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U. S. DEPARTMENT OF AGRICULTURE.

REPORT FOR FEBRUARY, 1899.

MARYLAND AND DELAWARE SECTION
OF THE
CLIMATE AND CROP SERVICE
OF THE
WEATHER BUREAU.

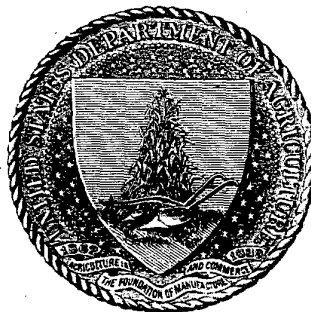
IN COOPERATION WITH THE
MARYLAND STATE WEATHER SERVICE.

(Prof. Wm. B. Clark, Director; Prof. Milton Whitney, Secretary and Treasurer.)

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

BY

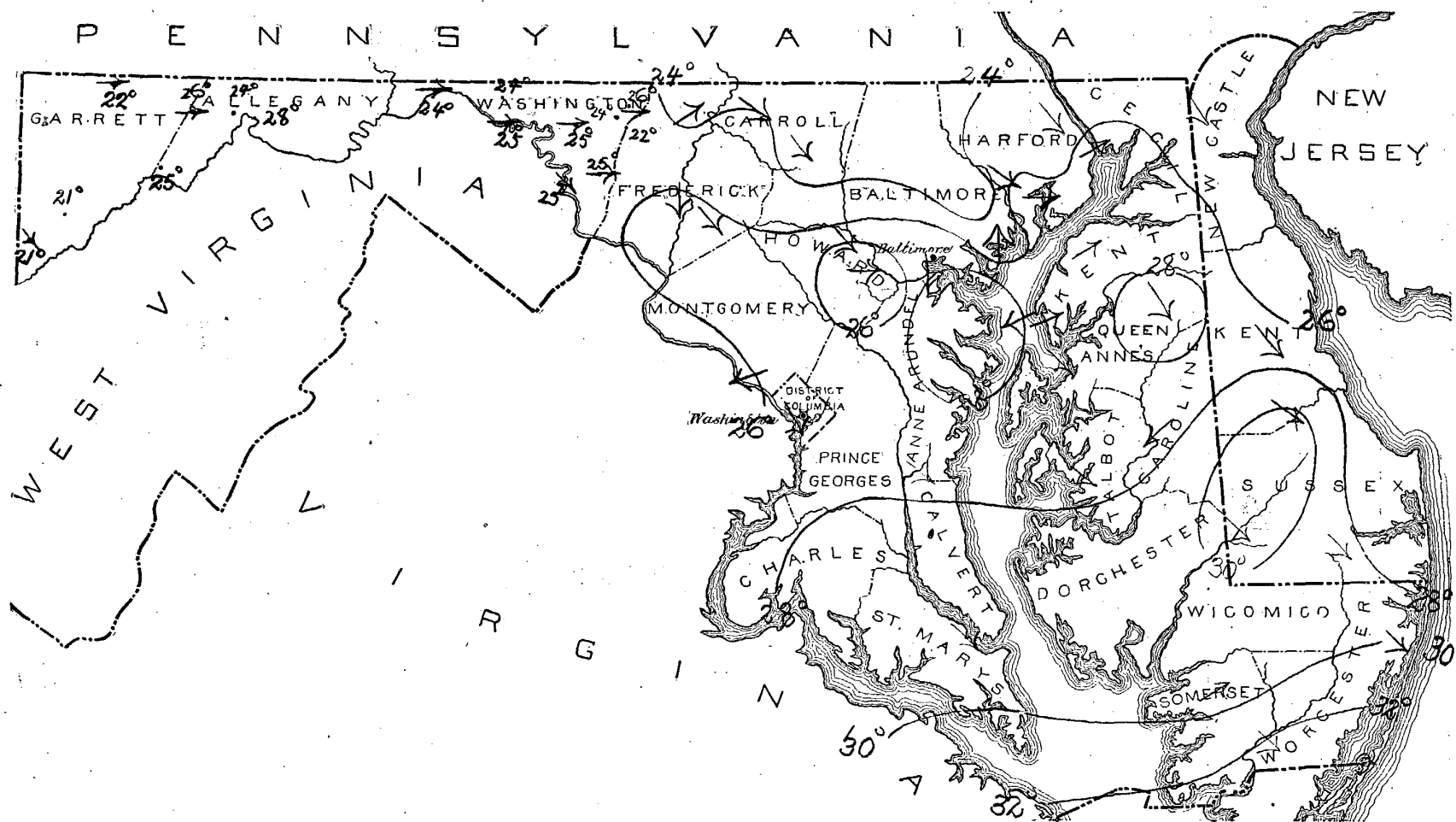
F. J. WALZ,
SECTION DIRECTOR.



BALTIMORE, MD.:
WEATHER BUREAU OFFICE.
JOHNS HOPKINS UNIVERSITY.

1899.

MONTHLY MEAN ISOTHERMS AND PREVAILING WINDS, FEBRUARY, 1899.



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

OF THE

WEATHER BUREAU.

CENTRAL OFFICE: WASHINGTON, D. C.

BALTIMORE, MD.

VOL. IV.

BALTIMORE, MD.

No. 2.

WINTER WHEAT IN MARYLAND AND DELAWARE.

In this Section the greater part of the growing wheat crop was sown late. The object was to lessen the chances of damage by the fly, since no general depredations were to be expected from that source if sprouting was delayed until moderately cold weather became permanent. Some good may have resulted locally, since early wheat has a thin stand in a few sections, and this is claimed to have been caused by the fly; but as a general thing early wheat is in fine condition, which is more than can be said for the late planting. It is probable that in evading risk of damage from insect enemies, an equal, if not greater, one was incurred through the exposure of a tender, immature growth to the frequent frosts of early winter. Freezing weather was especially damaging in December and January, owing to a lack of ample snow-cover during those months. In Garrett County alone the fields were well protected. Upland crops fared somewhat better than those in the lowlands, but a generally unfavorable tone pervaded the reports made at the close of January.

The earlier days of February were unfavorable to the wheat, through freezing and lifting of the soil, but the heavy snows of the 5th to 13th were protective and beneficial, and, except on exposed knolls and over a few wind-swept fields here and there, prevented damage from the severe cold weather of that time. Toward the close of the month, in districts where the snow began first to disappear, some freezing occurred, with resultant lifting of the soil and throwing out of the stools. Damage also resulted from snow melt and heavy rains flooding the lowlands, and even where there was no standing water the saturated state of the earth increased the injury from freezing and thawing. Still, in spite of these drawbacks, wheat has actually improved in condition since the first of the month. The good effects of the heavy snows were general, and more than offset the adverse weather features. The general condition of wheat is not as good as could be desired, neither is it up to the average for this time of year, but it is gratifying to note that the crop has partially overcome the effects of the early winter freezes, and that a perceptible, even if slight, gain has been made over the January report. A clearer idea of local conditions may be obtained from the report by counties which follows:

WESTERN MARYLAND.

