

MEAN TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	75.3	71.2	74.2	76.3	78.5	80.0	79.2	80.0	80.1	80.2	76.3	73.2	...
1897 ...	75.3	71.2	74.2	76.3	78.5	80.0	79.2	80.4	79.6	79.2	76.3	75.6	...
1898 ...	74.4	73.1	74.2	75.2	79.0	78.2	76.5	79.0	79.2	...	...	...	...
Av'ge.	74.8	72.2	74.3	75.8	78.8	79.1	77.8	79.8	79.8	79.7	76.3	74.4	76.9

MEAN OF MAXIMUM TEMPERATURES.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	75.0	...	...	...	...	...	...	86.0	87.1	88.0	81.2	82.1	...
1897 ...	80.3	78.0	81.1	82.2	84.1	88.3	85.1	87.1	87.1	87.0	83.0	82.2	...
1898 ...	80.1	80.2	82.9	83.1	87.0	86.2	84.2	85.1	86.3	...	...	...	...
Av'ge.	78.5	83.6	82.0	82.6	85.5	87.2	84.6	86.1	87.1	87.5	82.1	82.2	84.1

MEAN OF MINIMUM TEMPERATURES.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	69.0	...	...	...	...	...	...	73.0	73.0	73.1	70.1	69.0	...
1897 ...	66.1	67.0	68.1	70.0	73.1	73.2	74.0	76.1	72.2	72.0	70.1	69.1	...
1898 ...	69.1	65.2	65.2	66.0	73.1	72.1	71.2	72.0	72.2	...	...	...	...
Av'ge.	68.1	66.1	66.6	68.0	72.6	72.6	72.6	73.7	72.6	72.6	70.1	69.0	70.4

ABSOLUTE EXTREMES: MAXIMUM TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	80	81	78	...	...	...	...	87	92	93	85	85	93
1897 ...	86	84	84	87	89	90	89	92	90	91	86	84	92
1898 ...	85	85	85	87	95	92	89	87	93	...	...	...	95
Max...	86	85	85	87	95	92	89	92	93	93	86	85	95

ABSOLUTE EXTREMES: MINIMUM TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	64	62	64	...	...	...	...	72	71	70	67	65	62
1897 ...	61	65	65	68	69	71	72	72	71	71	65	65	61
1898 ...	66	61	64	65	71	70	66	67	70	...	...	...	61
Min...	61	61	64	65	69	70	66	67	70	70	65	65	61

TOTAL RAINFALL.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	4.54	3.32	4.19	5.34	10.44	7.85	13.33	16.98	12.26	6.53	23.08	11.59	132.95
1897 ...	13.16	2.87	3.67	13.73	32.80	3.93	10.45	7.62	10.36	11.56	16.17	9.77	130.18
1898 ...	6.81	2.50	5.27	2.98	7.62	8.34	18.40	12.87	9.93	...	...	...	...
Av'ge.	8.17	2.90	4.38	7.35	16.98	6.87	14.06	12.49	10.85	9.04	19.62	10.68	133.39

NUMBER OF DAYS WITH .01 INCH OR MORE OF RAIN.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	21	16	22	17	26	21	30	24	25	23	24	26	279
1897 ...	19	12	12	17	26	16	25	22	20	21	24	27	245
1898 ...	20	13	17	15	12	18	26	15	20	...	...	...	...
Av'ge.	20	14	17	16	21	18	27	20	22	22	28	26	251

GREATEST RAINFALL IN 24 CONSECUTIVE HOURS.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1896 ...	0.59	0.80	1.05	1.56	1.91	2.31	3.65	8.70	2.12	1.56	5.45	1.24	...
1897 ...	6.20	0.61	1.30	2.80	4.13	1.38	1.76	1.90	1.91	2.00	4.32	1.07	...
1898 ...	1.10	0.83	1.37	0.72	2.30	3.40	2.61	4.20	2.71	...	...	...	...
Max...	6.20	0.83	1.37	2.80	4.13	3.40	3.65	8.70	2.71	2.00	5.45	1.24	...

OBSERVATIONS AT RIVAS, NICARAGUA.

The records contributed for many years by Dr. Earl Flint, at Rivas, Nicaragua, include barometric readings. His present station is at 11° 26' N., 85° 47' W. The observations at 7:17 a. m., local time are simultaneous with Greenwich 1 p. m. The altitude of his barometer is 36 meters above sea level, but until the barometer has been compared with a standard it seems hardly necessary to publish the daily readings. The wind force is recorded on the Beaufort scale, 0-12. When cloudiness is less than $\frac{1}{10}$, the letter "F," or "Few," is recorded.

