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MARYLAND WEATHER BUREAU.

PRELIMINARY STATEMENT.

With the issue of the first publication of the Bureau, it would seem proper to give the particulars of its organization, the object of its establishment, and a brief outline of its future work. The following statement is therefore made, a portion of which is a resumé of an article printed in the June number of the *Johns Hopkins University Circulars*, under the heading, "Organization of the Maryland State Weather Service."

The organization of State Weather Services to conduct observations over limited areas has been undertaken in recent years in many portions of the country. What the national service does for the entire United States, the local service does for each State. While the U. S. Signal Service affords information concerning the general climatic conditions prevailing over the whole country, the State Service shows what those conditions are in the various districts and counties of the State. It at once becomes an important medium to the agriculturalist, through which he learns the most favorable times to plant and reap and how best to protect his crops. It aids the shipping interests along the coasts and in the bays and rivers by indicating the character of the weather and the direction of the winds. It gives to all the valuable predictions of the national service, together with the conditions that locally prevail.

The local service has already been officially recognized by many of the States as of the greatest commercial importance, and provision has been made by them for its maintainance. From the first, the present Chief Signal Officer has given every encouragement for the establishment of local services in the several States, supplying instruments, forms, stationery, and to each organization the assistance of a regular observer of the Signal Service. The item of postage is also provided for, forms and correspondence being mailed under the frank of the Department. It is left for the State Service to bear the expense of printing the bulletins and summaries made up for issue from the observations taken by its observers, and to give as much general aid as its plan of organization will allow. As a result of such liberal encouragement the officer in charge of the duties pertaining to State Weather Services reports to the Chief Signal Officer, under date of September 5, 1890, that 23 services, covering 34 states, are now in operation.

Ten of these services have been organized by legislative enactment and receive support from their state governments. The U. S. Signal Service was established in 1870. The first state service was that of Iowa, established in 1874 by Dr. Gustavus Heinrichs; and the second the Missouri Weather Service, organized by Professor Francis E. Nipher in 1877. Since then the greater number of the States has fallen into line and it is probable that within a year or two no part of the country will be without its local weather service.

As to the value of such organizations to their respective states it is only necessary to glance briefly at the work they have done and are now doing. In Iowa the practical benefit of forestry has been proven by the State Service; in Michigan, Dr. Henry B. Baker, Secretary of the State Board of Health, has established by careful comparison for a series of years the dependence of certain diseases (particularly those affecting the air passages) upon certain climatic conditions, and in New England thunder-storms have been carefully investigated and cyclonic storms and sea breezes studied. The states of the dry Rocky Mountain region are collecting data for the study of the question of irrigation, and the states of the south and west are using their weather service reports for the encouragement of immigration.

The Maryland Weather Bureau has been organized under the joint auspices of the Johns Hopkins University, the Maryland Agricultural College and the U. S. Weather Bureau. Its work will be similar to that of other like organizations, and the same benefits are anticipated. The natural and other advantages, however, which the states of Maryland and Delaware offer to render the local bureau of practical benefit to their inhabitants are unexcelled, and correspondingly good results should be obtained. The largest and most important arm of the Atlantic in the United States bisects the territory embraced, and important commercial interests can therefore be benefited by the establishment of signal stations, at such points on the Bay and its tributaries as can readily be communicated with, for the purpose of giving to captains of vessels information as to the forecasts for wind, weather and temperature. The climate varies from marine to continental, as the result of the influence of the Chesapeake Bay and the Ocean upon the eastern section, and the presence of the Appalachian System in Western Maryland; and consequently presents interesting features for study, the results of which should be of value.

Owing to the difference in climate, the varieties of soil formation and the length of coast line, the agricultural and commercial interests of the states are many, and the range of usefulness of a local weather bureau correspondingly wide. An important departure will be the determination and comparison of the several geological and soil formations as regards their variations in temperature and moisture under varying climatic conditions, the kind of crops adaptable to the different formations, and the possible methods and extent of change that can be made by the use of fertilizers and manures in suiting the land to particular crops. Investigation in this department is in progress.

