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CENTRAL OFFICE, JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD.

PROF. WM. B. CLARK,
JOHNS HOPKINS UNIVERSITY,
Director.

PROF. MILTON WHITNEY,
MARYLAND AGRICULTURAL COLLEGE,
Secretary and Treasurer.

DR. C. P. CRONK,
U. S. WEATHER BUREAU,
Meteorologist in Charge.

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The Leading Features of Maryland Climate.

BY WILLIAM B. CLARK.

Nothing so materially affects the development of a country as its climate. If favoring, prosperity and progress may be confidently looked for. But further than that, the character of the occupations adopted by the people will depend upon whether that climate be hot or cold, humid or dry, variable or constant. Fortunate is that region in its natural surroundings whose climate allows of a variety of pursuits and where the welfare of the community does not depend upon the success or failure of a single enterprise. Such diversity in climate with its attendant variety of occupations is found in the State of Maryland. This may be explained by the complexity of the surface configuration, the presence of the sea upon the eastern borders, the great area of highland which occupies the western division, and the bays and estuaries which deeply indent the land in all directions in the Chesapeake region. On account of these disturbing conditions, the same parallels of latitude show very great variations in the character of the climate.

Although the climate in general is what is known as continental, it is greatly modified in the eastern portion of the State by the ocean and the Chesapeake Bay, and in the extreme southeast becomes almost oceanic or insular, surrounded as the land is on nearly all sides by water.

A description of the climate of the State has been rendered possible as a result of the extended observations of the Maryland State Weather Service, which was organized two years ago, under the joint auspices of the Johns Hopkins University, the Maryland Agricultural College and the United States Weather Bureau, and was rec-

ognized by the Legislature of the State at its last session. Over fifty stations have been established in the several counties, so that every important variation which takes place within the limits of the State may be observed. Many records of temperature and rainfall were kept at isolated points throughout the State before the organization of the State Service, and these, together with the fuller and more accurate observations which have been taken during the last two years, afford the data upon which the conclusions of this paper will be based.

The climate of the State will be considered under the following heads, viz:—Temperature, Precipitation, Humidity, Winds and Barometric Pressure.

TEMPERATURE.

The great diversity in the physical features of Maryland, with its consequent effect upon the climate, renders a characterization of the temperature of the State, as a whole, quite impossible. The difference between the coastal portions and the mountains is so great that the monthly, seasonal and annual means for the entire State do not of necessity indicate the temperature for any single locality, although they are of interest in making comparisons with other areas. The following table of mean temperatures of the State is made up from all the authentic observations.

Upon an examination of the table it will be observed that the coldest month is January, with an average mean temperature of 32.8°, while the warmest month is July, with an average mean temperature of 75.8°, a difference of 43°. The greatest changes in mean temperature take place in the Spring and Autumn months, while those in Summer and Winter are very small.

Since the temperature is modified to a marked degree by altitude and proximity to the sea, the

MARYLAND STATE WEATHER SERVICE.

State of Maryland will naturally fall into the four following divisions, the topographic features of which have been described in an earlier number of the MONTHLY REPORT, viz:

Eastern Maryland, } = *Coastal Plain.*
Southern Maryland, }
Northern-Central Maryland = *Piedmont Plateau.*
Western Maryland = *Appalachian Region.*

TABLE OF MEAN TEMPERATURE FOR MARYLAND.

MONTHLY MEAN.												SEASONAL MEAN.				Annual Mean.
January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Spring.	Summer.	Autumn.	Winter.	
32.8	34.8	39.6	51.7	62.6	72.5	75.8	74.3	66.9	54.7	44.0	35.5	51.2	74.0	55.0	34.4	53.8

An examination of the following tables will show the differences in temperature which are found in the several districts. Since Eastern Maryland extends much farther north than South-

ern Maryland, its mean temperature is lower, although it is generally warmer at the same latitude.

TABLE OF MEAN TEMPERATURE FOR THE FOUR CLIMATIC DIVISIONS OF MARYLAND.

CLIMATIC DIVISIONS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Eastern Maryland	34.8	36.1	40.5	52.6	62.1	72.8	75.8	74.8	67.5	56.5	45.3	37.3
Southern Maryland	35.3	37.4	42.3	53.4	63.9	74.1	77.7	75.7	68.6	56.6	46.5	37.6
Northern-Central Maryland.....	30.7	33.9	38.2	50.9	63.5	72.8	75.7	72.4	65.8	54.2	42.8	34.0
Western Maryland.....	30.5	31.6	37.2	49.8	60.7	70.3	73.8	74.2	65.8	51.4	41.2	33.0

CLIMATIC DIVISIONS.	SEASONS.				YEAR.	SEASONAL CHANGES.			
	Spring.	Summer.	Autumn.	Winter.		Winter to Spring.	Spring to Summer.	Summer to Autumn.	Autumn to Winter.
Eastern Maryland	51.7	74.5	55.8	36.1	54.5	15.6	22.8	18.7	19.7
Southern Maryland	53.1	75.5	57.2	36.9	55.6	16.2	22.4	18.3	20.3
Northern-Central Maryland	50.6	73.5	54.3	33.1	53.0	17.5	22.9	19.2	21.2
Western Maryland	49.4	72.7	52.7	31.7	52.0	17.7	23.3	20.0	21.0

It will be observed that the mean annual temperature of the western division is 52°, while that of the southern is 55.6°, a difference of 3.6°. The mean annual temperature has a much greater range, however, when the extremities of the State are compared. The isothermal line of 50° passes through Garrett and Alleghany counties and bends down along the high ridge of the Piedmont Plateau into Carroll and Baltimore counties, while the isothermal line of 58° crosses Wor-

cester and Somerset counties to the Virginia shore of the Chesapeake. There is thus a difference of over 8° in the annual means between the extreme northern and western and the extreme southern portions of the State.

The seasonal isothermal lines indicate a still wider range in mean temperature between the western and southeastern portions of the State. In spring it ranges from 56° to 44°, a difference of 12°, in summer from 77° to 69°, a difference of 8°,

in autumn from 60° to 50°, a difference of 10°, and in winter from 40° to 27°, a difference of 13°.

Eastern Maryland. This portion of the State has been designated in an earlier paper as the eastern division of the Coastal Plain, and its low level surface described. Deeply indented by tidal estuaries and bordered by the ocean, its temperature is much modified by the surrounding water.

The southern portion of the area has a mean annual temperature of 58°, the highest in the State. In passing to the northward the temperature changes at first rapidly, the isothermal line of 57° and 56° following at short intervals. The greater portion of the eastern division, however, is found between the isothermal lines of 56° and 54°, while in the extreme north the temperature again changes rapidly, the isothermal lines of 53° and 52° following each other at short intervals. The extreme range in the mean annual temperature is thus found to be 6°.

The mean seasonal variations between the southern and northern portions of the region are also distinctly marked. As in the case of the annual means, the isothermal lines do not succeed each other generally at regular intervals.

The mean temperature for spring ranges from 50° in the north to 56° in the south. The greater portion of the region is found, however, between the means of 51° and 53°.

In summer there is very little range in mean temperature between the northern and southern portions of the district. The entire region lies between the isothermals of 74° and 76°.

In autumn the range in mean temperature is the same as in spring, amounting to 6°. Although the extremes are found between 54° and 60°, the greater portion of the region lies between 55° and 57°.

