

U. S. DEPARTMENT OF AGRICULTURE.

REPORT FOR NOVEMBER, 1896.

MARYLAND AND DELAWARE SECTION

OF THE

CLIMATE AND CROP SERVICE

OF THE

WEATHER BUREAU.

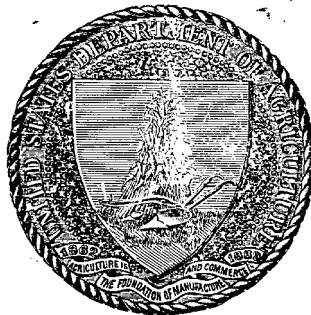
IN COOPERATION WITH THE

MARYLAND STATE WEATHER SERVICE.

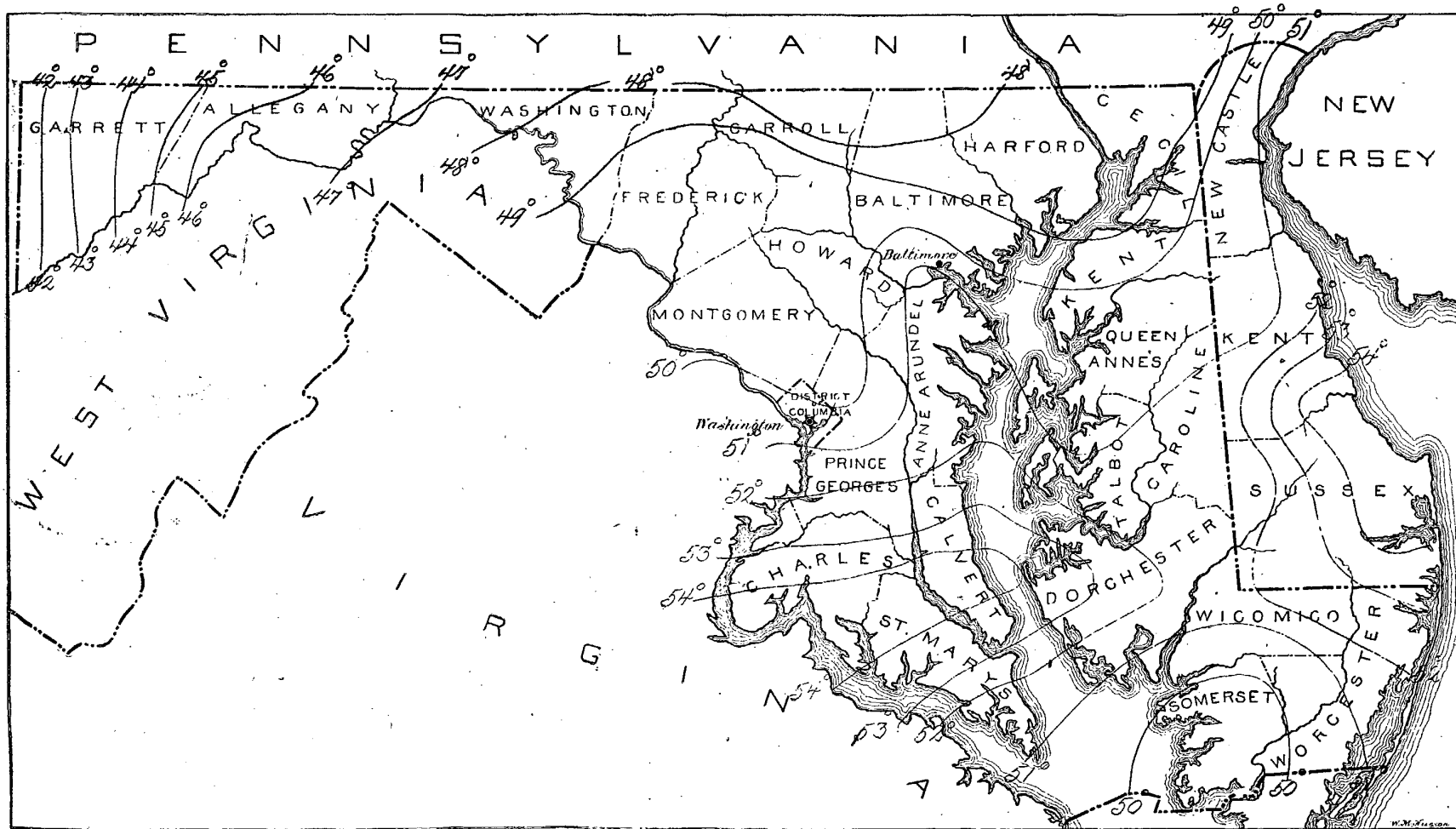
PREPARED UNDER THE DIRECTION OF
WILLIS L. MOORE,
CHIEF OF BUREAU.