The various places of observation and report, in all sections of the states, will be made points for the dissemination of meteorological information, such as frost warnings, crop bulletins, and monthly and annual summaries, comparisons and deductions. Twelve observers have sent their initial reports, and the number will be increased as rapidly as possible.

Monthly reports will be issued, and it is also proposed to print and circulate throughout Maryland and Delaware, weekly bulletins of crop conditions and prospects, made up from information received from crop reporters in all sections of the two states..

As the efficiency of the State Service will depend largely upon the closeness of coöperation with the U. S. Weather Bureau, it was considered advisable to move the Baltimore office of the National Bureau to the Johns Hopkins University. The quarters occupied are in the Physical Laboratory, and the roof of that building is used for the exposure of instruments.

The officers of the Bureau are Professor WILLIAM B. CLARK, of the Johns Hopkins University, *Director*; Professor MILTON WHITNEY, of the Maryland Agricultural College, *Secretary and Treasurer*; and Dr. C. P. CRONK, of the U. S. Weather Bureau, *Meteorologist in Charge*.

The issue of reports was not to have been begun before the receipt of the observers' monthly meteorological forms for June, but those for May were received shortly after the close of that month, and they contained so much valuable and interesting information that it seemed inadvisable not to make some use of it.

Recognition is due to the small band of observers for the promptness with which their forms were forwarded after notification by the Chief Signal Officer; and the indebtedness of this Bureau to those officers of other bureaus, who so generously furnished information concerning the organization of their respective services, is gratefully acknowledged.

TABLES.

Through the kindness of the Librarian of the Maryland Historical Society, the Bureau has access to the published observations of Mr. Lewis Brantz, taken from 1817 to 1822, inclusive. Summaries of this remarkably complete and valuable set of observations will be published monthly for comparison with recent records. The appended tables are self-explanatory.

Valuable tables in the possession of the Johns Hopkins University, and others received from A. E. Acworth, Barron Creek Springs, and from E. T. and Howard Shriver, Cumberland, will be of much use in making future comparisons.

Brief Study of the Weather for the Month.

The month was ushered in with the prevalence of a warm wave associated with the area of low barometer then passing down the St. Lawrence Valley. This area of low pressure was one of the exceptional storms which now and then pass from the northwest across the Lake Region and down the St. Lawrence Valley without causing general rains in this State. But three stations report rain on the first.

No well-defined anticyclone followed this storm, but the area of higher pressure intervening between it and the succeeding low area was accompanied by a cool wave which caused a considerable depression in temperature. The succeeding V-shaped depression, which developed a secondary on the Carolina coast, caused cool rains in Maryland on the third.

The great anticyclone which followed this depression, produced a further and decided drop in temperature and a cessation in rainfall. The influence of the cool wave lasted for several days, and killing frosts and ice were reported from many parts of Maryland and Delaware on the 6th and 7th. A minimum temperature of 40° was recorded at Baltimore on the morning of the 6th. Only three times in the history of the Baltimore station has so low a temperature been recorded, and it is the lowest recorded temperature for the period in which it occurred. On May 1st, 1876, the minimum was 35°; May 1st, 1880, 38°, and May 3rd, 1882, 38°.

The dry weather resulting from the passage of the great anticyclone continued until the 11th, when local showers fell on the front of an advancing anticyclone then central in the Mississippi Valley.

The showers which fell on the 15th, 16th, and 17th, were due to the cyclone which made its appearance on the South Atlantic coast on the 12th, and which passed slowly to the northeast, causing dangerous easterly winds along the Maryland and Delaware coasts on the 15th.

Fair and cooler weather (as the result of a well-defined anticyclone from the west) followed the passage of the coast storm.

On the 20th, rain resulted in some sections of Maryland from the receding anticyclonic area, mentioned in the above paragraph, and the resultant easterly winds on its western slope. From this time to the close of the month, rains were general, falling every day in central Maryland. These continu-

ous rains were due to the easterly winds which prevailed on the western slope of the area of high barometer, then slowly receding from the coast, and to the increasing influence of a well-developed cyclonic storm central on the 20th, in the upper Mississippi Valley. From this storm, a strong secondary was developed in the southwest, which lagged behind its parent, producing a continuation of rainy weather which was still further extended by storms from the Lake and Gulf regions and by a cyclone which passed up the coast during the last days of the month.