GARRETT: The coldest weather for years found wheat well protected. The snow has now disappeared except on the

hillsides and in large drifts. The only damage to wheat has been in a few level and poorly drained fields.

ALLEGANY: Wheat was well protected by snow during the severe frosts. Some damage has been done to the crop in the lowlands and where planted in light soil, but not enough to seriously affect the general outlook. The snow has about all gone. The general wheat condition is now satisfactory, but March is considered the critical month.

WASHINGTON: Reports vary somewhat. A few correspondents report extensive damage, partly through winter-killing and partly from the work of insects early in the season. For the most part the reports are favorable; the snow blanket protected wheat during the blizzard, except on exposed knolls, and even there the loss will hardly amount to 2 per cent; low, undrained fields have also suffered, but where drainage was sufficient the outlook is good. The coming month is feared, owing to the prospect of freezings and thaws without protection from snow.

NORTHERN-CENTRAL MARYLAND.

FREDERICK: The high winds that followed the great snow-storm swept the fields bare in places, and the exposed crops suffered considerably from the zero weather, as many of the roots of grain and grasses were left entirely unprotected. The snow has now generally disappeared, and much of the wheat in the lowlands is partly covered with water, and is in danger of being drowned out. In the uplands and well drained fields the crop appears promising.

CARROLL: The crop has done fairly well during the month, and in places improved somewhat over the rather unfavorable state that existed at the close of January. Reports indicate that the fields have been very unevenly protected by snow; owing to blowing and drifting caused by high winds, the fields were bared in a few sections, in others only partially covered, and again in other places heavy banks of snow overspread the land. In the unprotected spots the wheat looks yellow and unpromising, but the receding snow over the lately covered fields discloses a healthy growth, agreeable to the eye through the dark green color presented.

BALTIMORE: Fear of the fly caused most of the wheat in this county to be sown late, and its tender state during the prevalence of cold winds in January subjected it to some injury at that time. For the past month the crop has been protected by snow covering, and now at the close of February wheat presents nearly an average condition.

HARFORD: Main injury to wheat in this section was done in January. The February snows prevented damage from the rigid weather accompanying. The early planting of wheat looks well; most of the crop was planted late, however, and is consequently not so far advanced in growth as is usual at this time of year. The wheat looks freshened where exposed by the departing snow cover. Very little has been winter-killed, but the thaw and rains have flooded flat lands and drowned out some of the crop. On the whole the condition is probably slightly better than at the close of January.

HOWARD: The heavy snows afforded needed protection during the cold spell, and otherwise benefited the wheat. About all the damage mentioned seems to have been done in

January. The early sown wheat is especially thriving, but the late planting still looks backward. High temperatures at the close of the present month have given a tint of new green to the fields.

MONTGOMERY: The freezing and thawing of early winter affected the wheat very unfavorably, but the snow cover of February protected and benefited it, and in most localities the crop is now looking better than at any previous time since planted.

SOUTHERN MARYLAND.

ANNE ARUNDEL: February has been a favorable month except that heavy rains toward the close washed hill lands badly. Wheat is in a satisfactory condition where planted early and in good soil, but the late sown is inferior. The main damage resulted from freezes preceding the heavy snows, and the crop, especially in light lands, has not yet recovered from the injury then received.

PRINCE GEORGE: The unfavorable January reports have been to a great extent overcome by the propitious conditions of February. The heavy snow protected the wheat, and with its gradual melting the roots again took hold of the soil and reset themselves, after having been "thrown out" by the earlier freezes. All appearances are to the effect that the crop is in a better condition than a month ago.

In Charles County the appearance of late wheat is not favorable, as much of it was thrown up by the early frosts. In St. Marys the crop seems in thriving condition, except on low, flat lands. Many fields are now covered with water from melted snow and rains. (But one report was received from each of these two counties, and none from Calvert County. However, wheat raising is not an important agricultural feature in this section.)

EASTERN MARYLAND.

CECIL: Snow was beneficial during the cold weather, but the surface water resulting from its melting, combined with that received through excessive rains, will drown out crops on low and level lands.

KENT: The deep snow covering protected wheat during the cold weather. The crop is looking well where the snow has disappeared, and the prospect is promising.

QUEEN ANNE: The heavy snows were a great protection and really improved the condition of wheat. The heavy rains of late have done considerable damage on low lands.

CAROLINE: The very early seeding looks well; the later sown is healthy, though small. Conditions are generally improved as compared with those of the close of January. Considerable injury is now being done in low lands through accumulation of water from heavy rains that have fallen.

TALBOT: Condition of winter wheat somewhat variable. The snows were protective and beneficial, but at present unfavorable effects follow the freezing and thawing of the saturated surface of the soil, now entirely uncovered. The general condition may be classed as fair.

DORCHESTER: The early seeded looks well on high lands. Snow was a protection during the extreme cold, but blocked drainage during the melting and rains that followed, and low-

land crops have been injured by the wet weather. The late seeding generally is only fair.

WICOMICO: Only one report received, and that unfavorable, reporting the general appearance of the wheat crop the worst for several years at this time.

SOMERSET: Some damage done just before the blizzard, and also since by heavy rains. The snow was a great protection. Wheat seeded early on high lands looks well, but the most of the crop had a late start, and the winter as a whole has not favored its development.

DELAWARE.

NEW CASTLE: The heavy snows have benefited the wheat, and the wet season has helped the action of fertilizers. Before the snow the late wheat fared badly from freezing and thawing. It is generally thought that the crop will be under the average, judging from present appearances.

KENT: Wheat looking much better than previous to the snowstorm, but is not very promising yet, and farmers fear a short crop. It is hoped that the cold has destroyed all insect enemies.

SUSSEX: The general answer to the query, "How is your wheat looking?" is, "bad." The crop made a poor start owing to cold and sodden condition of the ground at seeding time. The heavy snows did some good in brightening what came up, but the prospect still points to a short crop.

* * *

SPECIAL REPORT ON PEACH PROSPECTS.

The unusually low temperatures of the past month, ranging from 12° below at places on the Eastern Shore to more than 20° below in the Mountain Peach Districts of Washington County, have had a fatal effect on the most important crop of these sections. The situation was early covered in special reports to the daily papers. The following additional statements have been obtained from well informed fruit growers, and others, living in the principal peach-growing districts.

Report from Mr. William Carnagy of Kirkwood, Del., states that "Trees have been badly hurt, the young wood being killed by freezing." Mr. James S. Harris of Coleman, Md., says that the low temperatures have killed nearly all buds of yellow peaches and very many buds of the red ones. Mr. D. W. Crowther of Smithsburg, Md., reports that, as far as examined, the peach buds are found to be all killed, and in some cases the young wood is injured. He does not think strawberries hurt, as they were well covered with snow during the coldest weather.