The greatest difference in mean temperature is found in winter. The variation is then 9°, and the mean temperature ranges from 31° in the north to 40° in the south. There is a much more gradual change than at other seasons, the isothermals being found approximately equidistant from one another.

Southern Maryland. The southern portion of the State has been already described as the western division of the Coastal Plain. The surface of the land is somewhat higher and more broken than in Eastern Maryland, but is still low and flat. On account of this general uniformity throughout the area, together with its limited extent from north to south, the variations in mean temperature are not very striking. The annual mean seldom exceeds that of Baltimore, which is 55.6°, by more than 2°, while Leonardtown and several other places have almost the same average temperature. At a few

points, owing to local causes, the mean annual temperature is even lower.

With the exception of the winter temperature, the mean seasonal temperatures show very slight variations, seldom reaching more than two degrees. In spring the region is crossed by the isothermal line of 53° and 54°, in summer of 75°, 76° and 77°, in autumn of 57°, 58°, 59° and 60°, the two latter, however, only touching the southern portion of St. Mary's county. In winter, on the other hand, variations of four or five degrees are found, the isothermal lines of 36°, 37°, 38°, 39° and 40° succeeding one another at very nearly equal intervals.

The interior portion of the county is warmer during the spring, summer and autumn months, but cooler during the winter.

Northern-Central Maryland. The hilly country which borders the Coastal Plain upon the east has been already described under the name of the Piedmont Plateau. It is here referred to under the name of Northern-Central Maryland. The rapid streams, and moderate though complex relief of the land, have been mentioned as characteristic features of the area.

The mean annual temperature of the region ranges from 50° to 55°. The coldest portions are found along the higher land of the Piedmont belt which culminates in Parr's Ridge. The Frederick valley is considerably warmer, corresponding in this respect with the eastern slope in Montgomery and Howard counties.

The mean seasonal temperatures have the same general relations to the topography as the annual temperatures. The high-central portion of the Piedmont area is at all seasons several degrees colder than the eastern slope of the Frederick valley. The spring means vary from 48 to 53°, the summer from 69° to 75°, the autumn from 52° to 57°, and the winter from 29° to 36°, which indicates a slightly greater range in temperature in winter and summer than in the spring and autumn.

Western Maryland. The portion of the State which is here considered under the name of Western Maryland, has been previously described as the Appalachian Region. It consists of parallel ranges of mountains, with deep valleys, which drain chiefly into the Potomac River. The mountains reach 3000 feet and more in altitude, and in the west rise from a high plateau, which declines gradually beyond the limits of the State.

As might be anticipated, there is a general lowering of the temperature throughout the entire district.

So far as conclusions can be drawn from the records of temperature, which are not altogether satisfactory, the valleys are warmer than the

mountains. This is best seen in the Hagerstown valley, where the isothermals invariably bend to the westward. In the smaller valleys few continuous observations have been taken, while, practically, none are recorded from the mountains, with which comparisons may be made.

There is a slight decrease in the mean annual temperature in passing from the eastern to the western portions of the region. The range is from 50° to 53°, making a difference of 3°.

This is shown more distinctly in the case of the seasonal means, particularly in the spring and winter. In the spring the mean temperature varies from 44° to 52°; in summer, from 70° to 75°; in autumn, from 50° to 54°; in winter, from 27° to 34°, which shows a greater variation in spring and winter than in summer and autumn.

PRECIPITATION.

The atmospheric precipitation in Maryland occurs both as rain and snow. There is no portion of the State in which either is entirely wanting, although the snowfall is far less in the eastern and southern districts than in the northern and western. The snowfall never fails completely even in the warmest winters, although it may be reduced to insignificant proportions.

The precipitation is more or less equally distributed throughout the months, when the means for a long term of years are taken into consideration, although wet and dry periods characterize the seasons of a single year, causing marked variations from the normal. A certain constant

increase in the mean precipitation is found to occur in the spring and late summer, with a corresponding decrease in the autumn and winter.

The western portion of the State has a less amount of annual precipitation than the eastern. A heavy rainfall characterizes the region which lies to the east of Catoctin Mountain, the easterly winds, as they reach the highlands, precipitating their moisture in the Frederick valley and over the western slope of the Piedmont Plateau. The eastern slope of the Piedmont Plateau has again less precipitation.

The western portion of the Coastal Plain has a much drier climate than the eastern, although numerous local exceptions appear. For example, the western shores of the Chesapeake have relatively much greater precipitation than the eastern, which makes the average precipitation for Southern Maryland exceed that for Eastern Maryland. The central and western portion of Eastern Maryland has a much greater rainfall than the area bordering the Atlantic.

The precipitation generally accompanies the areas of low pressure which traverse the country from west to east, and pass to the north of Maryland. It commonly occurs on their eastern front during the prevalence of easterly winds.

In the following table will be found the mean monthly, seasonal and annual precipitation for the State as a whole, and the four climatic divisions of the same, which have been previously characterized.

TABLE OF MEAN PRECIPITATION FOR MARYLAND.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Maryland.....	3.31	3.07	3.92	3.75	4.21	3.72	4.11	3.77	3.67	2.75	3.22	2.69
SEASONS.												
	Spring.				Summer.		Autumn.		Winter.		Year.	
Maryland.....	12.88				11.60		9.64		9.31		42.43	

TABLE OF MEAN PRECIPITATION FOR THE FOUR CLIMATIC DIVISIONS OF MARYLAND.

CLIMATIC DIVISIONS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Eastern Maryland.....	3.51	3.22	4.06	4.04	4.29	3.18	4.78	3.78	3.39	3.04	2.70	2.67
Southern Maryland.....	3.20	3.51	4.20	4.11	4.40	3.70	4.42	3.84	3.80	2.86	4.11	2.60
Northern-Central Maryland....	3.50	3.10	4.39	3.62	4.06	3.48	4.45	3.98	4.03	2.74	3.25	3.13
Western Maryland.....	3.01	2.45	3.02	3.23	4.08	4.53	2.77	3.48	3.46	2.35	2.82	2.35

TABLE OF MEAN PRECIPITATION FOR THE FOUR CLIMATIC DIVISIONS OF MARYLAND.

CLIMATIC DIVISIONS.	SEASONS.				Year.
	Spring.	Summer.	Autumn.	Winter.	
Eastern Maryland.....	12.39	11.74	9.13	9.40	42.66
Southern Maryland.....	12.71	11.96	10.77	9.31	44.75
Northern-Central Maryland.....	12.07	11.91	10.02	9.73	43.73
Western Maryland.....	10.33	10.78	8.63	8.81	38.55

The stations at which records of precipitation have been kept vary from one to over fifty years. At Fort McHenry, in Baltimore harbor, there is an almost continuous record since 1836. In Baltimore City the earliest data were collected in 1817, but there have been numerous breaks in the record.

The variations in annual rainfall are quite marked in some instances. The lowest recorded annual rainfall in Baltimore, for example, was in 1819, when there were 28.75 inches; the greatest was in 1846, when there were 62.04 inches. The mean annual rainfall is 44.34 inches, however. At Fort McHenry the lowest annual rainfall reported is 22.43 inches, in 1870; the highest, 66.38 inches, in 1889. Records have also been kept at other places for a considerable period, and similar striking variations in the annual precipitation are found.

HUMIDITY.