This station is situated on the western shore of Lake Nicaragua, not far from the eastern end of the western division of the Nicaragua Canal. The volcano Ometepe, on an island in Lake Nicaragua, is about 10 miles northeast of the station. Mr. Flint's records occasionally mention the presence of clouds in the early morning on the summit of this mountain.

Observations at Rivas, Nicaragua, August, 1898.

OBSERVATIONS AT 7 A. M. LOCAL (8 A. M. EASTERN STANDARD) TIME.

Date.	Temperature.		Wind.		Upper clouds.		Lower clouds.			Daily rainfall.	
	Air.	Dew-point.	Direction.	Force.	Kind.	Amount.	Direction from.	Kind.	Amount.		Direction from.
1.....	78	75	ne.	0	ck.	4	ne.	...	...	0.00	
2.....	79	75	ne.	0	ck.	6	ne.	...	...	0.00	
3.....	78.5	73	ne.	1	...	...	...	ks.	9	ne.	1.00
4.....	78.5	73	se.	0	...	...	...	k.	7	se.	0.00
5.....	78	74	se.	0	...	...	...	k.	10	se.	0.53
6.....	77	74	sw.	0	ck.	7	se.	...	...	0.00	
7.....	79	75	se.	2	ck.	10	se.	...	...	0.80	
8.....	79	73	se.	2	...	...	...	k.	Few	se.	0.00
9.....	79	73	se.	1	c.	3	sw.	k.	7	se.	0.00
10.....	79	73	se.	1	ck.	5	se.	...	...	0.00	
11.....	78	72	se.	0	c.	4	se.	k.	4	se.	0.20
12.....	78	72	se.	2	c.	10	se.	k.	10	se.	0.00
13.....	78	75	se.	1	ck.	7	se.	k.	7	se.	1.71
14.....	75	74	se.	0	ck.	7	se.	k.	5	se.	0.80
15.....	75	73	s.	0	...	...	...	k.	5	se.	0.68
16.....	77	74	ne.	0	ck.	Few	ne.	...	...	0.00	
17.....	78	75	se.	0	...	...	...	n.	10	se.	0.00
18.....	77	72	se.	0	c.	6	se.	...	...	0.00	
19.....	77	72	se.	0	c.	1	se.	...	...	0.00	
20.....	77	74	se.	0	...	...	...	k.	7	se.	0.00
21.....	75.5	73	sw.	0	...	...	...	n.	10	sw.	3.15
22.....	76	73	se.	0	...	...	...	k.	5	se.	0.40
23.....	77.5	73	se.	0	ck.	9	se.	...	...	0.60	
24.....	78	74	se.	1	...	...	...	ks.	6	se.	0.04
25.....	78	74	se.	0	...	...	...	ks.	10	se.	0.37
26.....	76.5	75	se.	0	ck.	5	se.	...	...	0.00	
27.....	76	74	s.	0	...	...	...	k.	10	se.	0.00
28.....	76	73	sw.	0	ck.	10	se.	...	...	0.40	
29.....	75	72	se.	2	...	...	...	n.	10	se.	1.77
30.....	77	74	se.	2	c.	7	se.	...	...	0.00	
31.....	78	74	sw.	1	c.	10	se.	...	...	0.00	
Means	77.3	...	...	...	...	...	...	...	...	...	11.85

OBSERVATIONS AT 8 P. M. LOCAL (9 P. M. EASTERN STANDARD) TIME.

Date.	Temperature.		Wind.		Upper clouds.		Lower clouds.			
	Air.	Dew-point.	Direction.	Force.	Kind.	Amount.	Direction from.	Kind.	Amount.	Direction from.
1.....	78	75	ne.	1	...	...	...	ks.	10	ne.
2.....	75	74	ne.	1	c.	10	ne.	...	...	...
3.....	77	73	se.	0	...	...	...	k.	9	se.
4.....	78	73	se.	0	...	...	...	k.	10	se.
5.....	78.5	74	se.	0	...	...	...	k.	10	se.
6.....	78	75	se.	0	...	...	...	k.	10	se.
7.....	78	75	se.	0	...	...	...	k.	10	se.
8.....	79	75	se.	2	cs.	10	se.	...	...	0.00
9.....	79	74	se.	1	...	...	...	ks.	10	se.
10.....	79	75	se.	0	...	...	...	ks.	10	se.
11.....	79	76	se.	1	...	...	...	ks.	10	se.
12.....	78	76	se.	1	...	...	...	k.	10	se.
13.....	75	74	s.	1	...	...	...	k.	10	s.
14.....	76	73	se.	1	...	...	...	k.	10	se.
15.....	77	73	se.	1	...	...	...	k.	10	se.
16.....	75	75	se.	2	...	...	...	k.	5	se.
17.....	78	75	se.	0	...	...	...	k.	10	se.
18.....	78	75	se.	0	...	...	...	k.	4	se.
19.....	80	74	se.	0	...	...	...	k.	10	se.
20.....	79	75	se.	0	...	...	...	ks.	4	se.
21.....	78	75	sw.	0	...	...	...	k.	10	se.
22.....	78	75	se.	0	...	...	...	k.	Few	se.
23.....	78	73	se.	0	...	...	...	k.	10	se.
24.....	78	73	se.	1	...	...	...	k.	Few	se.
25.....	75	75	se.	0	c.	5	se.	...	...	...
26.....	78	75	se.	0	...	...	...	k.	10	se.
27.....	77	73	se.	0	ck.	10	se.	...	...	...
28.....	78	75	se.	0	...	...	...	ks.	10	se.
29.....	78	75	se.	0	...	...	...	...	...	...
30.....	78	75	se.	0						