BY

GEORGE E. HUNT,
LOCAL FORECAST OFFICIAL AND SECTION DIRECTOR,
JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.



MONTHLY MEAN ISOTHERMS, NOVEMBER, 1896.



U. S. DEPARTMENT OF AGRICULTURE,
CLIMATE AND CROP SERVICE

OF THE
WEATHER BUREAU.

Central Office, } **WILLIS L. MOORE,**
 WASHINGTON, D. C. } **Chief.**

IN COOPERATION WITH THE
MARYLAND STATE WEATHER SERVICE.

MARYLAND AND DELAWARE SECTION.

GEORGE E. HUNT, Section Director,
 BALTIMORE, MD.

VOL. I. BALTIMORE, MD. No. 3.

NOVEMBER WEATHER.

November, 1896, in Maryland and Delaware, will long be remembered for its warm sunshiny weather; yet, no doubt, it will surprise many to learn that the mean temperature 49°.4, was only 6° above that of the average, which is 43°.4. The greatest departure from the normal occurred in Delaware, where the excess of heat amounted to 8°, and the least, in Eastern Maryland, where it was only 4°.3 above normal. The maximum temperature as a rule occurred about the 17th and 27th, and minimum readings about the 23d and last day of the month. As regards the city of Baltimore, the normal temperature for the month of November, is 47°, and the mean temperature of 51° was reached, breaking the record of the past twenty-five years by 2°, the highest previous mean 49°, having occurred in 1881. The maximum temperature however, for the month in Baltimore, was only 75°, and a reference to the records reveals the fact that this is 1° below the maximum of 1876, 2° below the maximum of 1895, and 3° below the maximum of 1879. The lowest November temperature ever recorded in Baltimore since the establishment of the Weather Bureau, was 15° in 1880, and the minimum reading of the past November was 29°, there being only two Novembers during which it has failed to go lower, 1878 with a minimum of 33°, and 1885 with 32°. The rainfall of the month was in excess of the normal in Western and Northern-Central Maryland, and slightly deficient in Southern and Eastern Maryland and Delaware. The wet periods were the 4-5th, 8th, 11th, 13th, 20-21st, 28-30th, the precipitation on the last named date being generally in the shape of snow.

* * *

NOTICE TO CORRESPONDENTS.

It is very important that voluntary observers carefully measure and note in the proper place on their monthly reports the depth of unmelted snow on the ground, and great care should be taken that these measurements are not made where the snow has drifted. Inches and tenths should be used in entering the depth of snow.

CLIMATIC CHANGES IMPERCEPTIBLE.

The writer has often been surprised at the confidence with which middle-aged, and even young men; assert that the climate has undergone change within their recollection. Upon being questioned, nine out of ten will express the opinion that the winters are not so cold, and that the summers are hotter. The least reflection would convince them that no such changes have taken place. To be perceptible within a lifetime, even, the increase of heat would be so rapid that the span between the unendurable cold of the past, and intolerable heat of the future, would limit human existence to a few centuries. The error is most likely due to the fact that severe winters are rarely more than three or four years apart, and that the impressionable mind of childhood retains the most vivid and ineffaceable recollections of the first ice and snow it beholds, and that with increasing age, and the adipose that the more luxurious living of manhood produces, the system becomes less and less able to resist the discomforts of heat and humidity. All things change, and it is probable that climate is no exception, though scientific observation has not yet bridged a sufficient period of time to detect it, and such change, if there be any, is more like the slow filling of the seas or the gradual extinction of the energy of the sun, than such rapid accretion of heat as could be noted within the life of a man.

* * *

PERSONAL.