The capacity of the atmosphere to hold moisture varies, but vapor of water is always present in greater or less amounts. When the atmosphere is near saturation the air is moist, but when it is capable of taking more water it becomes dry in proportion to the amount which can thus be taken.

If the saturated state is taken as the standard of comparison, or 100, then the relative amount of moisture can be indicated by percentage. Observations have been recorded at comparatively few points, so that reliable means are difficult to obtain. The following table gives the relative humidity of a few stations during the year 1892:

MEAN RELATIVE HUMIDITY DURING THE YEAR 1892.

STATIONS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Baltimore.....	79	78	73	65	69	77	72	73	72	67	76	74	73
Barron Creek Springs.....	85	87	84	72	72	80	78	82	78	71	77	84	79
McDonogh.....	80	80	74	69	66	75	73	82	80	72	76	70	75
Washington, D. C.....	74	73	70	65	70	75	76	73	74	68	70	74	72

From 1871 to 1892 the mean relative humidity in Baltimore has been as follows:

MEAN RELATIVE HUMIDITY AT BALTIMORE DURING THE PAST 22 YEARS.

1871 to 1892.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Baltimore.....	70	65	64	61	65	68	68	70	74	68	70	68	67.6.

WINDS.

The prevailing winds in Maryland are north-westerly. During the summer months they are more from the south, varying from southwest to southeast in the eastern and central portions of the State; while in the winter months they are more from the northwest and west. In the

mountainous regions in Western Maryland the winds are more constantly from the northwest and west throughout the year.

Continuous records have been kept at only a few points sufficiently long to establish reliable means. Those obtained at Baltimore during the last 22 years are the best. They are given below.

MEAN DIRECTION OF WIND AT BALTIMORE DURING THE PAST 22 YEARS.

MONTH.	DIRECTION.	FOLLOWED BY RAIN OR SNOW.	
		Most Likely.	Least Likely.
January.....	N. W.	N. E. to S. E.	N. to W.
February.....	N. W.	N. E. to S. E.	N. to W.
March.....	N. W.	S. E. to S. W.	N. to W.
April.....	N. W.	S. E. to S. W.	N. to W.
May.....	S. E.	N. E. to S. E.	N. to W.
June.....	S. E.	S. E. to S. W.	N. to W.
July.....	S. W.	S. E. to S. W.	N. W. to N. E.
August.....	S. W.	S. E. to S. W.	N. W. to N. E.
September.....	N.	E. to S.	N. to W.
October.....	N. W.	E. to S.	N. to W.
November.....	N. W.	N. E. to S. E.	N. to W.
December.....	N. W.	N. E. to S. E.	N. to W.
Annual Mean.....	N. W.		

Other stations, at which less complete records have been kept, indicate the same general conclusions, except that the westerly direction of the wind veers more and more to the southerly in passing from the inland mountainous region toward the coast.

Along the shore line of the State during the warmer months there are inflowing currents of air, or sea breezes, which moderate the temperature of the land for some distance from the coast. They generally blow from mid-day till sundown, and are due to the heated atmosphere over the land rising and thus causing the cooler air over the water to flow in to take its place.

BAROMETRIC PRESSURE.

The variations in barometric pressure are not very great in the more populous portions of the State. Since none of the larger towns are situated at even a height of 1000 feet above sea level, the variations in the mercury column due

to elevation would not, at ordinary temperatures, exceed one inch. Even the highest ranges of the western portion of the State would show a difference of but little over three inches. In recording barometric observations, however, it is customary to make corrections by reducing the readings to a common datum, which is that of sea level. The most important variations in the barometric pressure are due to the passage of areas of low pressure, few of which, however, take their track directly across the State. Most of them pass to the north of the confines of Maryland. Their coming is generally accompanied by rainfall; and are preceded by a rise and followed by a fall in temperature. Barometric observations have been taken continuously at only a few points in the State, and no important general conclusions can be drawn from the records. The mean monthly barometric readings for Baltimore from 1871 to 1892 are given in the following table:

MEAN BAROMETRIC PRESSURE AT BALTIMORE DURING THE PAST 22 YEARS.

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
30.06	30.14	29.99	29.98	29.98	30.00	29.90	30.00	30.01	30.06	30.10	30.14	30.03

The Available Water-Power of Maryland.

BY WILLIAM B. CLARK.

Among the natural advantages afforded by the State of Maryland, by no means the least is the water-power. Although much is available within the limits of the State, only a small portion has been utilized down to the present time. Some of the most valuable powers are situated at a distance from railroad or water communications, so that no attempt has been made to use them, while the readily accessible localities have not been developed to their full capacity.

According to the Tenth Census report, Maryland held the 20th place among the States in the total amount of water-power employed, and 12th in the amount used per square mile. The total water-power utilized in 1880, when the last estimates were made, was equal to 18,043 horse-power, a little less than had been employed 10 years earlier, in 1870, while the amount of steam power had nearly trebled in the same period.

Very detailed investigations of the water-power of Maryland were conducted in connection with the tenth census, and as much of the data is of such a character as to be of lasting value, it will be, in many instances, incorporated in the present account.

The water-power of Maryland will be considered under the three topographic divisions explained in an earlier paper: 1. The Coastal Plain. 2. The Piedmont Plateau. 3. The Appalachian Region.

The Coastal Plain. The streams of the Coastal Plain do not afford, at any point, great power on account of their sluggish uniform currents. With the exception of the Potomac and the Susquehanna, which are tidal to the east of the "fall line," there are no large rivers. The smaller streams, however, afford sufficient power to drive numerous grist and saw mills, which are scattered throughout the eastern and southern counties. In a few instances larger works have been established, but the country is essentially an agricultural, not a manufacturing region.

The Piedmont Plateau. The best water-power of the State is found in the region of the Piedmont Plateau. The Potomac and the Susquehanna Rivers here flow with rapid currents, and with their greatest volume, before becoming tidal, while less variability is manifested than in their upper courses. The smaller streams, too, have wider drainage basins, and are less subject to sudden changes.

The Potomac River, in crossing the Piedmont Plateau, falls 230 feet, which is its height at Point of Rocks, to tide at Georgetown. The distance

is 47 miles, so that the average fall per mile is about 5 inches. There are several points at which the fall is much greater, as at Great Falls, 14 miles above Georgetown, where, in the distance of $1\frac{1}{2}$ miles, the river descends 80 to 90 feet. This would make the average fall for the remainder of the distance less than 3 inches in the mile.

Ascending the river, the first available power is five miles above Georgetown, at Little Falls, where a dam (No. 1) has been constructed for the Chesapeake and Ohio Canal, formerly an important waterway across the State. The estimated power here in low season of dry years is about 2600 horse-power. It has been employed to some extent at Georgetown.

The next site above is at Great Falls, fourteen miles above Georgetown. The water here pours over a rocky channel, and the facilities for building are ample on either bank. In the principal fall there is a descent of 35 or 40 feet in 100 to 150 yards, which is increased to 80 or 90 feet through a mile and a half. The drainage area above the Great Falls is estimated at 11,476 square miles, and the available power in a low season is estimated at 20,700 horse-power, which is wholly unemployed at the present time. The water supply for the cities of Washington and Georgetown is taken from above the falls.

The next site is just below the mouth of Seneca Creek, about seven miles farther up the river, where another dam (No. 2) has been constructed for the canal.

From this latter site to Point of Rocks the river has no pronounced fall. The current is moderately rapid, but no dams have been constructed.