The weather for the last third of the month presents for study so many different and intricate phases, so many departures from regular forms, that space will not admit of entering into an extended discussion of it here.

With the exception of the frosts on the 6th and 7th (which did less damage than anticipated), the short drought which followed, and the rather too frequent rains during the last part of the month, the weather was favorable for growing crops in Maryland and Delaware.

MONTHLY SUMMARY,
MARYLAND AND DELAWARE,
MAY, 1891.

Temperature (degrees).—Mean monthly, 61.3. Highest monthly mean, 64.2, at Cumberland (H. Shriver). Lowest monthly mean, 57.5, at Summit Hall. Highest temperature, 91, at Cumberland (H. Shriver), on the 10th. Lowest temperature, 36, at Barron Creek Springs on the 6th. Greatest local monthly range, 50, at Barron Creek Springs, and at Cumberland (E. T. Shriver). Least local monthly range, 33, at Summit Hall. Mean monthly range, 46.6. Mean maximum, 70.9. Mean minimum, 51.7.

Precipitation (in inches).—Average, 3.86. Greatest amount, 6.17, at Leonardtown. Least amount, 2.45, at Mt. St. Mary's.

Wind.—Prevailing direction, southwest.

Thunderstorms.—At Baltimore, on the 11th, 22d and 31st; at Leonardtown, on the 1st, 20th and 22d; at Barron Creek Springs, on the 1st, 3d and 20th; at Woodstock College, on the 11th and 22d.

Hail.—At Leonardtown on the 1st.

Frost.—At Leonardtown on the 5th and 6th; at Kirkwood, (Del.) on the 6th; at Barron Creek Springs, on the 4th, 6th and 17th; and at Baltimore, on the 6th.

Snow.—At Kirkwood, on the 6th, and at Baltimore, on the 6th.

Halos.—At Barron Creek Springs, on the 18th and 20th, and at Baltimore, on the 19th and 20th.

Average number of cloudless days, 8; partly cloudy days, 8; cloudy days, 12; rainy days, (.01 of an inch or more,) 11.

NOTES BY OBSERVERS.

Barron Creek Springs.—4th, considerable frost. 6th, a killing frost. White oak, sassafras, and persimmon leaves killed, or partly killed. Irish potato tops killed to ground on some land, and a few on sandy land. Peas, beans, cucumbers, melons and strawberries supposed to be killed in some places, and in others, reduced to half a crop. Bush lima beans not much injured. Ice. Ten degrees colder for this period, than for 20 years, at Princess Anne, as determined from observations taken at 6 a. m., from 1822 to 1850. 7th to 12th, colder than any record of mine from 1879 to 1891. 17th, considerable frost; 31st, a very heavy fog from 4.30 to 9 a. m.

Cumberland.—17th, light frosts for several days, but no great amount of harm. Two ferns from greenhouse were cut, and tomatoes were said to have been bitten. Fruit not hurt. The temperature of May derived from 33 years, is 60 degrees; that of May, 1891, 64°. The mountain fires, so general and long continued, may have had an appreciable influence on the month's temperature. By reference to tables in the observer's possession it appears that but twice, has the month shown a higher average, viz.: in 1881, 65°, and in 1880, 67°. The mercury on the 10th rose to 93°, being the highest point ever reached in May. In 1887 it marked 91°; in 1880, and 1889, it reached 90°.

Frederick.—22d, about 5.45 p. m. severe wind storm from a little south of west, lasting five or ten minutes, and uprooting some trees and breaking many large branches from others. It was followed by rain and lightning.

Kirkwood, Del.—6th, some snow fell about 5.45 a. m. Ice and frost.