More lengthy responses to letters of inquiry from this office are given in full below:

MILFORD, DEL., February 27, 1899.

I have with a great deal of care interviewed our largest peach growers and they are almost all satisfied there will be no peaches on this peninsula. The strongest evidence of their belief is a willingness to sell for a nominal sum their crop for this year. There have been two or three large orchards sold at less than \$50.00, and one as low as \$5.00.

J. Y. FOULK.

SHARPSBURG, MD., February 26, 1899.

All peach growers in this county, both in the valleys and on the mountain, agree that the crop is entirely destroyed. I am of the firm conviction that they are perfectly correct in this opinion, as it is generally understood here that our peaches will not endure a temperature under 8° or 10° below zero; the last cold wave caused the mercury to fall to 13° and 24° below, according to location. Other fruits are similarly affected, even some, at least, of the apples. It may be safely classed as a clean sweep.

CHAS. G. BIGGS.

CHESTERTOWN, MD., February 27, 1899.

The black speck in the peach bud is a certain indication that there will be no fruit from that bud. A great many orchards have been examined, and the black speck is reported in all, though there are a few orchards, I suppose, in veins, where the cold was not so intense as in other places, and in these there may be a few live buds. But while there may be a sprinkle of peaches in some orchards, there will, in my opinion, be many without a single peach to note the kind of fruit produced.

Pears, such varieties as Howell and Duchess, are hurt to some extent. Such varieties as Kiefer and Bartlett are all right. Apples we think in a good state of preservation.

R. G. NICHOLSON.

We will close this article with the excellent report received from Mr. J. W. Kerr, of Denton, Md., entitled by him, "Effects of the recent very low temperature on the peach crop for 1899, on the Chesapeake and Delaware peninsula:"

"A fact with which the majority of Eastern peach growers are not generally familiar, to say nothing of people who are only indirectly interested in this fruit,—is that the same variety of peaches that is uninjured in the dormant bud in western and northwestern localities when mercury drops to 24° below, has its blossom buds entirely destroyed here when it is from 10° to 12° below. In my collection are two varieties that have produced a crop after the buds had been subjected to a temperature of 28° below in Iowa and Nebraska; the 12° below here of Saturday morning (11th inst.) has blackened and destroyed the little embryo peach in every bud that I have examined of these same so-called iron-clad varieties.

I make my weather notes at sunrise and sunset. Thursday morning, 9th inst., mercury stood at zero; at sunset of same day 3° above. Friday, 10th, 9° below at sunrise, 1° below at sunset. Saturday, 11th, 12° below at sunrise and 10° above at sunset. Sunday, 12th, 6° above at sunrise and 12° above at sunset. The temperature of 12° below was fatal to the little peach germs, however snugly nature may have enclosed them. So that generally throughout this Italy of America—the Chesapeake peninsula—the peach crop will cut no figure in the business of 1899. The degree of cold, however, was not sufficiently severe to injure the trees, or to in any way perceptibly impair their vitality or future usefulness. But when we contemplate that this peach crop failure means more than a million dollars less in the wealth of the growers, and general lubrication of the business machinery of the peninsula, then only does the serious side of the picture become visible."

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A TEXT-BOOK ON CROP STRUCTURE AND GROWTH.

For some time Section Directors of the Climate and Crop Service have felt the want of a text-book or book of reference on crops, especially on the structure and life of agricultural plants. We are glad to see that this want can now be filled in a book by Mr. Samuel W. Johnson, entitled "How Crops Grow," and published by the Orange-Judd Company, New

York, a revised and enlarged edition of which has just been issued. This book is a comprehensive treatise on the chemical composition, structure, and life of plants, and is especially designed for students of agriculture, and is well adapted for the use of the various section directors. The book is divided into two general divisions, the first of which treats of the chemical composition of the plant, and the second, of the structure of the plant and the offices of its organs.

* * *

A WEATHER REVIEW FROM WASHINGTON COUNTY.

(J. A. MILLER, Crop Correspondent at Keedysville, Md.)

February, 1899, furnishes an interesting chapter for the annals of the Weather Bureau. The first day was clear and cold. The second was cloudy, and consequently the proverbial groundhog did not see its shadow. There followed a gradual rise in the mercury, and between 9 and 10 o'clock A. M. of the 3d this section was visited by an electrical storm that lasted about an hour. There was a considerable down-pour of rain, accompanied by sharp and vivid lightning and deep or heavy peals of thunder. Men who were harvesting 5 and 6-inch ice with the mercury in the twenties remarked that it was certainly a phenomenal freak of the weather. On Saturday (4th) mild weather prevailed and occasional showers fell. The 5th ushered in the snow which continued intermittently until Wednesday morning when it cleared, and the mercury gradually fell until Thursday morning when it stood at 15° to 18° below zero, and again at the same point on the following morning (10th). The weather remained clear until 4 P. M. of the 11th, when a fine show began falling from a hazy (not cloudy) sky, the sun shining dimly until it went down. Snow fell all day Sunday, increasing in force until Monday about 4 o'clock, when the storm reached its height, the wind blowing about 35 miles an hour and drifting the snow to a depth of 10 feet in many places. Snow ceased falling about 7 o'clock Monday evening, after a duration of 53 hours, having attained a depth of 28 to 30 inches where it did not drift. The roads were so badly drifted that it required a large force of men and horses until Wednesday evening to make them passable. The memory of the octogenarian can recall nothing to equal it. At this writing (Feb. 25th) the snow is gradually melting and passing away without doing any damage along water courses.

* * *

LATE REPORT.

Charlotte Hall, St. Marys County: Mean temperature, 29.6°; maximum, 75° on the 22d; minimum, -19° on the 11th; mean maximum, 41.5°; mean minimum, 17.6°; greatest daily range, 58° on the 14th; total precipitation, 5.75; greatest amount in twenty-four hours, 3.00 (30 inches of snow) on the 12th and 13th; total snowfall, 39.5 inches; number of days with .01 inch or more precipitation, 11; number of clear days, 10; partly cloudy, 9; cloudy, 9; prevailing wind direction, northwest.

Prof. J. F. COAD.

A REVIEW OF FEBRUARY WEATHER.

The opening of the month presented uneventful features. On the 1st a high barometric pressure was directly over Maryland, while a receding snowfall area lay to the northeast. This high pressure passed into the ocean on the 2d. It was followed by cloudiness, but the weather continued cold.