The only tributary of importance entering the Potomac from the north throughout this distance is the Monocacy River, which rises to the north of the northern boundary of Maryland and drains an area of somewhat over 1000 square miles. The stream takes its course through a broad, low valley, and is as a rule sluggish. Its flow, although not so variable as the tributaries of the Potomac in the Appalachian Region, is still liable to considerable fluctuations, and freshets of some violence at times occur. Several grist and saw-mills have been built along the main stream and its tributaries.

The first stream north of the Potomac which is worthy of special mention is the Patuxent River, which west of the "fall-line" drains an area of about 200 square miles. The stream has a variable, and in dry seasons, a very small flow. Several sites have been improved and a few factories and mills built.

The next stream of importance above the Pa-

tuxent is the Patapsco, which west of the "fall-line" drains an area of about 300 square miles. It is the most important manufacturing stream in the State, and over 3000 horse-power is utilized. No other stream in the State, with the exception of the Potomac, offers so many advantages or so many sites for power.

Two tributaries of the Patapsco which enter that stream on the northern side, below the "fall-line," viz., Gwynns Falls and Jones Falls, have been employed to a limited extent. Since Jones Falls has been used by the City of Baltimore as a part of the public water supply, the mills that formerly utilized the power of the stream have been abandoned, or steam has been substituted.

The only other stream of importance before reaching the Susquehanna is the Gunpowder River, which divides, a short distance from its mouth, into Big and Little Gunpowder Creeks. The former drains an area of about 275 square miles, but the lower part of the stream is not available for power, as one of the reservoirs to supply the City of Baltimore has been located on the stream, and all the water rights below have been purchased by the city. Above the reservoir, considerable power has been utilized in the past, several small grist, saw, paper, woolen and other mills having been established. Upon the Little Gunpowder Creek, small powers have been improved, but the stream is not large.

The Susquehanna River flows 12 miles in Maryland from the State line to its mouth, during which distance it descends 69 feet, or an average of 5.75 feet per mile. There are few valuable sites, however. A canal which was built some years ago from Peach Bottom to Port Deposit, both for transportation and water-power, afforded several sites which were for a time utilized. The available horse-power produced at Port Deposit in a total fall of 80 feet in the canal was estimated in 1880 to be 94,000 horse-power in the low season of dry years.

To the east of the Susquehanna are several small streams in which the water-powers have been utilized to some extent. Among the more important are Principio, Northeast, and Big Elk Creeks. Several small cotton, woolen, grist, saw and paper mills have been established.

The Appalachian Region. With the exception of western Garrett County, all the drainage of the Appalachian Region reaches the Potomac River. Ascending that stream, from Point of Rocks, the first important site is at Weverton, 57 miles from Georgetown, at the point where the river finds its passage through the Blue Ridge Mountains. The power available here, in the low season of dry years, is estimated to be 5100 horse-power.

A few miles farther up the Potomac, at Harper's Ferry, just above the point where that stream is joined by the Shenandoah, there is, probably, the most favorable site on the river. The facilities for transportation are excellent, building materials are abundant, and there seems no reason why a large and fine power could not be utilized here. The power is estimated, in the low season of dry years, to be 2800 horse-power. At this point is situated a dam (No. 3), connected with the canal. The fall, from the dam to the mouth of the Shenandoah, is about 22 feet.

About 8 miles above Harper's Ferry the Potomac receives the Antietam River from the north. It drains a rolling and fertile country of about 340 square miles, but its declivity is uniform and uninterrupted by falls and rapids. The stream is utilized, to a considerable extent, together with its tributaries, to run grist, flour and paper mills. The flow of the stream is very variable, however.

Between the mouth of the Antietam River and Williamsport there are two sites upon the Potomac, one a mile below Shepherdstown, which has an estimated power, in the low season of dry years, of 920 horse-power, and a second, some 10 to 15 miles above, of 725 horse-power.

The Conococheague River, which joins the Potomac near Williamsport, drains an area of about 500 square miles. It resembles the Antietam, on the eastern side of the Great Valley, in all essential respects, and, like it, is utilized for grist and paper mills, none of which are very large.

There are several good sites on the Potomac between Williamsport and the junction of the north and south branches of that stream, but practically no attempt has been made to improve them. No tributaries of importance enter the Potomac from the north throughout this distance.

The north fork, which, throughout much of its course, forms the dividing line between Maryland and West Virginia, drains an area of about 1300 square miles. The flow of the stream, however, is very variable, and at Cumberland its maximum discharge is over 700 times its minimum, which is nearly fatal to the extensive use of water-power. This great variability is explained by the absence of lakes, the steepness of the mountain slopes and the narrowness of the valleys. Some of the tributaries of the north fork partake of its general characteristics, while others are said to be quite constant in flow, but on the whole their power is of little importance.

Most of western Garrett County drains to the northward by the Youghiogheny River into the Monongahela. The flow of the streams is for the most part variable, and very little attempt has been made to utilize the power.

With some striking exceptions which have been noted in the preceding lines, the greater portion of the developed water-power of the State is found in the Piedmont Plateau. The Potomac has some excellent sites in the eastern portion of the Appalachian Region, but farther to the west they become unimportant.

Altogether there is a vast amount of undeveloped water-power in the State, and in many instances the sites are most favorably located.

Miscellaneous Notes.

THUNDERSTORM OBSERVATIONS.

"The work of collecting observations of thunderstorms, which was conducted in a number of States during the summer of 1892, the Chief of the Weather Bureau desires continued during the summer of 1893, over a more extended territory, and with this end in view the co-operation of meteorological observers and others interested is earnestly solicited. The object of this work is to gather material to be utilized in the study of these storms and the attending atmospheric conditions, with a view to making the forecast of value to agricultural interests. The great advantage of receiving information as to the actual prevalence of violent thunderstorms in certain quarters of your State, with reliable predictions as to when such a storm will likely reach your own community, should be apparent to all, and as there is no class of citizens which would not be benefited by a system that would make such work possible, there should be no difficulty in securing the voluntary assistance of observers in such numbers as to supply ample material for this work. Upon such voluntary co-operation on the part of observers the success of the plan will largely depend."

The above paragraph is from a circular sent out by the Chief of the Weather Bureau. The co-operation of people in all parts of Maryland and Delaware is asked. Copies of the circular and cards for making reports will be sent upon application, until the supply is exhausted. An observer undertaking these reports should have in his possession a good thermometer and a rain-gauge; but if he has no rain-gauge, a pail or can with vertical sides can be used, when the amount may be measured with a common rule.

Mr. C. R. Moore, Birdsnest, Va., Mr. O. A. Browne, Cape Charles, Va., and Mr. C. H. Constable, Warsaw, Va., observers of the Virginia State Weather Service, have kindly volunteered to forward monthly meteorological reports to the Maryland Service. The situation of these stations, near the southern border of Maryland,

makes the reports of considerable value to the Maryland Service, particularly in the drawing of isotherms.

Dr. J. Lee McComas, Oakland, Md., and Mr. Thomas Berry, Benedict, Md., have forwarded meteorological records for April, and the results of their observations are included in this Report.

During the month, Mr. A. W. Nyce, Glyndon, Md., and Mr. E. A. Reynolds, Rising Sun, Md., were appointed Weather Signal Displaymen.

Review of the Month—April.

WEATHER.