a rainfall of an inch in depth would equal 6,272,640 cubic inches of water, and we may convert the latter into gallons, barrels, or tons, as we please.

We recently computed for publication in the Year Book of an Agricultural Journal, a table giving the quantity of water corresponding to different depths of rainfall. A correspondent offers the criticism that the wine gallon of 231 cubic inches should have been used instead of the imperial (British) gallon of 277.463 cubic inches, as the former is the legal standard in the United States and the one commonly in use. We have, therefore, recomputed the table, giving the number of gallons per acre corresponding to given depths of rainfall in both measures for the convenience of all concerned. One inch of rainfall = 22,607 imperial gallons per acre, or 27,154 United States gallons.

Quantity of rainfall corresponding to given depths.

Depth of rainfall. <i>Inches.</i>	Cubic inches per acre.	Gallons per acre.		Ton per acre (2,000 pounds).
		United States or Queen Anne.	Imperial (British).	
0.25	1,568,160	6,789	5,652	28
0.50	3,136,320	13,577	11,303	56
0.75	4,704,480	20,366	16,955	85
1.00	6,272,640	27,154	22,607	113
1.25	7,840,800	33,943	28,259	141
1.50	9,408,960	40,731	33,911	170
1.75	10,977,120	47,520	39,563	198
2.00	12,545,280	54,309	45,214	226
2.25	14,113,440	61,097	50,866	255
2.50	15,681,600	67,886	56,517	283
2.75	17,249,760	74,674	62,169	311
3.00	18,817,920	81,463	67,821	339
4.00	25,090,560	108,617	90,428	452
5.00	31,363,200	135,772	113,035	565
6.00	37,635,840	162,926	135,642	678

The United States gallon adopted by Congress in 1830 is identical with the wine gallon of Queen Anne. The latter as well as the Winchester corn-gallon of 274½ cubic inches, and the standard ale gallon of Queen Elizabeth of 282 cubic inches, were abolished as standard measures of capacity in Great Britain in 1824, when the new imperial standard gallon containing 10 pounds weight of water at temperature 62° F., barometer 30 inches, was made the standard of capacity for liquid measure. At the same time a cubic inch of distilled water, weighed in air by brass weights at the temperature of 62° F., the barometer being at 30 inches, was declared to contain 252.458 grains, thus making the contents of the imperial gallon 277.274 cubic inches.

A redetermination of the weight of a cubic inch of distilled water at the Board of Trade, Standards Department, London, 1889, by Mr. H. J. Chaney (Philosophical Transactions of the Royal Society of London, Vol. 183 A., pp. 331-354), gave 252.286 grains as the true weight, instead of the hitherto accepted value of 252.458, whence it follows that the capacity of the imperial gallon is 277.463 cubic inches, and the number of gallons per acre = $\frac{6,272,640}{277.463} = 22,607$, as above.

The figures in the last column, tons per acre, were obtained by reckoning 200 imperial gallons to the ton of 2,000 pounds.

COLONEL CHILDS' RECORD OF RAINFALL IN NICARAGUA.

Through the kindness of Rear-Admiral John G. Walker, United States Navy, president of the Nicaragua Canal Commission, the Weather Bureau has obtained a copy of the record of rainfall in Nicaragua, September 9, 1850, to September 25, 1851, made in connection with the survey of the Nicaragua route for a ship canal, by Col. O. W. Childs, civil engineer. This record has often been referred to, but we are not aware that it has ever before been made available to meteorologists, and we therefore publish it in full.