On the 3d, a sudden development of low pressure conditions over the districts from the Ohio valley to the west Gulf gave general rains or snows. The accompaniment of frequent thunderstorms on that morning was unusual, considering the fact that temperatures over the northern limits of the precipitation area were from 25° to 35°. In sections of Maryland these thunderstorms were very severe, and one death by lightning resulted in Worcester County. The storm had reached New England by the 4th, but an offshoot remained about stationary over the Gulf coast. Precipitation was diminishing and temperatures had risen above normal.

The 5th was somewhat cooler. The storm in the south had moved to North Carolina, while the earlier storm formation had passed to the far northeast. The two had been split by an area of high, and conditions were such that a commingling of opposing cold and warm air currents took place over the State. As a result a heavy fall of snow ensued. The amount at Baltimore on the night of the 4th measured six inches.

On the 6th and 7th another storm from the Gulf districts moved slowly northeastward, and each day was marked by an added snow depth of about two inches. The storm reached the New Jersey coast on the 8th, increasing in energy, and one more inch of snow was laid above the previous falls.

A brief survey of the preceding record shows that three distinct low pressure storms formed and moved over the eastern portions of the country without any high pressure areas intervening. It is true that reference is made to the high pressure of the 4th-5th, but the latter was connected with the low area storms only in the closing stages of their movements, and had a very remote, if any, relation to their formation and development. Another noteworthy fact is that, during this entire period, all of the country west of the Mississippi was dominated by an area, or areas, of high pressure. These, with barometer readings ranging from 30.5 inches to 30.8 inches, held unbroken sway, and doubtless served as immense feeders to the low area storms that had successively formed far to the southeastward.

On the 9th the western high barometer began a perceptible eastward movement. The weather became colder over Maryland, and clear skies prevailed generally on the Atlantic coast, except in the extreme northeast portions. On the 10th the advancing high pressure centered over Tennessee, *while another high of 31.1 inches had formed in the far northwest.* This was the coldest day ever known in Baltimore, and remarkably low temperatures prevailed throughout the entire State. On the 11th the original high pressure centered directly over Maryland, and the western high was north of Montana. Between the two, a belt of snowfall had formed.

By the morning of the 12th the high pressure over Maryland had dissipated. The western high centered over Kansas, but had overspread the surrounding country to include Texas, and

had reached the Mississippi valley. A low pressure centered over the Florida peninsula, and a heavy snow belt lay east of a line from New Orleans to Oswego.

On the 13th the low pressure storm had moved to the Virginia coast. The high centered over Texas. The precipitation area had narrowed to the Atlantic coast States, over which rain or snow was falling heavily. 15.5 inches in 24 hours was the snow record at Baltimore, and at 11.10 P. M. of the 13th, when the snow ceased, there was a depth of 31 inches on the level. The high winds drifted the very dry snow so that in many places it was from ten to twenty feet deep. Street car traffic in the city was entirely suspended for the better part of two and a half days, and railroad traffic, from one to one and a half days. No mails arrived or departed from 10 A. M. of the 13th until the morning of the 15th. The country roads were entirely blocked, and the city was completely snow-bound. The cold weather which immediately followed caused further ice to form in the harbor and bay, entirely closing navigation for two or three days, and greatly impeding it for about a week.

The snow-producing effects of the contending disturbances ceased on the night of the 13th. During the two days following there was a sluggish movement of the high pressure to the northeast. A low area storm was forming on the west Gulf at the same time, and it reached this section on the 16th, causing sleet and rain; these conditions, abetted by a second low area storm over the Lakes, continued two days.

From the 19th to the 22d there was a steady flow of southwesterly winds over Maryland, and the snow melted fast as the weather warmed. On the last named date there were light showers, caused by a low passing eastward from the Lake Region, but cold northwest winds and clear skies followed. Mild mutations were the rule until the 26th, when a low area storm over Lake Michigan spread a broad belt of precipitation eastward. Heavy rains fell on the 26th and 27th, and then the storm passed beyond the section. The last day of the month was clear and cool.

It would be interesting if there could be presented a complete series of the weather charts covering the conditions that have held sway during this very unusual period. Lack of space prevents the reproduction of more than three. These have been reduced from the original publications of the Central Office, and are (1) the chart showing snow depths over the United States on February 13th, and (2 and 3) the two morning weather charts for February 12th and 13th, showing the atmospheric conditions immediately preceding our greatest snowstorm.