Weather Conditions of the Month as Related to Areas of High and Low Barometric Pressure.—The month opened with fair weather in Maryland. A storm (area of low barometric pressure) had just passed to the northeast, attended by warmer weather and light rainfall, principally in its west quadrants, as frequently happens when the air is comparatively dry, and the storm followed by a decided fall in temperature. Light showers fell in Western Maryland. Between the storm above mentioned and its successor, extended from north to south across the United States, an indistinctly defined ridge of high pressure, and the cooler, fair weather of the 2nd and 3rd was due to its presence. On the 4th the storm from the northwest, in the rear of the ridge of high pressure, passed eastward to the north of Maryland, causing a considerable rise in temperature, but no rain. The lack of precipitation, in Maryland, seems to have been due to the presence of an area of high pressure to the southward, and the northerly route of the storm. From the night of the 4th to the night of the 5th a well defined area of high barometric pressure was passing from west to east across the Atlantic States, and the fair weather continued, attended by a slight drop in temperature. The fall in temperature continued on the 6th, as the storm, succeeding the high area, swept up from the southwest, and there flowed into its vortex the cold northeast wind from the area of high pressure to the northward. Very light local rains fell. On the evening of the 6th the weather map showed the high area last mentioned to have settled southward, and the storm to have disappeared. On the 7th this high area was replaced by an extensive area of low pressure from the west; the temperature rose, and the period of dry weather came to an end with quite general rains in Maryland, the District of Columbia, and Delaware. Showers fell, also, on the 8th and 9th, due to a lingering secondary of the storm above mentioned.

A high area passed to the northward on the

9th, but it was small and could not ward off the rains caused by another storm, which extended in a long trough of low pressure from the southwest. On the 10th, with a depression on the south, and a cold high area on the north, cold north-east winds blew across Maryland. The rains were quite general, and in places heavy, on the 10th, but lighter and more dispersed on the 11th, as the high settled southward and displaced the storm.

A very severe storm, which originated in Utah on the 10th, and traveled northeast over the Lake Region, caused the rains of the 12th and 13th, and the rise in temperature on the 13th and 14th; but its strong secondary from the southwest immediately elongated to the northeast, causing rains on the 14th, and strong, cold northerly winds. As a high area succeeded the low area on the 15th, the low temperature continued; and as the high last mentioned became merged into another and very extensive area of high pressure to the westward, cool, fair weather prevailed, with a few scattered, indisposed showers until the evening of the 19th. Then a very severe storm which had started in Texas on the 17th included Maryland within its borders. The cool weather continued, and general and heavy rains fell. The rains were lighter and more dispersed on the 21st, and on the 22nd but light local showers resulted.

On the 22nd the depression from the southwest, which had partially divided, retreated eastward, followed by a well defined and extensive wave of high pressure. The weather continued cool, and was generally fair on the 23rd and 24th, as a result of these conditions.

On the 25th a storm, which made its appearance on the 22nd in the far northwest, but which was crowded into a more southerly course than is usual with storms starting there, was central in Oklahoma Territory, and its rain area extended eastward to the Middle Atlantic coast. After remaining nearly stationary in Oklahoma Territory for 12 hours, it recurved, passing northeast over the Lake Region, and down the St. Lawrence Valley. By the night of the 28th it had passed to the northeast; but another storm immediately swept up from the southwest, and though the weather was generally fair on the 28th, light rains were general on the 29th, as a result of the secondary storm.

The showers of the 30th were due to another depression then approaching from the southwest. The temperature, which was generally below the average from the 15th to the 28th, rose to the normal on the 29th and 30th.

Temperature (degrees).—Monthly mean (for entire territory covered), 52.4; highest monthly mean, 58.6, at Benedict; lowest monthly mean,

46.2, at Sunny Side. Highest temperature, 92 at Boettcherville, on the 8th; lowest temperature, 22, at Sunny Side, on the 24th. Greatest local monthly range, 59, at Sunny Side; least local monthly range, 37, at Distributing Reservoir, D.C., and Receiving Reservoir, D.C. Mean monthly range, 45.2. Mean maximum temperature, 61.9; mean minimum temperature, 44.3.

Attention is invited to the map, page 13, which shows in a graphic manner the mean temperatures of the different sections.

Precipitation (in inches).—Average, 3.94; greatest amount, 6.75, at Oakland; least amount, 2.56, at Jewell. The greatest fall of snow during the month, in Maryland, 3.5 inches, was reported by the observer at Sunny Side; the least fall, trace, at New Market.

The distribution of the rainfall throughout the month is exhibited by the table of daily precipitation, page 12, and the distribution over the surface, of the entire monthly fall, is shown by the map, page 13.

Wind.—Prevailing direction, southeast. Total movement in miles, Baltimore, 6604; Norfolk, Va., 8278; Washington, D. C., 5869.

Halos.—Lunar, at Baltimore, on the 24th, 27th; at Glyndon, on the 3rd, 22nd. Solar, at Baltimore, on the 18th.

Corona.—Lunar, at Baltimore, on the 27th; at Cumberland (H. Shriver), on the 27th.

Polar Bands.—At Baltimore, on the 27th; at Cumberland (H. Shriver), on the 27th.

Meteors.—At Baltimore, on the 1st.

Auroras.—At Millsboro, Del., on the 21st.

Hail.—At Barron Creek Springs, on the 29th; at Cambridge, on the 29th; at Fenby, on the 7th; at Glyndon, on the 7th, 20th; at New Market, on the 20th, 22nd; at Oakland, on the 20th.

Thunderstorms.—At Benedict, on the 29th; at Cambridge, on the 7th, 15th, 29th; at Cumberland (H. Shriver), on the 7th, 20th, 29th, 30th; at Dover, Del., on the 29th; at Fallston, on the 7th; at Fenby, on the 21st; at Frederick, on the 14th, 20th; at Glyndon, on the 8th; at Jewell, on the 7th, 17th, 29th; at Leonardtown, on the 14th, 15th, 29th; at Mt. St. Mary's, on the 9th, 14th; at New Market, on the 17th, 20th; at Seaford, Del., on the 29th; at Solomon's, on the 15th, 27th, 29th; at Oakland, on the 3rd, 20th, 29th.

Average number of clear days, 9; fair days, 9; cloudy days, 12; rainy days (.01 of an inch or more), 12.

CROPS.

Week ending April 10th.

Western Maryland.—The threatened drouth relieved by copious rains at close of week.

The rain was much needed, as late sown wheat was looking bad in some places. Oats sowing and potato planting in progress. Grass looking well. Prospects for fruit favorable.

Northern-Central Maryland.—A great deal of Spring work accomplished; potatoes planted; oats sown; soil in excellent condition; growing grain rather better than average; fruit promising well.

Peach buds uninjured, but crop will not be large, owing to many trees having died during past three years.

Southern Maryland.—Farm work far advanced; the rain that fell was of great benefit to wheat, oats, grass, and all crops; some clover damaged by dry weather; tobacco plants growing well. Showers of the 7th enabled the setting out of early cabbage and strawberry plants; the cloudy weather following was favorable. Prospect for peaches, favorable.

Eastern Maryland.—Prospect reported good for full peach crop, peach buds being in good condition, abundant, and swelled nearly to blooming. Fruit, generally, not so early as usual, owing to severe winter. Wheat and grass have been backward, but will greatly improve owing to the recent rains. Weather has been very favorable for all kinds of farm work.