We regret very much to have to close the voluntary station at Wilmington, Del. Mr. F. C. D. McKay, who has long been noted as one of the most accurate and painstaking voluntary observers connected with the Maryland and Delaware Climate and Crop Section, has determined, for reasons connected with the health of his family, to leave Wilmington, and although he made every effort, has been unable to find anyone to take his place. It is unfortunate that so important a city as Wilmington should go unrepresented in a climatic way, but still more unfortunate that the Service should lose so valuable an observer as Mr. McKay.

* * *

REMARKS BY OBSERVERS.

Cumberland, Mr. Howard Shriver.—Polar bands extending from northeast to southwest, were noticed on the 3d, 14th, 17th, and 19th. White frost occurred on the 7th, 15th, and 23d. The first snow of the season occurred on the 13th, and the second on the 29th.

Cumberland, Mr. Webster Bruce.—Average temperature for November, twenty-five years' record, 41°.3, and average rainfall, 2.23 inches.

Flintstone, Mr. Newton T. Downs.—Blizzard on the 13th and 14th.

CLIMATOLOGY OF THE MONTH.

ATMOSPHERIC PRESSURE—IN INCHES AND HUNDREDTHS.

Monthly mean at Washington, D. C., 30.24; at Baltimore, 30.22; average, 30.23; highest, 30.76 at Washington and Baltimore, on the 23d; lowest, 29.63 at Washington and Baltimore, on the 5th.

TEMPERATURE—IN DEGREES FAHRENHEIT.

The monthly mean (entire territory), 49° 4, which is 6° 0 above the normal.

The highest monthly mean was 54° 2, at Milford, Del.

The lowest monthly mean was 42° 0, at Sunnyside.

The highest temperature recorded during the month was 78°, at Westernport and Milford, Del., on the 28th, and at Millsboro, Del., on the 1st.

The lowest temperature recorded during the month was 12°, at Sunnyside, on the 30th.

The greatest local monthly range was 59°, at Westernport.

The least local monthly range was 36°, at Cherryfields.

The greatest daily range was 44°, at Flintstone, on the 15th, and Maryland Agricultural College, on the 19th.

The least daily range was 0°, at Chestertown, on the 30th.

PRECIPITATION—IN INCHES AND HUNDREDTHS.

The monthly average (entire territory) 3.08, which is 0.05 above the normal.

The greatest amount was 6.92, at Milford, Del.

The least amount was 1.08, at Charlotte Hall School.

The greatest amount in twenty-four hours was 3.00, at Boettcherville, on the 4th and 5th.

The average number of rainy days, 7.

WIND.

The prevailing direction was from the southwest.

The total movement was 3,132 miles, at Baltimore, and 4,818 miles, at Washington, D. C.

The maximum wind velocity was 30 miles per hour from the northwest, at Washington, D. C., on the 13th.

MISCELLANEOUS PHENOMENA.

Thunderstorms.—At Green Spring Furnace, on the 5th; at Bachman's Valley, on the 5th; at Fallston School, on the 5th; at Mardella Springs, on the 4th and 11th.

Hail.—At Bachman's Valley, on the 29th; at New Market on the 29th; at Woodstock College, on the 20th and 29th; at Wilmington, Del., on the 21st.

Sleet.—At Green Spring Furnace, on the 29th; at Sharpsburg, on the 25th and 29th; at Fallston School, on the 8th and 29th; at New Market, on the 29th; at Princess Anne, on the 30th; at Newark, Del., on the 29th; at Wilmington, Del., on the 21st.

Frosts, light.—At Fallston School, on the 7th; at Mt. St. Mary's College, on the 13th, 14th, and 15th; at Woodstock

College, on the 7th, 13th, and 16th; at Princess Anne, on the 7th and 10th; at Wilmington, Del., on the 15th and 23d.

Frosts, killing.—At Cumberland, on the 7th, 15th, and 23d; at Sharpsburg, on the 7th, 10th, 14th, 15th, and 23d; at Fallston School, on the 9th, 10th, and 14th; at Mt. St. Mary's College, on the 9th, 10th, and 23d; at St. Charles College, on the 9th; at Taneytown, on the 10th and 23d; at Woodstock College, on the 10th, 15th, and 23d; at Wilmington, Del., on the 7th and 10th.

