

Climatological observations for twenty-four hours ending at 7:17 a. m. local (or 1 p. m. Greenwich) time, October, 1899.

Date.	Temperature.		Wind.		Average cloud-ness.	Total rainfall.	Rainfall at Sapoa.
	Maximum.	Minimum.	Prevailing direction.	Maximum force.			
1	97	79	ne, e.	3	6	Inches. Ins.	0.00
2	97	76.5	n, e.	3	4	0.00	0.00
3	99	75	n, ne.	3	5	0.00	0.00
4	94	73	n, w.	4	5	0.84	0.00
5	96	73	sw.	3	6	0.00	0.00
6	97.2	75	ne.	2	7	0.05	0.03
7	97.4	75.5	nne.	2	3	0.20	0.00
8	96.5	76	nne.	3	5	0.35	0.43
9	97.5	76	ne.	4	6	0.07	0.10
10	96.3	77	ne.	3	5	0.00	0.05
11	97.5	74.5	ne.	2	6	0.10	0.10
12	94.5	76	wnw.	3	7	0.36	0.01
13	97	75	nw by n.	2	8	1.99	0.28
14	96	75	nw.	3	8	0.65	1.67
15	95	76	n to se.	2	8	0.07	0.02
16	92	75	w, nw.	3	9	0.50	0.10
17	92.3	75	sw.	3	8	0.22	0.02
18	95	75	w, nw.	4	6	0.01	0.00
19	96	74	ne.	4	7	0.09	0.17
20	92	78	ne.	4	10	0.00	0.86
21	78	75	ne.	2	10	0.07	0.00
22	95	73	ne.	1	6	0.40	0.10
23	93.3	75	sw.	3	5	0.01	0.14
24	93	74.5	sw.	3	9	0.10	0.00
25	90	74	sw.	4	10	0.01	0.39
26	92	76	sw.	6	9	2.84	0.24
27	90	75	sw.	6	8	4.21	0.93
28	90	75	sw.	6	10	1.70	0.71
29	91.2	75	sw.	3	10	0.80	0.09
30	93.1	74.5	sw.	1	7	0.00	0.00
31	94	75.5	ne.	2	8	1.02*	0.00
Sums	94.3	75.4				19.86	6.45
Means							
Departures						+2.90	

* An additional 0.53 inch that fell later is to be carried over to November. In addition to his record for Rivas, Mr. Earl Flint kindly also sends the rainfall record for Sapoa, which is printed above. The fall at Sapoa was unusually light; that at Rivas, as used by Mr. Flint (30.39 inches, including the 0.53 inch that fell late on the 31st) was 3.43 inches above normal.

METEOROLOGY OF PANAMA.

By Gen. HENRY L. ABBOT (dated Paris, November 11, 1899).

The following additional data are in continuation of my previous contributions to the climatology of Panama and Colon. (See MONTHLY WEATHER REVIEW, May, p. 198, and July, p. 302).

MONTHLY RAINFALL FOR 1899.

The new station, Alhajuela, is on the River Panama, about 18 miles above Gamboa. The height of the instruments is about 50 meters above sea level. The locations of Bohio and Gamboa were given in my previous communication. The following figures for rainfall bring the records up to date:

Stations.	July, 1899.		August, 1899.		September, 1899.	
	Mm.	Inch.	Mm.	Inch.	Mm.	Inch.
Bohio	451	17.76	390	12.99	326	8.90
Gamboa	240	9.45	273	10.94	342	13.46
Alhajuela	297	11.69	259	10.20	205	8.07

At Alhajuela, during the last 19 days of June, 34 mm., or 1.34 inches, fell.

HOURLY TEMPERATURES IN 1899.

The records made by the self-registering thermometer and barometer at Alhajuela have been read off and the means taken by myself, with the results given in the following table:

1999.	Temperatures.						Barometric pressures.					
	July.		August.		September.		July.		August.		September.	
	° C.	° F.	° C.	° F.	° C.	° F.	Mm.	Ins.	Mm.	Ins.	Mm.	Ins.
1 a. m.	25.5	77.9	24.8	76.6	24.7	76.5	760.0	29.92	759.4	29.90	759.9	29.93
2 a. m.	25.3	77.5	24.7	76.5	24.5	76.1	759.7	29.91	759.0	29.88	759.5	29.90
3 a. m.	25.2	77.4	24.5	76.1	24.4	75.9	759.5	29.90	758.8	29.88	759.4	29.90
4 a. m.	25.0	77.0	24.4	75.9	24.2	75.6	759.4	29.90	758.9	29.88	759.6	29.91
5 a. m.	24.9	76.8	24.4	75.9	24.1	75.4	759.6	29.91	759.3	29.89	759.8	29.91
6 a. m.	24.7	76.5	24.3	75.7	24.2	75.6	759.8	29.91	759.5	29.90	760.2	29.93
7 a. m.	24.6	76.3	25.4	77.7	25.7	78.3	760.1	29.93	759.8	29.91	760.6	29.94
8 a. m.	25.1	77.2	26.6	80.0	27.4	81.3	760.3	29.93	760.2	29.93	760.9	29.96
9 a. m.	25.7	78.3	28.4	83.1	29.1	84.4	760.5	29.94	760.2	29.93	760.9	29.96
10 a. m.	26.8	80.2	29.1	84.4	30.1	86.2	760.5	29.94	760.1	29.93	760.6	29.94
11 a. m.	27.5	81.5	29.6	85.6	31.0	87.8	760.3	29.93	759.8	29.91	760.2	29.93
Noon	28.2	82.8	29.9	85.8	31.2	88.2	760.0	29.92	759.4	29.90	759.7	29.91
1 p. m.	28.5	83.3	29.5	85.1	30.5	86.9	759.7	29.91	759.0	29.88	759.2	29.89
2 p. m.	28.3	82.9	29.3	84.7	29.9	85.8	759.2	29.89	758.6	29.87	759.9	29.88
3 p. m.	28.5	83.3	29.3	84.6	29.8	85.7	759.9	29.88	758.3	29.86	758.8	29.88
4 p. m.	28.2	82.8	28.8	83.8	28.8	83.8	759.9	29.88	758.2	29.85	758.8	29.88
5 p. m.	27.7	81.9	28.1	82.6	28.2	82.8	759.7	29.88	758.4	29.86	758.9	29.88
6 p. m.	27.1	80.8	27.3	81.1	27.1	80.8	759.3	29.89	758.7	29.87	759.4	29.90
7 p. m.	26.7	80.1	26.7	80.1	26.4	79.5	759.7	29.89	759.1	29.89	759.6	29.91
8 p. m.	26.4	79.5	26.3	79.3	25.9	78.6	760.2	29.93	759.5	29.90	760.3	29.93
9 p. m.	26.3	79.3	25.6	78.1	25.6	78.1	759.5	29.94	759.9	29.93	760.6	29.94
10 p. m.	26.3	79.3	25.4	77.7	25.3	77.5	760.7	29.95	760.1	29.93	760.6	29.94
11 p. m.	26.1	79.0	25.2	77.4	25.3	77.0	760.6	29.94	759.9	29.92	760.5	29.94
Midnight	25.8	78.4	25.0	77.0	24.8	76.7	760.4	29.94	759.7	29.91	760.2	29.93
Means	26.4	79.5	26.8	80.2	27.0	80.6	760.0	29.92	759.3	29.89	759.9	29.92
Maximums	31.0	87.8	34.5	94.1	35.9	96.6	762.2	30.01	761.5	29.98	762.8	30.03
Minimums	22.0	71.6	21.9	71.4	22.0	71.6	756.7	29.79	756.5	29.78	757.0	29.80

The records for these three months are complete, except that during July six days of temperature and three days of pressure records are missing. Nothing is said as to the nature of the self registers, but they are presumably of the Richard pattern and checked by occasional observations of the standard instruments. The observations and records have been made or collected by the officers of the new Panama Canal Company.

TEMPERATURES AT DULUTH, MINN.

By H. W. RICHARDSON, Local Forecast Official (dated October 28, 1899).

Temperature records, Duluth, Minn.

Month.	Mean temperature.	Maximum.		Minimum.		(2) Times Above.	(3) Times Below.	(4) 20° falls to 0°.	Consecutive days.					
		Day.	Year.	Day.	Year.				(5) Maximum.	(6) Minimum.				
											80°	0°		
January	10.5	51	(28 1877) (14 1894)	-41	2	1885	3	50	15	0	2	0	0	8
February	14.4	58	26 1895	-26	9	1899	3	55	11	0	1	0	0	6
March	33.6	64	23 1899	-26	19	1875	3	30	5	0	1	0	0	0
April	39.1	61	19 1891	+2	1	1881	3	25	16	32	0	1	0	0
May	48.4	68	9 1896	23	2	1888	3	55	3	32	0	1	0	0
June	57.7	92	(28 1893) (19 1898)	33	2	(1885) (1897)	5	90	2	40	0	2	0	0
July	66.0	99	1 1888	45	1	1885	31	90	5	50	0	3	0	0
August	64.8	95	25 1888	40	31	1886	11	80	2	50	0	3	0	0
September	56.5	94	1 1894	29	29	1899	3	90	1	32	0	1	0	0
October	44.8	80	7 1886	+8	(25 1887)	9	75	7	32	0	1	0	0	0
November	28.8	65	(7 1874) (1 1897)	-29	29	1875	6	60	2	0	1	0	2	0
December	17.6	54	12 1891	-34	25	1879	4	50	8	0	1	0	5	0
Annual	39.3	99	* 1883	-41	† 1885					6	12	24		

* July 1. † January 2.

† The maximum temperature of 80° or more occurred twice in 26 years in April and June.

(1) The first column relates to the 29 years, November, 1870, to October, 1899, inclusive, the rest of the table relates to the 26 years, November, 1873 to October, 1899.

(2) The total number of times the temperature equaled or exceeded 50° or other specified degrees.

(3) The average number of times the temperature equaled or fell below 0° or other specified degrees.

(4) Average number of times that the temperatures fell 20° or more in twenty-four hours, and reached zero or lower.

(5) The average of the greatest number of consecutive days whose maximum temperature was 80° or above.

(6) The average of the greatest number of consecutive days whose minimum temperature was zero or below.

The following temperature data for Duluth were prepared for publication in a local paper and, at the request of the Editor of the REVIEW, have been expanded slightly, as shown in the preceding table. A study of the figures here given will show that the climate at the head of Lake Superior is invig-