Week ending April 17th.

Western Maryland.—Rains of past week beneficial to growing crops, but unfavorable for farm work. It is thought that the cold weather of Saturday may have injured the fruit. Warm weather needed.

Northern-Central Maryland.—Outdoor work, to some extent, interrupted by the well distributed and much needed rain. All crops improved; clover short; wheat fields looking well, with few exceptions, but warmer weather with sunshine needed. Preparations for corn planting well advanced. Ground in excellent condition. Fruit prospects good.

Southern Maryland.—In southern portion wheat and grass suffered from drouth for month preceding past week, when relief came with generous showers. Plowing backward. Oats coming up. Clover and grass seed backward in sprouting. Tobacco beds late. Peas growing nicely. Cherry, peach, and pear trees beginning to bloom. Full crops of all fruits anticipated; some fears, however, as to results of Saturday night's cold weather.

Eastern Maryland.—The liberal rains of the week, well distributed, and slightly in excess of the normal, have greatly benefited all crops in all sections. Wheat and grass growing rapidly. Peach trees beginning to bloom, and an abundant crop promised. Other fruit ready to blossom.

Pear crop bids fair to be a full one. Corn ground nearly all broken. Farm work well advanced.

Week ending April 24th.

Western Maryland.—Spring plowing well advanced in eastern sections, and corn will be planted during ensuing week. A delay of farm work on account of the rain is reported. It is believed that there has resulted no injury to fruit crop on account of the frost. Wheat has improved.

Northern-Central Maryland.—Wheat, generally, looks well; the weather, however, has been too wet and cold for all growing crops. Peaches in some places thought to have been injured by frost of 24th. Plowing delayed by wet weather.

Southern Maryland.—Wheat not yet recovered from past drouth. Oats and tobacco plants growing nicely. Some apple blossoms show effects of frost of 16th, though fruit, generally, is not thought to be injured. Corn planting has begun. The rains of the week have been beneficial, but warmer weather and more sunshine is needed.

Eastern Maryland.—The past week, on account of the heavy rains and low temperature, has not been favorable, generally, to the rapid preparation of corn ground, though better reports have come in from some localities. Some corn has been planted. Wheat is stated to have wintered well and to be in good condition. Grass somewhat backward, but now improving. Oats beginning to look green. Cherry and pear trees in blossom. Peach trees in bloom, and not thought to have been injured by the cold weather.

Week ending May 1st.

Western Maryland.—Wheat fair; grass short; oats growing slowly; peach trees in bloom—reported not injured by frost.

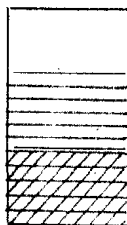
Northern-Central Maryland.—Wheat, oats, and grass looking fairly well; farm work delayed, and corn planting late on account of wet weather; fruit probably not injured by frost.

Southern Maryland.—Grass and grain not up to average, but benefited by the copious rains. Oats growing nicely; plowing retarded; tobacco plants plenty and doing well; fruit trees in bloom, and thought uninjured by frosts; early peas looking well; beans and corn, planted over two weeks ago, now coming up; some tomato plants set out.

Eastern Maryland.—Weather unfavorable for farm work; little corn planting yet done; peach trees, and fruit trees generally, in bloom and reported uninjured by cold weather; strawberries in blossom and injured slightly by frosts; raspberries looking well; wheat and grass in good condition.

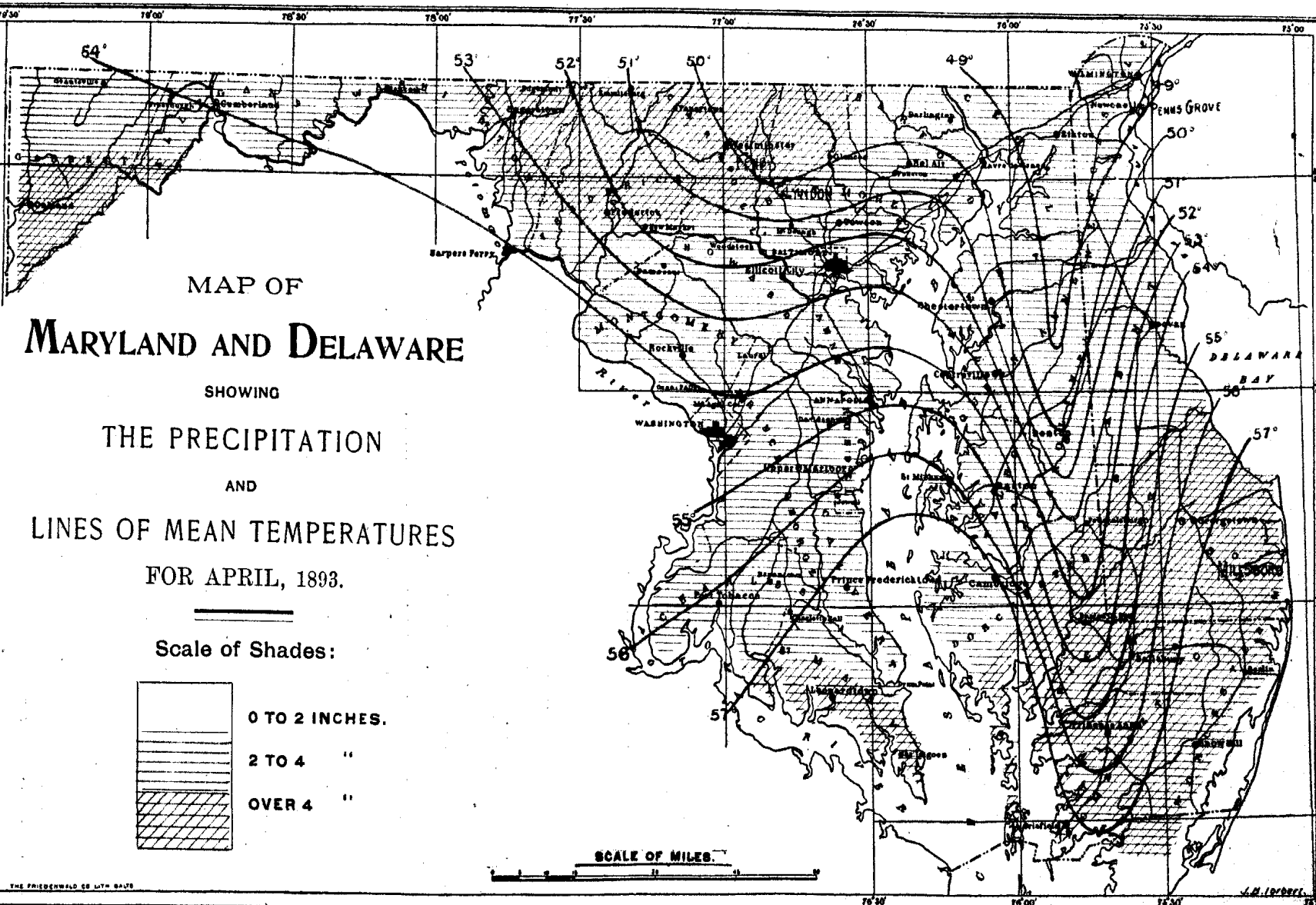
MAP OF
MARYLAND AND DELAWARE
 SHOWING
 THE PRECIPITATION
 AND
 LINES OF MEAN TEMPERATURES
 FOR APRIL, 1893.