Fogs, light.—At Mardella Springs, on the 3d, 8th, 18th, 25th, and 26th; at Millsboro, Del., on the 7th, 8th, and 25th; at Wilmington, Del., on the 1st, 3d, 5th, 7th, 8th, 10th, 11th, 12th, 19th, and 20th.

Fogs, dense.—At Solomon's, on the 25th; at Wilmington, Del., on the 26th.

Auroras.—At Fallston School, on the 6th; at Charlotte Hall School, on the 24th and 28th; at Millsboro, Del., on the 1st and 6th.

Halos, solar.—At Jewell, on the 9th and 10th.

Halos, lunar.—At Cumberland, on the 17th, and 19th; at Mt. St. Mary's College, on the 12th and 19th.

Coronas, lunar.—At Cumberland, on the 19th; at Taneytown, on the 15th.

Earthquakes.—At Wilmington, Del., on the 20th.

* * *

REMARKS BY OBSERVERS.

Grantsville, Mr. J. S. Miller.—The month was remarkably fine. Farmers are well advanced with all work.

Green Spring Furnace, Prof. E. G. Kinsell.—On the 5th, light shower at 3 p. m., and sharp gust 3.30 to 3.40 p. m., with some lightning and thunder. On the 13th, first snow of season; slight snow squall at 12.30 p. m., and sharp snow squall 3.30 to 4.00 p. m. On the 15th, ice $\frac{3}{8}$ -inch thick formed. On the 29th, snowing lightly from 1.10 p. m. to 6.00 p. m. On the 30th, snow lying in spots.

Mt. St. Mary's College, Prof. J. A. Mitchell.—On the 5th, high wind, rain from 5 a. m. up to 11 a. m., when clouds broke; heavy storm from west at 4.30 p. m., with rain; gorgeous sunset; lightning from 6 to 8 a. m., in eastern heavens; high wind at 8 p. m.

Cherryfields, Col. J. Edwin Coad.—Morning of the 14th, strong northwest wind, and the first freeze. On the 15th, a very high tide. Strawberries in bloom throughout the month.

Laurel, Dr. T. M. Baldwin.—Snow squall on the 13th. On the night of the 29th, 3 inches of snow.

Solomon's, Dr. W. H. Marsh.—On the 13th, first snow; on the 14th, first ice.

Washington, D. C., Mr. S. W. Beall.—Relative humidity; average 8 a. m., 81.9; average 8 p. m., 66.8; mean, 74.4.

Mardella Springs, Mr. Albert E. Acworth.—The average relative humidity was 79°. The average temperature of the month was 6° 5 warmer than last.

Climatological data for Maryland and Delaware, November, 1896.