Leonardtown.—5th and 6th, tender vegetation slightly damaged by frost. 22nd, severe wind storm (with lightning and thunder) from the west, about 7.30 p. m. The wind blew about 70 or 80 miles per hour, breaking off and carrying up trees, damaging fences, &c. It was central at Leonardtown, and its duration was about ten minutes. May 28th, very heavy rainfall from about 4 p. m. to 9 p. m.—about 2.20 inches.

Summit Hall.—Early part of month cold northwest winds prevailed—latter part, moist growing weather. The wheat crop in excellent condition, and bids fair to be much better than the average. 5th, 6th, 7th, cold winds; no injury to fruit by frosts.

Verification of Forecasts Signals Displayed at Wilmington, Del., and Milford, Del.:

Weather,	-	-	-	-	-	85.0	per	cent.
Temperature,	-	-	-	-	-	96.0	"	"
Average,	-	-	-	-	-	90.5	"	"

DAILY PRECIPITATION

For May, 1891.

Date.	Baltimore.	Barron Creek Springs.	Cumberland.	Frederick.	Jewell.	Leonardtown.	McDonogh.	Mt. St. Mary's.	Woodstock College.
1	::	.31	::	::	::	.54	.52	::	::
2	F	::	::	::	::	::	::	::	::
3	.35	.27	.05	.26	.25	.18	.52	::	::
4	::	::	::	::	::	::	::	::	.39
5	F	::	::	::	::	::	.02	::	::
6	T	T	::	::	::	::	::	::	::
7	::	::	::	::	::	::	::	::	::
8	::	::	::	::	::	::	::	::	::
9	::	::	::	::	::	::	::	::	::
10	::	::	::	::	::	::	::	::	::
11	.07	::	::	T	T	.14	.40	::	.21
12	.33	T	::	::	::	.02	::	::	::
13	::	::	::	::	::	::	::	::	::
14	T	::	::	::	::	::	::	::	::
15	.21	::	::	.50	1.63	::	.93	::	.46
16	.28	::	::	.05	::	1.18	.16	::	.20
17	::	::	::	::	::	::	::	.48	::
18	::	::	::	::	::	::	::	::	::
19	::	::	::	::	::	::	::	::	::
20	.07	.04	.26	.20	::	.13	::	::	T
21	.03	T	.22	.11	::	::	::	.02	T
22	.10	.09	.18	.18	::	.29	.30	.08	.05
23	.13	T	.69	.10	T	.01	.12	.23	.07
24	.15	T	::	.11	::	.04	.43	.06	.28
25	T	::	::	T	.50	.33	.47	.13	.34
26	.47	::	::	.45	.62	::	.13	.06	.26
27	T	1.01	::	T	::	::	.02	::	::
28	.25	::	::	.38	2.50	::	.52	::	2.00
29	.65	.38	.65	.34	::	3.25	.71	1.07	::
30	T	::	.46	T	::	.06	::	.02	::
31	.02	::	::	T	::	::	::	.30	.30
Month....	3.11	4.10	2.51	2.50	5.50	6.17	4.73	2.45	4.56

MONTHLY SUMMARY OF REPORTS MADE BY OBSERVERS OF THE MARYLAND WEATHER BUREAU (INCLUDING MARYLAND AND DELAWARE),
IN CO-OPERATION WITH THE U. S. WEATHER BUREAU, MAY, 1891.