Scale of Shades:



0 TO 2 INCHES.
 2 TO 4 "
 OVER 4 "

SCALE OF MILES.



Meteorological and Weather Signal Display Stations of the Maryland State Weather Service.

Stations.	County.	Meteorological Observer.	Displayman.
Annapolis	Anne Arundel.....	.....	W. M. Abbott.
Appleton	Cecil.....	.....	W. C. Henderson.
Baltimore.....	.....	{ E. C. Meredith. A. T. Brewer, Ass't Editor of Monthly Report. H. D. Stuart, Ass't Editor of Weekly Bulletin. R. C. New.	.....
Barron Creek Springs... ..	Wicomico	A. E. Acworth.....	L. A. Wilson
Benedict.....	Charles.	Thomas Berry.	.....
Bel Air.....	Harford.....	.....	N. N. Nock.
Boettcherville.....	Alleghany	F. F. Brown.	.....
Bradshaw	Baltimore.....	.....	B. F. Taylor.
Bridgeville, Del.....	Sussex .....	.....	T. J. Gray.
Buckeystown.....	Frederick.....	.....	A. W. Nicodemus.
Cambridge	Dorchester.	Calvert Orem.....	Calvert Orem.
Chestertown.....	Kent.....	.....	J. S. Vandegrift.
Cumberland	Alleghany.....	{ Howard Shriver. E. T. Shriver.	.....
Darlington... ..	Harford	A. F. Galbreath.	.....
Delaware City, Del.....	New Castle.....	.....	W. E. Reybold.
Denton.....	Caroline.....	F. C. Ramsdell.	.....
Dickerson	Montgomery .....	.....	W. H. Dickerson.
Distributing Reservoir, D. C.....	.....	Lieut.-Col. Elliot.	.....
Dover, Del.....	Kent.....	Jno. S. Jester.	.....
Easton.....	Talbot.....	G. W. Minnick.....	G. W. Minnick.
Edgemont.....	Washington	Chas. Feldman.	.....
Fallston.....	Harford.....	G. G. Curtiss, A. M.	.....
Fenby.....	Carroll.....	Wm. Fenby.	.....
†Felton, Del.....	Kent.....	.....	J. H. Hubbard.
Frederick	Frederick.....	G. Ernest Bantz.....	W. T. Delaplaine.
Frostburg	Alleghany .....	.....	C. J. Conner.
Glyndon.....	Baltimore.....	A. W. Nyce.....	A. W. Nyce.
Grantsville... ..	Garrett.....	.....	T. H. Bittinger.
Great Falls.....	Montgomery.....	Lieut.-Col. Elliot.	.....
Greensboro.....	Caroline.....	.....	Plummer & Plummer
Havre de Grace.	Harford.....	.....	W. S. McCombs.
Jewell.....	Anne Arundel.....	Jos. Plummer.	.....
Kirkwood, Del ..	New Castle.....	W. C. L. Carnagy.	.....
Leonardtwn.	St. Mary's.....	G. W. Joy.	.....
Lonaconing.....	Alleghany .....	.....	J. J. Robinson.
McDonogh.....	Baltimore.....	.....	H. Pender.
Middletown.....	Frederick .....	.....	G. C. Rhoderick, Jr.
Milford, Del.....	Kent.....	J. Y. Foulk.....	J. Y. Foulk.
Millsboro, Del.....	Sussex.....	Rev. L. W. Wells.	.....
Mt. St. Mary's.....	Frederick	J. A. Mitchell, A. M.....	Jos. H. Martin.
New Market	Frederick	H. H. Hopkins, M. D.	.....
Oakland.....	Garrett.....	J. Lee McComas, M. D.	.....
Odenton.....	Anne Arundel.....	.....	E. B. Watts.
Receiving Reservoir, D. C.....	.....	Lieut.-Col. Elliot.	.....
Rising Sun.....	Cecil .....	.....	E. A. Reynolds.
Salisbury	Wicomico.....	.....	L. W. Gunby.
Seaford, Del.....	Sussex.....	H. L. Wallace.....	H. L. Wallace.
Snow Hill	Worcester .....	.....	Purnell & Vincent.
Solomon's	Calvert.....	W. H. Marsh, M. D.	.....
†Sparrow's Point.....	Baltimore.....	.....	Md. Steel Co.
St. Michael's.....	Talbot.....	.....	E. M. Jefferson.
Sunny Side.....	Garrett.....	John G. Knauer.	.....
Taneytown.....	Carroll.....	C. W. Weaver, M. D.	.....
Washington, D. C.....	.....	S. W. Beall.	.....
Westminster.....	Carroll.....	.....	W. S. Myer & Bro.
Wilmington, Del.....	New Castle.....	.....	Wm. Lawton.
Woodstock	Howard	T. J. A. Freeman, S. J.	.....
*Birdsnest, Va .....	.....	C. R. Moore.	.....
*Cape Charles, Va.....	Northampton	O. A. Browne.	.....
*Norfolk, Va.....	.....	A. B. Crane.	.....
Warsaw, Va	Richmond.....	C. H. Constable.	.....

*Stations of the Virginia State Weather Service. †Whistle signals only.

MONTHLY SUMMARY OF REPORTS FOR APRIL, 1893.