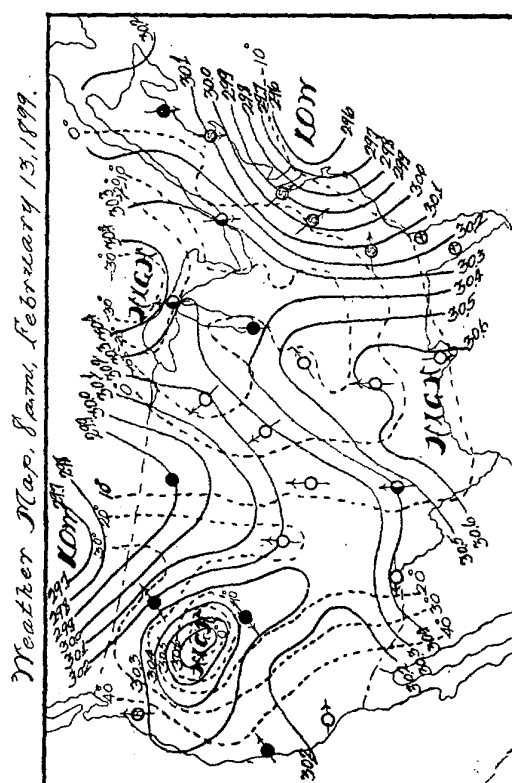
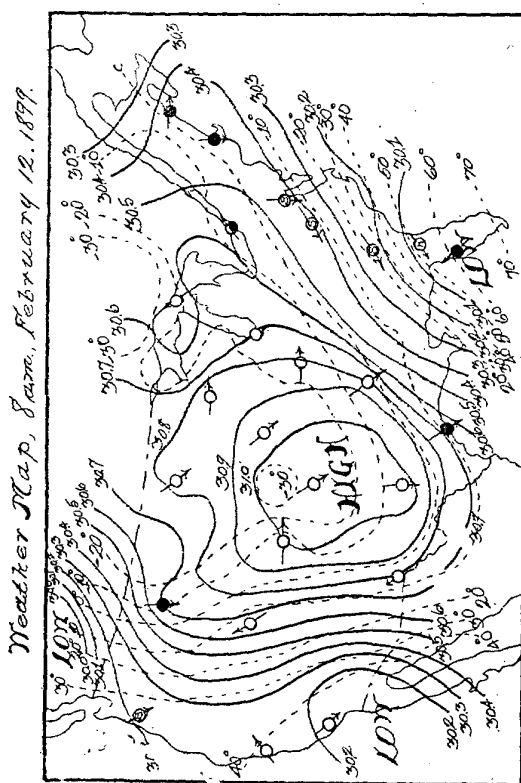
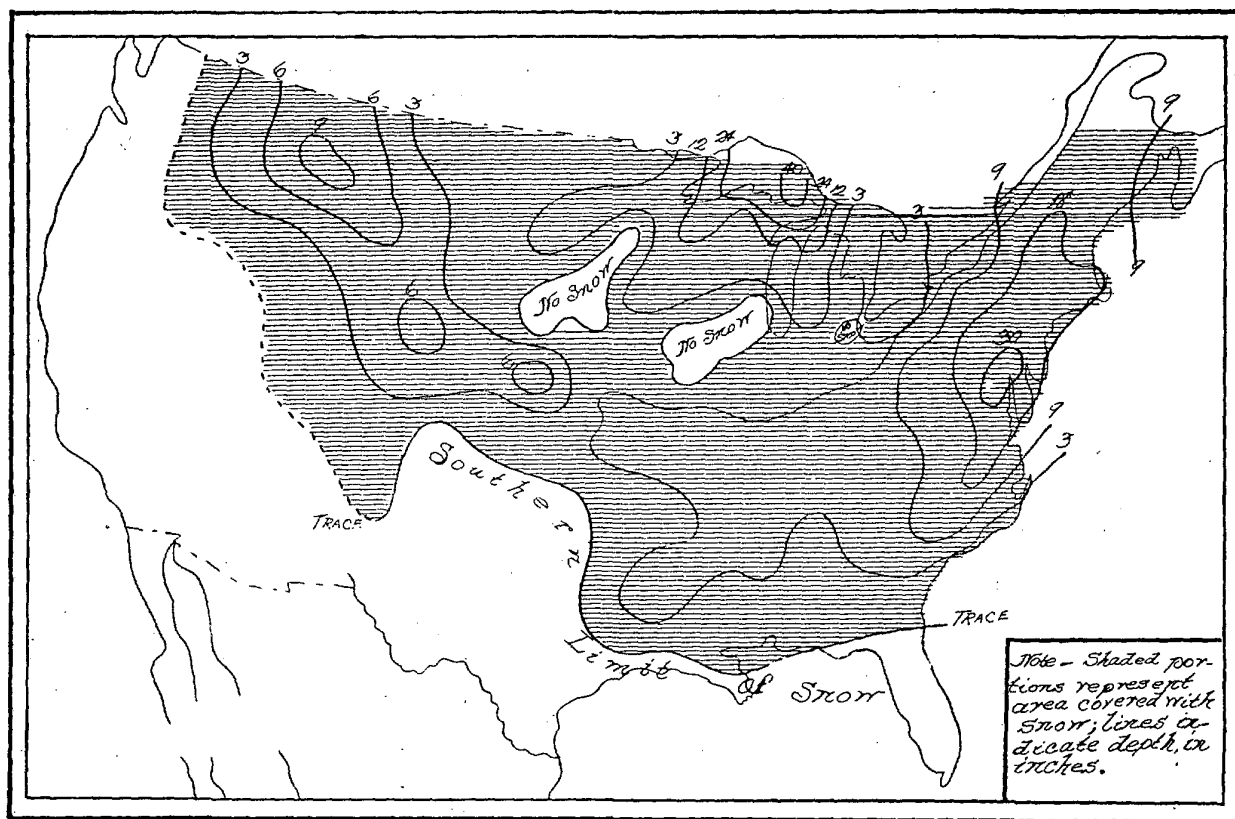
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LATE REPORT.

Rock Hall (1), Kent County: Mean temperature, 27.7°; maximum, 58° on the 22d; minimum, -6° on the 10th; mean maximum, 35.5°; mean minimum, 19.9°; greatest daily range, 40° on the 15th; total precipitation, 5.57; greatest amount in twenty-four hours, 1.02 on the 26th-27th; total snowfall, 32.5 inches; number of days with .01 inch or more of precipitation, 15; number of clear days, 12; partly cloudy, 4; cloudy, 12; prevailing wind direction, northeast.

C. N. SATTERFIELD.

SNOW CHART FOR 8 P. M., MONDAY, FEBRUARY 13, 1899.



CLIMATOLOGY OF THE MONTH.**ATMOSPHERIC PRESSURE—IN INCHES AND HUNDREDTHS.**

Monthly mean at Washington, D. C., 30.10; at Baltimore, 30.07; average, 30.08; highest, 30.71 at Washington, D. C., and at Baltimore, on the 11th; lowest, 29.53 at Baltimore, on the 8th.

TEMPERATURE—IN DEGREES FAHRENHEIT.

The monthly mean (entire territory), 26.6, is 6.6 below the normal.

The highest monthly mean was 32.0, at Pocomoke City.

The lowest monthly mean was 21.2, at Sunnyside.

The highest temperature recorded during the month was 67, at Cumberland and Frostburg, on the 21st.

The lowest temperature recorded during the month was —26, at Sunnyside, on the 10th.

The greatest local monthly range was 89, at Frostburg.

The least local monthly range was 64, at Frederick and St. Charles College.

The greatest daily range was 52, at Deer Park, on the 15th.

The least daily range was 0, at Chestertown, on the 8th.

PRECIPITATION—IN INCHES AND HUNDREDTHS.

The monthly average (entire territory) 5.51, was 1.87 above the normal.

The greatest amount was 8.85, at Coleman.

The least amount was 2.07, at Boettcherville.

The greatest amount in twenty-four hours was 8.65, at Coleman, on the 16th.

The average number of rainy days, 12.

WIND.

The prevailing direction was from the southwest.

The total movement was 8,946 miles, at Baltimore, and 5,525 miles, at Washington, D. C.

The maximum wind velocity was 48 miles per hour from the northwest, at Washington, D. C., on the 13th.

MISCELLANEOUS.

The following are dates on which various miscellaneous phenomena occurred:

SNOW: Annapolis, 5, 6, 7, 12, 13; Bachmans Valley, 1, 5, 6, 7, 8, 11, 12, 13, 16; Baltimore, 1, 5, 6, 7, 8, 11, 12, 13, 14; Boettcherville, 4, 6, 7, 12, 13, 16; Boonsboro (a), 3, 4, 5, 6, 7, 11, 12, 13; Boonsboro (b), 5, 6, 7, 8, 12, 13, 16; Chase, 1,