STATIONS.	COUNTIES.	Altitude.	Latitude.	Longitude.	BAROMETER.					TEMPERATURE.								Total precipitation.	Clear days.	Fair days.	Cloudy days.	Number of rainy days (01 or more.)	Prevailing Wind.	OBSERVERS' NAMES.
					Monthly mean.	Maximum.		Minimum.		Monthly mean.	Mean of maximum.	Mean of minimum.	Maxim.		Minim.		Monthly range.							
						Height.	Date.	Height.	Date.				Degrees.	Date.	Degrees.	Date.								
Baltimore.....		179	39° 17'	76° 36'	30.066	30.415	21	29.815	16	62.2°	70.6°	53.8°	88	22	40	6	48°	3.11	13	5	13	14	N.E.	{ G. N. Wilson, W. D. White, G. H. Roger. Albert E. Acworth.
Barron Cr'k } Springs....	Wicomico.....	...	38° 30'	75° 39'	...	...	...	...	...	61.1°	68.3°	51.1°	86	10	36	6	50°	4.50	7	9	15	6	S.W.	
Cumberland..	Alleghany.....	...	39° 39'	78° 45'	...	...	...	...	...	64.2°	75.0°	53.6°	91	10	42	6	49°	2.51	...	...	...	9	W.	H. Shriver.
Cumberland..	Alleghany.....	700	39° 39'	78° 45'	...	...	...	...	...	60.0°	70.0°	51.7°	88	10	38	6	50°	2.57	18	2	11	7	...	E. T. Shriver.
Frederick.....	Frederick.....	...	...	...	...	...	...	...	...	62.3°	71.8°	52.3°	89	10	40	17	49°	2.50	...	...	...	11	...	McClintock Young.
Jewell.....	Anne Arundel	...	...	...	...	...	...	...	...	63.7°	...	...	...	...	...	...	...	5.50	...	...	...	6	...	Jos. Plummer.
Kirkwood.....	New Castle, } Del..... }	...	...	...	...	...	...	...	...	62.3°	...	...	88	...	42	...	...	...	...	...	...	...	...	W. G. Carnagy.
Leonardtown.	St. Mary's.....	...	...	...	...	...	...	...	...	58.0°	...	...	74	23	42	5	32°	6.17	...	...	...	17	S.W.	G. W. Joy.
McDonogh....	Baltimore.....	535	39° 28'	...	...	...	...	...	...	61.1°	70.9°	50.7°	89	10	38	6	51°	4.73	...	...	...	13	...	G. M. Carvill.
Mt. St. Mary's.	Frederick.....	720	36° 41'	77° 21'	...	...	...	...	...	60.9°	...	...	88	11	40	6	48°	2.45	3	9	19	10	...	J. A. Mitchell, M. A.
Summit Hall..	Montgomery..	...	...	...	...	...	...	...	...	57.5°	...	...	74	22	41	6	33°	2.00	...	...	...	...	...	J. T. DeSellum.
Woodstock } College.... }	Howard.....	392	39° 20'	10° 40'	...	...	...	...	...	62.1°	69.5°	48.9°	87	11	41	6	46°	4.56	8	9	14	11	N.W.	T. J. A. Freeman, S. J.
Averages.....					30.066					61.3°	70.9°	51.7°	.....	.....	.....	.....	.....	3.7	9.8	6.8	14.4	10.5		W. D. W., 6-13-91.

METEOROLOGICAL SUMMARY

FOR THE MONTH OF MAY, 1817 TO 1822, FROM OBSERVATIONS TAKEN NEAR BALTIMORE

BY LEWIS BRANTZ, Esq.

JOHN MURPHY & CO., PRINTERS, BALTIMORE.

	TEMPERATURE.					Rainfall. (Inches.)	Fair Days.	Rainy Days.	Cloudy Days.	PREVAILING WINDS.				
	Mean.	Highest.	Date.	Lowest.	Date.					N. W. Quarter.	N. E. Quarter.	S. E. Quarter.	S. W. Quarter.	
1817	59.0	83	26	43	9	2.8	19	10	2	7	6	2	16	
1818	57.0	84	27	37	5	6.4	14	13	4	7	5	12	7	
1819	62.3	85	23	35	20	4.1	17	11	3	9	10	8	3	1 Calm.
1820	58.2	84	23	42	3	4.4	14	10	7	8	4	11	4	1 N., 1 E. 1 W., 1 V.
1821	59.8	90	29	42	5 & 6	5.1	18	5	8	8	5	13	4	1 Calm.
1822	66.7	88	2	51	12 & 26	1.5	21	5	5	7	2	13	9	
Sums.	363.0	Highest.	Date.	Lowest.	Date.	24.1	103	54	29	46	32	59	43	
Means.	60.5	90	{ 29 1821	35	{ 20 1819	4.0	17.1	9.0	4.8	7.7	5.3	9.8	7.2	