Stations.	Counties.	Elevation, feet.	Length of record, years.	Temperature, in degrees Fahrenheit.						Precipitation, in inches.					Sky.				Prevailing direction of wind.	Observers.	
				Mean.	Departure from the normal.	Highest.	Date.	Lowest.	Date.	Greatest daily range.	Total.	Departure from the normal.	Greatest in 24 hours.	Total snowfall (unmelted).	Number rainy days.	Number clear days.	Number partly cloudy days.	Number cloudy days.			
WESTERN MARYLAND.																					
Boettcherville* 1	Allegany	900	6	44.0	+4.2	72	27	24	29	31	4.30	+2.34	3.00	5						F. F. Brown.	
Cumberland No. 1	do	650	35	50.5		74	18	29	30	32	3.69	+1.34	2.60	4						Howard Shriver.	
Cumberland No. 2	do	650	35	46.5	+6.2	74	27	27	30	37	3.68	+1.51	2.68	2						Webster Bruce.	
Deer Park	Garrett	2,457	5	43.1		69	26	13	30	41	3.33		1.30	5						S. P. Specht.	
Elintstone	Allegany	do	5	46.3		72	18	19	23	44	4.05		2.95	4						N. T. Downs.	
Frostburg	do	do	5	46.3		72	18	19	23	44	4.05		2.95	4						J. N. Benson.	
Grantsville	Garrett	2,100	3	43.8		72	3	18	30	36	3.37		1.35	3.5	8	4	10	16	sw	J. S. Miller.	
Green Spring Furnace	Washington	500	4	48.0	+8.2	74	27	22	15	41	2.85		1.93	0.5	6	14	8	8	e	E. G. Kinsell.	
Hagerstown	do	550	5	49.4		74	27	27	30	30	2.54		0.72		7	16	6	1		Prof. C. E. Carl.	
Oakland	Garrett	2,380	5	48.8		74	18	27	15	33	2.51		1.16	1.5	6	14	7	9		J. L. McComas, M. D.	
Sharpsburg	Washington	420	2	42.0	+6.2	70	21	12	30	38	5.29	+2.63	1.42	2.3	12	9	0	21	sw	R. L. Hiberger.	
Sunnyside	Garrett	2,440	4	42.0	+6.2	70	21	12	30	38	5.29	+2.63	1.42	2.3	12	9	0	21	sw	J. G. Knauer.	
Westernport	Allegany	1,000	2	45.5		78	27	19	30	36	2.83		2.20	0.5	5					Prof. O. H. Bruce.	
Average				46.2	+6.2						3.49	+1.95		6						sw	
NORTHERN-CENTRAL MD.																					
Bachman's Valley	Carroll		3	47.1		72	18	23	23	32	3.70		1.15	2.5	7	13	6	11	sw	J. M. Myers.	
Baltimore	Baltimore	123	62	51.0	+5.1	75	17	29	30	30	3.34		1.25	3.0	11	5	14	11	sw	U. S. Weather Bureau.	
Darlington Academy	Harford	300	7	49.5	+7.4	72	18	26	30	29	4.49	+1.37	1.85	6.0	7	13	7	10	sw	Prof. A. F. Galbreath.	
Fallston School* 1	do	450	28	48.5	+6.0	72	17	24	30	25	5.60	+2.35	2.72	5.0	10	2	18	10	s	G. G. Curtis, A. M.	
Frederick	Frederick	250	24	49.4	+6.0	74	17	25	23	34	3.12	+0.17	0.95	2.0	10	7	15	8		McClintock Young.	
Great Falls* 2	Montgomery	150	8	50.3	+7.2						2.53	+0.23	1.00		5					Maj. Chas. J. Allen.	
Johns Hopkins Hospital	do	124	2	49.6		75	17	29	30	40					12	6	12	nw	W. L. Woods.		
McDonogh School	Baltimore	545	21	50.3	+7.0	73	18	26	30	25										H. Norwig.	
Mt. St. Mary's College	Frederick	720	35	48.4	+3.7	71	17	25	23	27	4.63	+0.84	2.40	T.	10	13	13	4	sw	J. A. Mitchell, Ph. D.	
New Market	do	550	13	49.2	+6.9	74	18	24	23	30	3.43	-0.93	0.88	4.0	9	7	10	13	s nw	H. H. Hopkins, M. D.	
St. Charles College	Howard	300	2	52.1		75	18	28	30	26	3.13		1.35	5.0	7	18	2	10	s	H. M. Chapuis, S. S.	