The original manuscript states:

The observations were taken at Rivas de Nicaragua from September 9, 1850, to March 11, 1851, and from the latter period to September 25 of the same year, they were taken on the San Juan River.

The rainfall was carefully ascertained by means of a rain gauge. The observations were in all cases taken by a member of the party, except during a term of thirty-four days in September and October, 1850, when they were taken by Don Fruita Chomorro, then prefect of that department of the state.

It is not likely that the missing days in September, 1850 and 1851, will materially affect the monthly totals; but, in order that a summary for exactly one year may be obtained, the following data were given in Colonel Childs' manuscript:

Summary for one year, from September 9, 1850, to September 8, 1851.

Whole number of days on which rain fell.....	139
Whole number of days on which no rain fell.....	226
From May to October, the wet season, there fell.....	90.88 inches
From November to April, the dry season, there fell.....	6.55 "
Greatest fall in any one month (July, 1851).....	22.54 "
Least fall in any one month (February, 1851).....	0.00 "

The rainfall is almost invariably by showers of short duration, which occur in the latter part of the day and in the night.

In the following table a bracket indicates that the rainfall of two days is given in one measurement. The blank spaces at the beginning and end show those dates for which there is no record. The time of day at which the record was made daily is not mentioned, but was presumably at some early hour, in accordance with universal custom.

Precipitation at Rivas and San Juan River, Nicaragua.

	1850.				1851.								
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
1		0.10	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.03	0.00
2		0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09	2.71
3		2.72	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	4.71
4		0.03	0.00	0.00	0.19	0.00	0.00	0.00	0.00	0.46	0.60	0.96	0.00
5		0.29	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.60	1.92	0.84
6		0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95	0.77	0.00
7		0.00	0.31	0.60	0.00	0.00	0.00	0.00	0.00	0.35	0.49	0.00	0.18
8		0.00	0.00	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.72	1.26	0.00
9	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.25	0.00	0.73	1.20	0.30	
10		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.73	1.51	0.00
11		0.00	0.00	0.00	1.27	0.00	0.00	0.00	0.00	0.66	0.66	0.54	0.00
12		0.44	1.30	0.02	0.00	0.00	0.00	0.00	0.00	0.66	0.24	2.65	0.63
13		0.06	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.04	0.00
14		0.75	1.90	0.00	0.49	0.00	0.00	0.00	0.00	1.13	1.38	0.07	0.00
15		0.00	2.23	0.00	0.00	0.00	0.00	0.00	0.00	1.82	0.22	0.49	0.00
16		0.26	2.79	0.00	0.00	0.00	0.00	0.00	0.04	0.16	0.58	0.64	0.00
17		0.26	0.29	0.00	0.00	0.00	0.00	0.00	0.84	0.00	0.78	0.00	0.00
18		0.31	1.15	0.00	0.35	0.00	0.00	0.00	0.14	0.00	0.19	0.05	0.47
19		1.03	0.04	0.18	0.00	0.00	0.00	0.00	0.92	0.35	0.00	0.00	1.72
20		0.09	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.53	0.00
21		0.93	0.01	0.00	0.00	0.19	0.00	0.12	0.00	2.27	0.99	0.00	0.00
22		0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.03	0.00	1.34	0.24
23		0.19	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.12	0.71	0.00	0.08
24		0.00	1.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	1.01
25		0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.09	0.45	0.00
26		0.00	2.04	0.00	0.14	0.00	0.00	0.00	0.00	0.76	0.10	5.92	0.00
27		0.23	0.00	0.04	0.00	0.00	0.00	0.47	0.00	0.42	0.83	0.41	0.61
28		0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	2.77	0.52	0.09
29		1.60	0.07	0.60	0.00	0.00	0.00	0.00	0.00	0.13	0.30	0.42	0.50
30		0.38	0.69	0.00	0.00	0.00	0.00	0.00	0.18	0.27	1.39	2.29	0.00
31		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.51	0.00	0.00
Sums.	7.00	17.86	1.39	3.21	0.38	0.00	1.14	0.43	9.14	14.31	22.54	11.81	12.24

SEVERE HAILSTORM IN MISSOURI.

Communicated by A. E. HACKETT, Section Director, Columbia, Mo.

Mr. J. R. Brink, voluntary observer at Maryville, Mo., sends an account of a hailstorm of unusual violence that occurred on September 5, in Nodaway County, on the northern border of that State. The path of the hailstorm was about three miles wide; it extended far to the westward and moved due eastward for 18 miles across Nodaway County to One Hundred and Two River where it suddenly stopped. From the newspaper accounts it appears that the hail was heavy enough