5, 6, 7, 8, 12, 13, 14; Chestertown, 4, 5, 6, 7, 8, 11, 12, 13; Chewsville, 5, 6, 7, 11, 12, 13, 15; Clear Spring (b), 1, 5, 6, 7, 8, 12, 13, 14, 17; Coleman, 5, 6, 8, 12, 13; Darlington, 5, 6, 7, 12, 13; Cumberland, 5, 7, 12, 13, 15, 16; Deer Park, 5, 6, 7, 11, 12, 13, 16; Denton, 5, 6, 7, 12, 13; Easton, 1, 7, 12, 13, 14; Fallston, 1, 5, 6, 7, 8, 12, 13, 14; Green Spring Furnace, 1, 5, 6, 7, 8, 12, 13, 16; Hagerstown, 5, 6, 7, 11, 12, 13, 16; Hancock, 1, 6, 12, 13, 16; Frederick, 1, 5, 6, 7, 8, 12, 13, 16; Frostburg, 1, 5, 6, 7, 12, 13, 16, 24; Grantsville, 5, 6, 7, 11, 12, 13, 16, 18, 19, 24; Great Falls, 1, 5, 6, 7, 8, 14; Jewell, 1, 6, 11, 12, 13; Laurel, 5, 6, 7, 11, 12, 13; Mardela Springs, 6, 11, 12; Md. Agri. Coll., 5, 7, 12, 13; Milford, Del., 5, 6, 7, 11, 12, 13; Mt. St. Marys, 5, 7, 8, 11, 12, 13, 16; Newark, Del., 1, 5, 6, 7, 8, 11, 12, 13, 14; New Market, 5, 6, 7, 8, 11, 12, 13, 16; Ocean City, 6, 11, 12, 13; Pocomoke City, 6, 7, 11, 12, 13, 14; Port Deposit, 7, 8, 13, 14; Princess Anne, 6, 7, 9, 11, 12, 13, 24; Queenstown, 6, 7, 12, 13; Rock Hall (b), 1, 5, 6, 7, 8, 11, 12, 13, 14; Sandy Point, 8, 11, 12, 13; Seaford, Del., 8, 11, 12, 13; Sharpsburg, 5, 8, 11, 12, 13, 17; Solomons, 5, 6, 7, 11, 12, 13; Smithsburg (a), 5, 6, 7, 11, 12, 13; Smithsburg (b), 1, 5, 6, 8, 11, 12, 13, 16; St. Charles College, 1, 3, 4, 5, 6, 7, 8, 12, 13; Sudlersville, 5, 6, 7, 8, 11, 12, 13; Sunnyside, 2, 5, 6, 7, 8, 11, 12, 13, 14, 16, 18, 19, 23, 24, 28; Taneytown, 2, 5, 6, 7, 8, 11, 12, 13, 16, 17; Van Bibber, 4, 5, 6, 7, 11, 12, 13; West. Md. Coll., 1, 5, 6, 7, 8, 11, 12, 13; Westernport, 1, 4, 5, 6, 7, 11, 12, 13, 16; Woodstock, 4, 5, 6, 7, 8, 11, 12, 13; Wyoming, Del., 5, 6, 11, 12, 13, 14.

SLEET: Bachmans Valley, 26; Boettcherville, 3; Boonsboro (a), 16; Chestertown, 5, 7, 16; Chewsville, 15, 17; Coleman, 3, 16; Laurel, 3; Mt. St. Marys College, 3; New Market, 3, 5, 16, 26; Pocomoke City, 6, 7; Princess Anne, 5, 6, 7; Queenstown, 7; Rock Hall (b), 8, 16; Sharpsburg, 3, 16; Solomons, 3, 5, 6, 7, 8, 9, 16; Smithsburg (a), 16; Smithsburg (b), 16; St. Charles College, 3; Taneytown, 26; West. Md. College, 3, 16, 26; Woodstock, 16.

HAIL: Boettcherville, 3; Coleman, 3, 16; New Market, 16; Rock Hall (b), 8; Solomons, 5; Taneytown, 16.

FOG: Bachmans Valley, 17, 18; Easton, 22; Jewell, 3, 4; Laurel, 17; Pocomoke City, 3; Princess Anne, 3, 22; Seaford, Del., 3, 22; Woodstock, 17, 18, 26.

THUNDERSTORMS: On the 3d at Annapolis, Bachmans Valley, Baltimore, Boonsboro (a), Boonsboro (b), Chase, Chestertown, Chewsville, Coleman, Denton, Easton, Fallston, Green Spring Furnace, Frederick, Grantsville, Jewell, Milford, Del., Mt. St. Marys, New Market, Port Deposit, Princess Anne, Queenstown, Sandy Point, Seaford, Del., Sharpsburg, Solomons, Smithsburg (a), Smithsburg (b), Sunnyside, Taneytown, Van Bibber, Washington, West. Md. College, Woodstock, and on the 22d at Princess Anne and Solomons.

LUNAR HALOS: Baltimore, 15, 17; Green Spring Furnace, 21; Mt. St. Marys College, 17; Smithsburg (b), 17, 21; St. Charles College, 17; Taneytown, 17, 21; Washington, 15, 17, 19, 25; Western Md. College, 17, 19, 21.

SUNDOG: Green Spring Furnace, 28.

SOLAR HALOS: Rock Hall (b), 15; Washington, 4, 11.

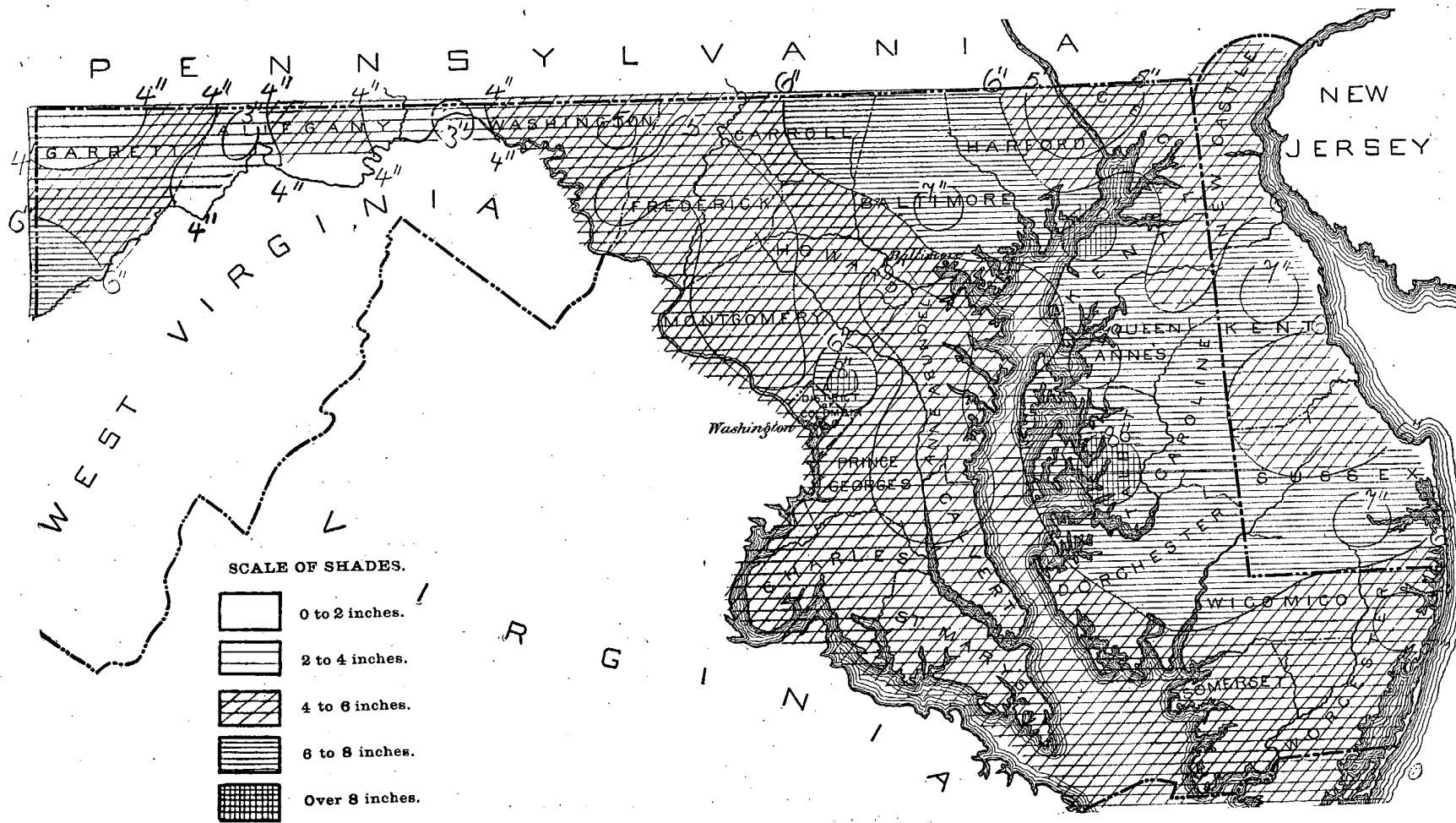
AURORAS: Laurel, 17; Princess Anne, 1.

