8	1915	7.2	1891
Dec.	20	1917	6	1882	60.1	1886	7.4	1912	26.0	1886	3.2	1912
Year	300	1905	251	1903	1613.7	1887	927.6	1912	36.1	1887	20.7	1912

\*And in other years.

## HORIZONTAL MAGNETIC DIRECTION.

Horizontal Magnetic Direction, West of North (from daily measures of the continuous curves).

1919	MEANS OF †				Mean for the month	Mean daily range ‡	Highest reading of the month	Lowest reading of the month	Monthly range
	Highest readings	4 p.m. readings	4 a.m. readings*	15° +					
	Lowest readings	4 p.m. readings	4 a.m. readings*						
January	72.0	67.4	70.0	69.3	10.6	18.0	49.0	29.0	
February	70.2	65.4	68.0	67.5	10.9	18.0	49.0	29.0	
March	68.0	62.8	66.0	65.4	14.2	18.0	42.0	36.0	
April	65.4	59.2	64.2	63.0	10.9	14.0	47.0	27.0	
May	63.4	56.0	61.4	59.7	15.2	17.0	40.0	37.0	
June	59.8	49.6	52.8	55.1	13.9	7.0	45.0	22.0	
July	61.0	52.0	53.8	56.6	11.4	17.0	47.0	30.0	
August	61.6	52.8	54.4	56.5	16.4	17.0	—1.0	115.0	
September	59.8	51.8	58.0	55.9	14.5	7.0	34.0	33.0	
October	56.4	47.2	49.4	51.5	17.0	15.0	34.0	41.0	
November	52.8	49.8	51.4	51.0	9.1	16.0	31.0	45.0	
December	52.6	49.6	51.2	51.1	8.3	7.0	36.0	31.0	
Means ...	61.9	55.3	57.0	58.6	12.7	17.0	39.0	38.0	
Mean for the year ...				15° 58.6 W.					

† For the 5 quietest days.

\* Of the following day.

‡ Includes all days.

## HORIZONTAL MAGNETIC FORCE.

Horizontal Magnetic Force in C. G. S. Units (from daily measures of the continuous curves).

The figures in the columns are entered to the unit  $10^{-5}$  C. G. S.

1919	MEANS OF †					Mean for the month	Mean daily range ‡	Highest reading of the month	Lowest reading of the month	Monthly range
	Highest readings	Lowest readings	4 p.m. readings	4 a.m. readings*	0 +					
	17000 +									
January	338	318	325	333	328	58	384	223	161	
February	335	314	325	328	326	54	389	228	161	
March	332	306	318	320	319	73	394	219	175	
April	338	296	317	316	317	70	380	242	138	
May	334	288	304	311	309	86	407	150	257	
June	326	283	312	313	310	68	389	233	156	
July	316	277	302	307	301	69	398	237	161	
August	301	265	285	291	286	95	633	—159	792	
September	303	264	294	294	289	71	412	150	262	
October	301	235	291	292	287	81	371	39	332	
November	303	287	296	303	298	40	339	237	102	
December	304	289	295	300	297	40	339	131	208	
Means ...	319	288	305	309	306	67	403	161	242	
Mean for the year ... 0.17306 C. G. S. Units.										

† For the 5 quietest days.

\*Of the following days.

‡ Includes all days.

## ABSOLUTE MEASURES—SUMMARY.

DIRECTION			FORCE.		
1919	Declination Corrected	Inclination	Horizontal	Vertical	Total
C. G. S. UNITS.					
January ...	15 53.1	68 42.6	0.17288	0.44365	0.47615
February ...	15 57.3	68 43.4	0.17260	0.44323	0.47565
March ...	15 58.0	68 44.9	0.17274	0.44406	0.47646
April ...	15 62.0	68 43.7	0.17275	0.44373	0.47617
May ...	15 59.7	68 42.9	0.17258	0.44299	0.47541
June ...	15 68.0	68 42.9	0.17316	0.44448	0.47701
July ...	15 61.2	68 38.9	0.17272	0.44180	0.47436
August ...	15 61.9	68 41.5	0.17274	0.44286	0.47536
September ...	15 55.2	68 47.1	0.17288	0.44537	0.47775
October ...	15 54.0	68 43.4	0.17322	0.44483	0.47736
November ...	15 56.3	68 42.3	0.17317	0.44427	0.47684
December ...	15 56.2	68 43.0	0.17290	0.44385	0.47634
Means ...	15 58.6	68 43.1	0.17286	0.44376	0.47624

## DATES OF MAGNETIC DISTURBANCES.

The disturbances are divided generally into three classes, *small*, *moderate*, and *greater*; these are indicated by the initial letters of the classes, and the letter *c* denotes *calm*. Very great disturbances are marked *vg.* The days are reckoned astronomically from noon to noon.