Taneytown	Carroll		4	49.4		76	17	27	10	35	3.20		1.19	2.0	9	4	13	13	s	Prof. H. Meier.	
Van Bibber	Harford		1	47.2		69	2	19	30	35	4.57		1.85		10	15	5	10	sw	H. A. Wroth.	
Western Maryland Coll.	Carroll		2	52.6		73	1	28	14	38					16	3	11			Prof. Roland Watts.	
Woman's College	Frederick		2																	Miss Irene Martin.	
Woodstock College	Baltimore	392	27	47.7	+6.3	76	27	21	23	43	3.40	+0.34	1.55	2.5	7	15	8	7	w	T. J. A. Freeman, S. J.	
Average				49.5	+6.2						3.76	+0.63		8						s sw	
SOUTHERN MARYLAND.																					
Annapolis	Anne Arundel	20	23																	J. E. Abbott.	
Charlotte Hall School	St. Mary's	167	3	54.0		77	18	29	30	31	1.68		0.96	0.5	2	13	12	5	sw	J. F. Coad.	
Cherryfields 3	do	20	3	51.2		68	28	32	30	31	2.28		0.95	3.0	10	13	11	6	nw	Col. J. E. Coad.	
Distributing Reservoir* 2	Dist. of Columbia	120	6	51.2	+7.4						1.68	-1.35	0.58		6					Maj. Chas. J. Allen.	
Jewell	do	165	9	52.6	+6.7	76	18	27	30	30	2.11	-1.30	0.85	0.5	5	16	3	11	sw	J. Plummer.	
Laurel	Prince George's		2	50.0		77	17	24	23	41	2.60		1.50	3.0	3	6	15	9		Dr. T. M. Baldwin.	
Md. Agricultural College	do	170	47	47.2	+5.3	77	17	21	23	44	2.50	-1.50	1.33	1.5	7					Prof. J. H. Patterson.	
Receiving Reservoir* 2	Dist. of Columbia	160	6	50.6	+6.8						2.44	-0.50	0.70		5					Maj. Chas. J. Allen.	
Solomon's	Calvert	20	5	53.4	+5.9	75	27	29	30	30	2.10	-1.59	0.85	2.0	9	8	8		sw se	W. H. Marsh, M. D.	
Upper Marlboro	Prince George's	60	3																	J. B. Perrie.	
Washington	Dist. of Columbia	112	25	50.6	+4.2	77	17	26	30	38	2.54	-0.37	0.71		12	9	8	13	s	U. S. Weather Bureau.	
Average				51.2	+5.0						2.15	-1.10		7						sw	
EASTERN MARYLAND.																					
Chestertown	Kent	80	12	50.0	+4.3	71	27	28	23	30	1.77	-1.23	0.65	1.0	5						Hon. M. de K. Smith.
Denton	Caroline	42	7																		F. C. Ramsdell.
Easton	Talbot	35	7	51.0	+6.3	74	2	28	15	35	1.90	-0.80	0.90	0.5	7	19	5	6	sw	Henry Shreve.	
Mardela Springs	Wicomico	25	9	51.9	+5.6	75	18	28	23	35	1.89	-1.60	0.79	1.8	7	11	11	7	nw se	A. E. Acworth.	
Pocomoke City	Worcester	37	3																		R. M. Stevenson.
Princess Anne	Somerset	20	22	49.8	+0.9	75	11	21	15	41	2.01		0.90	1.0	9	9	9	12	sw	J. R. Stewart.	
Average				50.7	+4.3						1.89	-1.21		7						sw	
DELAWARE.																					
Dover	Kent	40	20	50.8	+6.5	74	18	30	30	28	2.15	-1.32	0.75	0.5	10	16	4	10	nw	J. S. Jester.	
Milford	do	17	17	54.2	+10.8	78	28	30	15	35	6.92	+3.28	1.16	0.5	6	19	1	10	sw	J. Y. Fouik.	
Millsboro	Sussex		4	53.9	+8.6	78	1	26	15	35	2.04	-1.67	0.67		9	14	8	8	n	Rev. L. W. Wells.	
Newark (Delaware Coll.)	Newcastle		3	48.5		73	18	25	23	32	2.95		1.10	3.0	10	14	3	13	sw	Prof. W. H. Bishop.	
Seaford	Sussex		6	51.2	+6.0	74	18	28	30	29	2.06	-1.62	1.15	1.5	11					H. L. Wallace.	
Wilmington	Newcastle	115	3	51.3		74	2	29	30	32	2.93		0.85	3.0	12	4	18	8	w	F. C. D. McKay.	
Average				51.6	+5.0						3.18	-0.18		10						sw	
General average				49.4	+6.0						3.68	+0.05		7						sw	