Climatological data for Maryland and Delaware, February, 1899.

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	Allegany	780	9	26.4	-4.6	62	21	-19	10	46	2.07	-1.22	0.70	17.0	8					F. F. Brown.
Boonsboro 1	Washington	600	1	24.8		60	21	-15	10	38	5.04		1.07	29.0	9	7	13	8	W	Chas. E. Huntzberg.
Boonsboro 2	Washington	800	1	24.7		59	21	-19	10	26	4.48		1.04	34.0	11	8	11	9	NW	Samuel L. Ford.
Chewsville	Washington	530	1	23.9		54	22	-20	13	45	4.30		1.09	31.0	8	11	7	10	W	E. I. Oswald.
Clear Spring 1	Washington	500	1																	W. E. Loose, Jr.
Clear Spring 2	Washington	650	1	23.8		57	23	-15	10	32	5.66		1.15	28.0	14	13	5	10		W. W. Frantz.
Cumberland	Allegany	722	40	27.7	-8.7	67	21	-12	10	44	4.76	+1.52	1.42	29.5	11					Howard Shriver.
Deer Park	Garrett	2,457	8	21.3	-6.3	56	21	-25	11	52	4.40	+1.51	1.22	20.0	12					S. P. Specht.
Frostburg	Allegany	2,200	4	25.8		67	21	-22	10	45	4.86		0.95	16.2	12	14	0	14	W	G. G. Townsend.
Grantsville	Garrett	2,400	6	22.2	-3.0	58	21	-22	10	40	3.27	-1.35	1.00	19.0	13	2	7	19	W	J. S. Miller.
Green Spring Furnace	Washington	450	2	25.0	-6.8	56	20	-14	11	38	5.13	+1.94	1.00	30.0	15	16	1	11	W	E. G. Kinsell.
Hagerstown	Washington	552	2	24.6	-10.7	55	22	-14	10	35	5.42	+2.03	1.37	34.0	10	12	1	15	W	Prof. C. E. Carl.
Hancock	Washington	455	1	23.5		61	21	-18	11	46	2.93		0.83	25.0	8	7	11	10	W	J. D. Stotlemeyer.
Sharpsburg	Washington	420	5	25.3	-4.5	55	21	-13	10	27	4.35	+1.57	1.04	25.2	12	11	5	12	NW	R. L. Hilberger.
Smithsburg 1	Washington	750	2	25.6		54	21	-18	10	31	5.67		1.07	30.0	10	12	6	10	W	Joseph L. Miller.
Smithsburg 2	Washington	900	1	24.2		60	21	-18	10	27	5.40		1.80	34.0	13	11	4	13	S	Dr. D. W. Crowther.
Sunnyside	Garrett	2,440	7	21.2	-3.2	56	21	-26	10	49	6.36	+0.80	1.16	26.5	20	7	6	15	NW	J. G. Knauer.
Westernport	Allegany	1,000	5	24.6	-4.2	60	21	-13	9	37	3.87	+1.20	1.31	21.5	10					Prof. O. H. Bruce.
Average				24.4	-5.8						4.59	+0.89		26.5	12	10	6	12	W	
NORTHERN-CENTRAL MD.																				
Bachman's Valley	Carroll	860	6	21.7	-6.9	52	22	-23	11	37	6.10	+1.80	1.80	31.0	12	13	5	10	NW	J. M. Myers.
Baltimore	Baltimore	123	65	28.4	-8.0	60	22	-7	10	25	5.47	+1.97	1.10	33.9	17	12	5	11	N	U.S. Weather Bureau.
Baltimore, J. H. Hospital	Baltimore	112	5	26.9	-4.7	59	22	-11	10	40	7.16		1.90	33.2	13	10	3	15	NW	W. L. Woods.
Baltimore, Walbrook	Baltimore			26.8		58	17	-12	11											F. J. Walz.
Chase	Baltimore	25	1	24.5		58	22	-25	10	45	6.84		1.00	34.0	14	13	4	10	S	J. W. Crouch.
Darlington Academy	Harford	300	10	25.4	-4.3	56	22	-12	11	32	4.55	+1.00	1.35	27.0	8	13	6	9	NW	Prof. A. F. Galbreath.
Fallston School	Harford	450	31	25.5	-6.9	53	22	-14	11	24	6.09	+2.21	1.92	26.8	15	7	11	10	NW	G. G. Curtis, A. M.
Frederick	Frederick	275	27	26.2	-7.6	54	21	-10	11	37	5.35	+1.56	0.94	34.2	13	10	8	10	N	McClintock Young.
Great Falls	Montgomery	200	11	24.8	-10.6	57	21	-14	11	44	4.88	+1.65	1.30	35.8	10	14	0	14	NE	Washington Aqueduct.
McDonogh	Baltimore			25.8	-8.2	58	21	-11	9	37										W. B. Wessels.
Mt. St. Mary's College	Frederick	720	39	24.3	-6.3	55	22	-15	10	23	4.35	+0.97	1.19	26.5	11	10	7	11	SW	J. A. Mitchell, Ph. D.
New Market	Frederick	550	16	25.7	-7.4	56	21	-14	11	37	4.37	+0.11	0.82	31.0	12	7	8	13	NW	H. H. Hopkins, M. D.
St. Charles College	Howard	500	5	24.1	-14.7	56	22	-8	10	33	5.07	+0.92	1.08	34.0	14	11	5	12	W	Rev. George L. Harig.
Taneytown	Carroll	490	7	25.1	-8.2	57	27	-16	11	40	5.57	+1.67	1.25	32.8	13	13	3	12	W	Prof. H. Meier.
Van Bibber	Harford	22	4	26.0	-7.2	58	27	-11	10	32	6.04	+0.51	1.57		8	24	2	12	NW	H. A. Wroth.
Western Maryland Coll.	Carroll	720	5	23.6	-7.9	59	21	-16	10	28	4.86	+0.58	1.10	25.5	12	8	6	14	W	Dr. Cleveland Abbe, Jr.