1919	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1919
D.													D.
1	c	m	m	s	s	s	m	m	*	v.g.	s	c	1
2	c	m	g	*	v.g.	m	s	s	v.g.	v.g.	s	s	2
3	v.g.	s	m	*	v.g.	s	s	s	m	v.g.	s	m	3
4	g	m	s	s	s	s	c	s	s	g	g	m	4
5	vg	s	m	c	s	s	c	c	c	v.g.	s	s	5
6	s	s	m	s	s	s	s	c	m	m	s	c	6
7	m	c	*	m	c	s	s	c	m	s	c	c	7
8	m	c	c	*	m	c	s	c	c	s	c	m	8
9	c	s	c	m	s	m	s	c	m	m	c	s	9
10	c	c	c	s	c	m	s	c	m	s	c	s	10
11	c	c	c	s	c	m	m	v.g.	s	s	m	s	11
12	s	c	c	c	c	m	s	v.g.	c	s	m	s	12
13	m	g	m	c	g	s	s	c	s	c	c	s	13
14	m	m	m	c	g	s	s	c	*	c	c	g	14
15	s	s	s	c	m	s	c	s	*	s	s	v.g.	15
16	v.g.	m	s	m	m	c	s	s	s	m	g	c	16
17	m	c	m	g	m	s	g	s	s	m	g	c	17
18	g	s	c	m	m	c	s	s	s	m	m	m	18
19	m	c	m	m	m	c	c	g	v.g.	c	c	s	19
20	m	s	g	m	m	c	s	s	m	c	c	m	20
21	s	v.g.	g	m	m	s	c	c	s	c	m	m	21
22	s	g	v.g.	m	m	s	m	c	c	m	m	m	22
23	s	g	m	s	s	s	m	s	s	m	m	m	23
24	s	c	c	s	v.g.	s	m	c	g	c	s	m	24
25	c	c	m	c	m	s	s	s	s	c	c	s	25
26	c	c	s	c	m	s	m	s	m	s	s	c	26
27	c	m	m	c	m	s	c	c	c	m	c	c	27
28	s	v.g.	g	c	c	s	c	m	c	*	c	c	28
29	s		m	s	s	s	s	s	c	*	c	c	29
30	c		m	s	s	s	c	c	c	s	c	c	30
31	g		m	s	s	s	s	c	c	c	m	c	31
TOTAL	c	9	10	5	9	6	4	8	13	8	8	11	
	s	9	7	5	9	9	21	16	12	7	8	9	
	m	7	6	14	9	11	5	6	3	6	7	9	
	g	3	3	4	1	2	...	1	1	1	1	1	
	vg	3	2	1	...	3	...	...	2	2	4	...	1

\* No record.

**DATES OF SOLAR OBSERVATIONS, AND DISC AREAS  
OF SPOTS AS MEASURED FROM THE DRAWINGS.**

The unit is  $\frac{1}{100}$ th of the visible surface.

n=note without a complete drawing.

1919	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	1919
D.													D.
1				7.6		7.4	3.0				13.0		1
2			8.0	6.8	7.4	9.6			4.3	7.6	12.5	5.0	2
3	1.0	13.0	6.8		12.1	9.6	5.4	2.1		6.6			3
4		15.0							5.0	5.0			4
5	1.2		6.7		9.5		5.5	6.6	5.6	4.4			5
6				6.5		9.0		6.8	5.0			1.5	6
7		23.0			18.8	11.6		8.2	4.1	4.3		1.3	7
8		20.0		6.0		9.0	4.0		2.6	4.7	5.0	1.7	8
9		22.4	12.6	7.5	14.0	6.4	3.0	10.7	5.4	8.0			9
10		19.0			16.8	7.7	2.4	10.0	7.8	n	6.4		10
11	15.1			4.0	13.5	8.4	4.4	13.2	11.4	12.0	4.2	2.5	11
12		15.6		5.1	10.0	12.0		10.1				4.2	12
13	12.0	15.6		3.5	12.5	17.4	14.3			12.3	1.7	4.0	13
14			16.6		9.6	21.0	13.0	15.7	13.0	10.0	0.5	5.5	14
15	7.0		16.8		12.4	18.5	11.7	15.6	13.0	7.5	0.5		15
16			10.0			22.2		17.2	10.2	6.0	0.5		16
17	3.2		8.4		24.1	21.1		21.5	9.2				17
18	2.7	7.8				20.6	9.1	21.3			0.2	1.2	18
19				0.8	32.7		8.4	21.2	4.8	0.9		1.0	19
20				2.6	31.7			23.6	5.4	1.2	0.6		20
21			2.2	3.0			6.6	24.0	5.6	1.4	1.4	n	21
22	0.8		1.7	5.7	27.5		7.4			1.0			22
23		2.5	1.8	6.2	16.0		6.6	13.4	5.6			1.2	23
24		3.2	3.8		12.2	14.4	7.0	8.7			4.4	1.8	24
25		4.6	4.8				7.4			2.0		2.2	25
26	3.3		6.8		4.4	13.6	7.2		11.4	2.8	5.6		26
27				9.8	4.9				7.7	4.2		0.8	27
28	5.7	8.3	9.2	10.0	2.7		2.4		10.2	6.3	9.1		28
29	5.4		7.6	9.2	1.6	9.0	2.6	1.3	10.7				29
30			6.1		4.0	4.8	2.7	1.5	13.5	12.0	6.5		30
31			7.0		5.6		1.6	4.5		15.6			31
Daily Means	5.2	13.1	7.6	5.9	13.2	12.7	6.2	12.2	7.8	6.2	4.5	2.4	