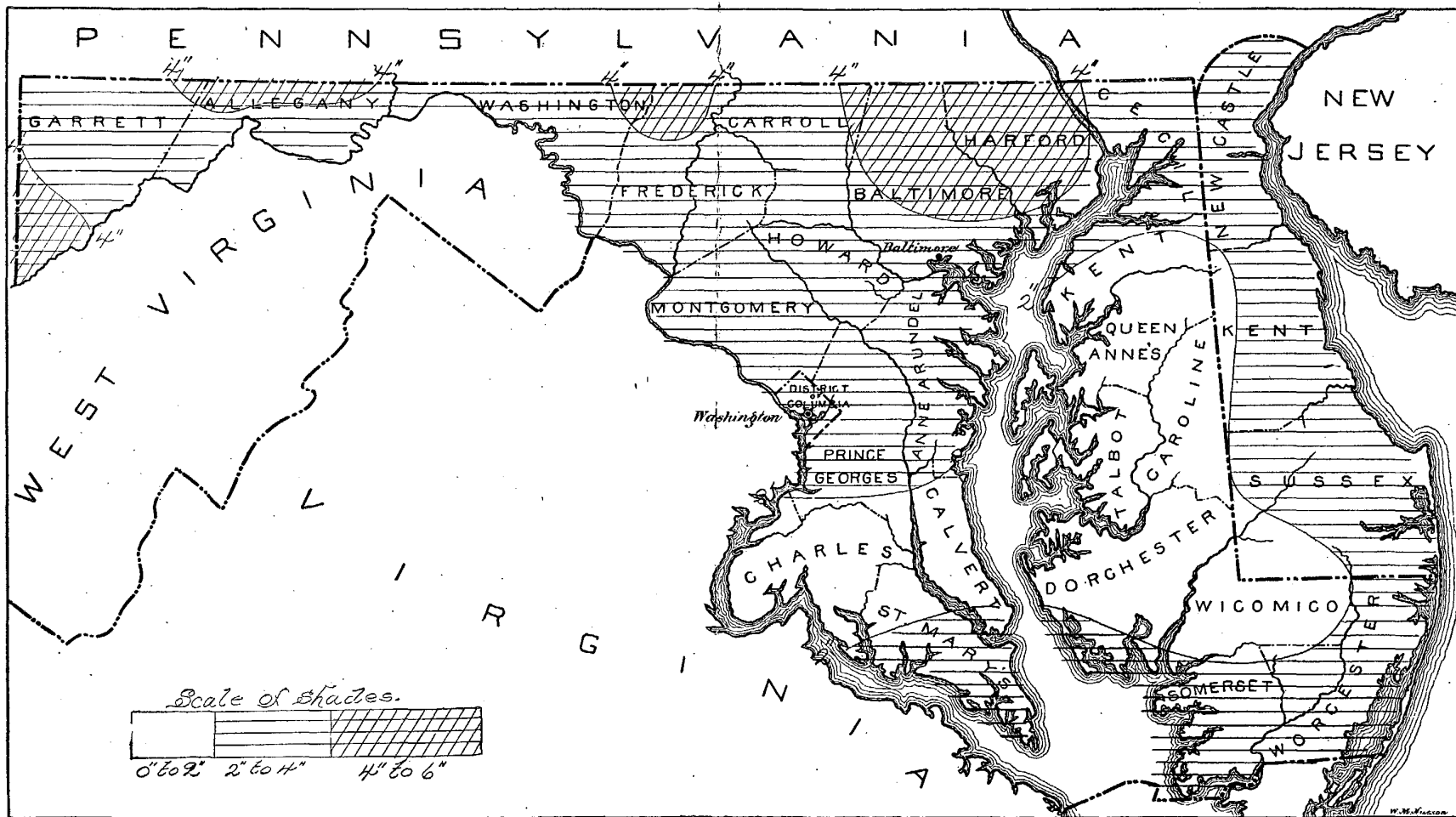
* Extremes of temperature from observed readings of dry thermometer.