Woodstock College	Baltimore	392	30	26.9	-6.9	57	21	-13	11	41	5.35	+1.61	1.55	25.5	13	8	7	13	NW	T. J. A. Freeman, S. J.
Average				25.3	-7.7						5.47	+1.27		30.8	12	11	5	12	NW	
SOUTHERN MARYLAND.																				
Annapolis	Anne Arundel	45	26	28.4	-7.2	60	22	-6	10	26	4.97	-1.11	1.45	31.0	8	15	2	11	NW	J. E. Abbott.
Charlotte Hall School	St. Mary's	167	6																	J. F. Coad.
Cherryfields	St. Mary's	7	6																	Col. J. E. Coad.
Distributing Reservoir	Dist. of Columbia	120	9	27.0	-7.1	60	22	-13	11		4.69	+1.26	1.51		9					Washington Aqueduct.
Jewell	Anne Arundel	165	12	27.0	-8.6	63	22	-14	10	25	3.94	+0.54	1.75	24.7	7	17	1	10	NW	J. Plummer.
Laurel	Prince George's	150	5	27.1	-9.1	60	20	-18	11	47	4.61	+0.43	0.90	20.4	11	8	6	14	NW	Dr. T. M. Baldwin.
Md. Agricultural College	Prince George's	170	8	28.0	-6.4	59	20			31	8.00	+3.96	2.60	30.0	7	12	6	10		Prof. J. H. Patterson.
Prince Fredericktown	Calvert	80		28.9		62	22	-10	11	30										Alfred Presson.
Receiving Reservoir	Dist. of Columbia	160	9	27.6	-6.2	58	22	-14	11		4.41	+1.05	1.53		13					Washington Aqueduct.
Solomon's	Calvert	20	8	28.9	-6.7	60	22	-5	10	27	4.54	+0.22	0.87	23.0	14	6	6	16	NW	W. H. Marsh, M. D.
Washington	Dist. of Columbia	112	29	27.4	-9.0	61	22	-15	11	41	5.17	+2.68	1.42	35.2	18	10	7	11	NW	U.S. Weather Bureau.
Average				27.8	-7.5						5.04	+1.26		27.2	11	11	5	12	NW	
EASTERN MARYLAND.																				
Berlin	Worcester																			Dr. E. J. Dirickson.
Chestertown	Kent	80	15	26.8	-5.8	56	22	-9	11	39	6.39	+2.77	1.60	34.2	12	10	6	12	N	Hon. M. de K. Smith.
Coleman	Kent	80	1	26.6		58	22	-10	11	37	8.85		3.65	31.5	9	13	5	10	SW	James S. Harris.
Denton	Caroline	42	10	27.3	-6.4	58	23	-14	10	42	6.63	+2.82	1.90	30.0	8	6	8	14	SW	F. C. Ramsdell.
Easton	Talbot	35	10	27.1	-7.9	60	22	-15	11	39	8.61	+4.55	2.16	50.3	15	14	3	11	NW	Henry Shreve.
Mardela Springs	Wicomico	25	12								7.11	+2.96	1.95	25.0	12					A. E. Acworth.
Ocean City	Worcester	10	1	30.2		60	22	-4	10	37	4.51		1.80	28.0	9	9	8	11	NW	E. M. Scott.
Pocomoke City	Worcester	37	6	32.0	-5.0	64	22	-4	11	34	5.38	+0.80	1.56	16.4	11	8	9	11	NW	R. M. Stevenson.
Port Deposit	Cecil	25	2	26.5		59	27	-10	11	30	5.05		1.40	34.0	7	12	3	13	NW	J. L. Franke.
Princess Anne	Somerset	20	25	29.0	-9.9	62	22	-10	15	47	5.79	+1.30	1.60	23.5	13	3	14	11	SW	J. R. Stewart.
Queensdown	Queen Anne	20	1	26.8		58	22	-9	9	30	7.28		1.32	45.0	11	11	7	10	NW	Dr. W. K. Carroll.
Rock Hall 1	Kent	20	1																	Chas. N. Satterfield.
Rock Hall 2	Kent	25	1	26.8		58	22	-14	15	46	5.27		1.00	30.5	15	12	5	11	SW	Isaac L. Leary.
Sandy Point	Worcester	12	1								5.75		1.40	14.5	9	15	0	13	SW	J. B. Dirickson.
Suddlersville	Queen Anne		1	28.0		61	22	-7	11	35	5.54		1.38	24.4	10	15	5	8	NW	J. S. Barwick.
Average				27.9	-7.0						6.32	+2.53		29.6	11	11	6	11	NW	
DELAWARE.																				
Milford	Kent	20	20	29.9	-4.7	59	22	-12	10	49	4.11	-2.53	0.89	36.0	11	19	0	9	NW	J. Y. Foulk.
Millsboro	Sussex	23	7	28.1	-5.9	60	23	-10	10	40	6.90	+2.04	1.50	24.4	15	15	4	9	NW	Rev. L. W. Wells.
Newark (Delaware Coll.)	Newcastle	136	6	24.6	-5.0	54	22	-12	11	41	5.85	+2.09	1.39	26.5	13	11	8	9	NW	Prof. W. H. Bishop.
Seaford	Sussex	40	9	29.9	-4.8	65	22	-11	11	46	6.12	+1.91	1.01	30.0	13	14	2	12	NW	W. T. Wallace.
Wyoming	Kent			26.0		56	22	-14	11	36	7.77		1.30	35.0	12	12	5	10	NW	J. A. Trope.
Average				27.7	-5.1						6.15	+0.88		30.3	13	14	4	10	NW	
General average				26.6	-6.6															

[illegible]

TOTAL PRECIPITATION, FEBRUARY, 1899.



† Trace, when precipitation is less than 0.01 inch.