1 Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.

2 Mean of 8 a. m. + 8 p. m. ÷ 2.

3 Mean of 7 a. m. + 2 p. m. ÷ 2.

TOTAL PRECIPITATION, NOVEMBER, 1896.



Daily precipitation for Maryland and Delaware, November, 1896.

Stations.	Day of month.																															Total.				
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.					
WESTERN MARYLAND.																																				
Boettcherville.....				3.00							†	.20	†																				1.00			4.30
Cumberland (1).....				2.60									.20								.05											.78			3.63	
Cumberland (2).....				2.68									.20																			1.00			3.68	
Deer Park.....				.68	.95																	.10									1.30			3.33		
Flintstone.....				2.95								.12																			.63	.35		4.95		
Frostburg.....																																				
Grantsville.....				1.35	.10							.20	.10	.30								.05	.55								.72			3.37		
Green Spring Furnace.....				1.93					.13					†							.09										.70			2.85		
Hagerstown.....				.70	.72				.10				.30										.17								.40	.15		2.54		
Oakland.....																																				
Sharpsburg.....				.16	1.14			.24				†	.20	†							†	†	†								.43		.33	2.51		
Sunnyside.....				.59	1.42			.12	†			.44	.31	.09						.08	.12		.65							1.24	.17		5.29			
Westernport.....				2.20	.03																†	.30								.05	.25			2.83		
NORTHERN-CENTRAL MARYLAND.																																				
Bachman's Valley.....	†				1.15			.85			.12	.19								†		.07		†	†					.78	.54		3.70			
Baltimore.....	†			.04	1.21			.28			.07	.08	†						†	†	.01	.10	.02		†	†	†			1.46	.57	.66	.30	3.34		
Darlington Academy.....					1.85			.28			.10										.30	.08	.06								1.59	.65		4.49		
Fallston School.....	†				2.72			.31			.12	.07								†		.08	.06											5.60		
Frederick.....				.15	.95			.45				.20	.02									.16	.02	†							.41	.60	.16	3.12		
Frederick (Woman's College).....					.48			.20	.40																							.01	.45		2.53	
Great Falls.....																																				
Johns Hopkins Hospital.....																																				
McDonogh School.....																																				
Mt. St. Mary's College.....	†			.40	2.40	.18		.45			.06	.10	.10						†		.14		†							.47	.33		4.63			
New Market.....	†			.12	.80			.58			†	.18	.05							†	.12									.30	.88	.40	3.43			
St. Charles College.....					.80			.50			.06	.18								†	.18									1.35	.10		3.13			
Taneytown.....					1.19	.18		.50			.10	.18	.01							†	.10		.01	†						.08	.61	.24	3.20			
Van Bibber.....				1.85	.17			.24			.13	.04									.19	.05								1.26	.59		4.57			
Western Maryland College.....																																				
Woodstock College.....	†			.50	.20			.55			.10	†									†	.10			†		†	†		1.55	.40			3.40		
SOUTHERN MARYLAND.																																				
Annapolis.....																																				
Charlotte Hall School.....																					†	.12										.96			1.08	
Cherryfields.....				.15	.26			.03			.01	.16	†								.07	.13		.13						.45	.95		2.28			
Distributing Reservoir, D. C.....					.27			.21	.09			.03																					.58		1.68	
Jewell.....	†			†	.76			.20			.11	.05								†	†	.25							†	.85			2.11			
Laurel.....					.78			.32																							1.50			2.60		
Maryland Agricultural College.....	†				.53			.33				.07										.09								.15		1.33		2.50		
Receiving Reservoir, D. C.....					.70	.08			.39																						.66	.61		2.44		
Solomon's.....	†			.05	.23			†			†	.11	†								†	.08	.07	.11						.05	.85	.55		2.10		
Upper Marlboro.....																																				
Washington, D. C.....	†			.01	.58	†		.36			.02	.06	†						.03	†	.01	.09	.02						.24	.71	.41		2.54			
EASTERN MARYLAND.																																				
Chestertown.....				.65	†		†	.15				.27									†		.25		†						.35			1.77		
Denton.....																																				
Easton.....					.64							.16											.18								.90	.05		1.95		
Mardela Springs.....	†				.75						†	1.18											.20								.72			1.89		
Pocomoke City.....																																				
Princess Anne.....	†			.05	.30			†			.02	.25	.07								†	.08	†	.14						.90	.20			2.01		
DELAWARE.																																				
Dover.....					.75							.12																					1.04		2.15	
Milford.....					.89						.12		.10								†		.20									1.16		2.47		
Millsboro.....				†	.50			†			.01	.02	.07									.04	.07	.08						.67	.38			2.04		
Newark (Delaware College).....					1.10			.12			.10	.07	.02									.06	.09								.97	.42		2.95		
Seaford.....	†				.62																	.04	.06	.08										1.15		
Wilmington.....				.18	.86			.08			.06	.05	.11							†	†		.06	.18		†	.03	.01		.72	.40	.30		2.93		

† Trace, when precipitation is less than 0.01 inch.