STATIONS.	COUNTIES.	Altitude above sea in ft.	Latitude.	Longitude.	TEMPERATURE.														Monthly Range.	Total Precipitation.	Clear Days.	Fair Days.	Cloudy Days.	Rainy Days. (.01 or more.)	Prevailing Wind.
					Monthly Mean.	Mean of Max.	Mean of Min.	Max.		Min.															
								Degrees	Date.	Degrees	Date.														
Baltimore.....		179	39°17'	76°36'	52.7	60.6	44.6	81	8	36	16	45	3.52	9	11	10	15	S. E.							
Barron Ck. Springs.....	Wicomico.....	25	38 30	75 39	53.1	59.1	46.6	75	29	35	10	40	5.42												
Benedict.....	Charles.....		38°31'	76°39'	58.6	66.1	51.1	81	9	42	11	39	3.28	18	0	12	5	W.							
Boettcherville.....	Alleghany.....		39 33	78 48	51.0			92	8	34	24	58	4.10												
Cambridge.....	Dorchester.....		39 39	76 46	57.6	65.6	49.6	78	29	40	6	38	3.47	11	5	14	9								
Cumberland (a).....	Alleghany.....	650	39 39	78 46	55.3	62.7	48.0	86	7	37	2	49	3.90	8	0	22	9								
Cumberland (b).....	Alleghany.....	650	39 39	78 45	52.3	60.1	44.5	88	8	32	16	56	3.96	15	5	10	14								
Darlington.....	Harford.....	300	38 47	76 14	49.9	59.1	40.7	78	4	32	3	46	3.18	16	5	9	9	S. W.							
Denton.....	Caroline.....	72	38 52	75 41	50.0	58.8	41.1	82	8	33	9	49	3.77	8	13	9	8								
Dist. Res., D. C.....			39 9	77 0	54.0			75	4	38	24	37	2.85												
Dover, Del.....	Kent.....		38 42	75 31	53.4	62.9	43.9	77	8	37	16	40	3.59	12	8	10	16	N. W. S. W.							
Easton.....	Talbot.....	35	39 45	76 6	55.0	65.4	44.7	80	14	37	7	43	3.38	6	16	8	9	N. W.							
Edgemont.....	Washington.....	35	39 31	77 36	50.6	59.0	42.3	76	8	31	21	45													
Fallston.....	Harford.....	1100	39 33	76 24	50.5		42.3	78	4	35	16	43	4.00	0	15	15	13	E.							
Fenby.....	Carroll.....	450	39 24	77 5	50.6			78	8	35	16	43	4.90	7	11	12	11	S. W.							
Frederick.....	Frederick.....	950	39 27	77 18	52.7	62.0	43.4	78	9	34	16	44	4.80	9	14	7	12								
Glyndon.....	Baltimore.....	280	39 0	77 41	50.0	58.7	41.4	78	8	33	24	45	4.83	15	5	10	14	S. E.							
Great Falls.....	Montgomery.....	660	38 44	77 14	54.0			77	8	39	24	38	2.69												
Jewell.....	Anne Arundel.....		39 35	76 36	56.0							2.56	10	12	8	11	N. E.								
Kirkwood, Del.....	New Castle.....		38 18	75 40	48.5																				
Leonardtown.....	St. Mary's.....		39 23	76 40	52.6	61.6	43.5	82	8	36	16	46	4.16	10	13	7	11	S. E.							
McDonogh.....	Baltimore.....		38 35	76 44	51.0	58.6	43.4	76	8	34	16	42	3.72												
Millsboro, Del.....	Sussex.....	535	39 41	75 15	53.6	64.0	43.3	80	8	34	12	46	5.31	11	9	10	13	N.							
Mt. St. Mary's.....	Frederick.....		39 23	77 21	51.6	61.1	42.1	79	8	33	3	46	3.61	5	13	12	10	S. E.							
New Market.....	Frederick.....	720	39 25	77 18	51.2			78	1	36	16	42	3.36	7	12	11	8	N. W.							
Oakland.....	Garrett.....	500	38 52	77 29	47.4			81	8	28	3	53	6.75	10	8	12	19	S. W.							
Rec. Res., D. C.....		2376	38 40	77 0	54.0			76	4	39	24	37	2.63												
Seaford, Del.....	Sussex.....		38 19	75 35	54.4	66.0	42.8	78	8	35	6	43	4.68												
Solomon's.....	Calvert.....		39 22	76 27	54.8	63.5	46.0	81	8	32	27	49	3.54	4	5	21	12	S. E.							
Sunny Side.....	Garrett.....	20	39 40	79 27	46.2			81	8	22	24	59		7	2	21	16	S. W.							
Taneytown.....	Carroll.....		38 52	77 9								5.38													
Washington, D. C.....			39 20	77 0	53.8	63.2	44.4	84	8	35	16	49	3.21	7	13	10	15	S.							
Woodstock.....	Howard.....	112	36 51	76 49	51.6	61.1	42.1	79	8	33	3	46	3.61	5	13	12	10	S. E.							
‡ Millville, N. J.....	Cumberland.....				54.0	63.4	44.7	76	1	34	3	42	3.40	9	11	10	10	N. W.							
‡ Cape Charles, Va.....	Northampton.....				56.2			81	29	40	6	41	2.42	4	11	15	11	S.							
‡ Birdsnest, Va.....					57.3			84	29	42	6	42	2.10												
‡ Norfolk, Va.....					60.0	69.0	50.0	87	29	40	7	47	2.07	11	14	5	11	S. W.							
‡ Warsaw, Va.....	Richmond.....				59.3	72.8	45.8	89	29	34	24	55	3.39	4	19	7	11	E.							
Averages.....					52.4	61.9	44.3					45.2	3.94	9.4	9.0	11.8	11.7	S. E.							

"a"—H. SHRIVER.

"b"—E. T. SHRIVER.

‡ Omitted in computing averages.

DAILY PRECIPITATION FOR APRIL, 1893.

STATIONS.	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	To-tal.
Baltimore.....		T					.15	.01	.11	.31	.01	.43	T	.05	.34		.02		T	1.08	.11	T	T		.12	.01	.78		.54			3.52
Barron Ck. Spr.						T	.35						1.87							.80							1.44			.96		3.42
Benedict.....							.20							1.08						.50							1.25		.25			3.28
Boettcherville.....			T	T			T		1.30			.50	.10	.20	.20					.50	.20	.10	T		.20	.60		.20		T		4.10
Cambridge.....							.22	.25	.13			.08			1.40					.69					.19		.12		.89			3.47
Cumberland (b).....							.08	.85	.35	.20	.12			.33					.15	.74	.10	.04			.15	.52		.18	.15			3.96
Darlington.....							.20		.35	.23		.78								.81	.03				.14		.63		.03			3.18
Denton.....							.16		.46	.12		.25	.37							.66					.20		1.55					3.77
Dist. Res., D. C.							.15	.18	.08	.25		.13		.39				.07		.22	.50				.16		.70		.06			2.85
Dover, Del.....							.20	.18		.30		.16		.59						.52	.02						1.55		.07			3.59
Easton.....							.15	.27	.20	.04	T		.73							.57							1.30		.12			3.38
Fallston.....	T						.23	.10	.33	.02	.40	.02		.82		T				.87	.24	.02			.08		.82		.05	T		4.00
Fenby.....							.20		T	.30		.60	.10	1.00	.70					.90	.50				.10		.40		.10	T		4.90
Frederick.....							.10	.04	.26	.53				1.53		T				1.77						.16	.28		.13			4.80
Glyndon.....							.12	.05	.63	.45	.15	.45	.31			T		T		1.42	.11	.11			.44	.06	.49		.04	T		4.83
Great Falls.....								.10		.26		.24		.36			.23			.06	.54	.05				.14	.63	.06		.02		2.69
Jewell.....	T					T			.38	T				.50		.25				.10					.25		1.00		.08			2.56
Leonardtown.....							.17		.20		.15			1.93		.12				.19	T						1.20		.20			4.16
McDonogh.....							.08	.13	.45	.47	.02	.24	.43		.03	1.94				.97					.12		.78					3.72
Millsboro, Del.....							.33	.05	.13	.08		.05	.01	.03	1.94					1.08		.03			.22	.03	1.35		.06			5.31
Mt. St. Mary's.....							.16		.15	.02	.27	.48		.16	.46					1.20	T	T			.11		.70		.06			3.61
New Market.....							.25				.60					T				1.57					.20		.44					3.36
Oakland.....	.23			.13		.11		.58		1.17		.36	.40	.58	.03		.02	.03		1.85	.43	.11	.17		.57	.47			1.03	.08		6.75
Rec. Res., D. C.							.04	.10	.13	.07	.20		.03		.34					.04	.56	.02				.15	.58		.06			2.63
Seaford, Del.....							T	.19	.22	.12		.03	T	1.63						.61					.20		.84		.36			4.64
Solomon's.....			T	T			T	.09	T	.03	.13		.03	T	1.46		.02			T	.28	T				.43	.05	.80		.16		3.54
Taneytown.....							.08	.09		.30		.62		1.21	1.46					.97	.06					.02	.05	.90		.17		5.38
Wash., D. C.....		T					.06	.10		.19	.26	.10	.02	T	.40		.09			T	.74	.17	T	.01		.13	.05	.79		.11		5.21
Woodstock.....							.16		.15	.02	.27	.48			.46					1.20					.11		.70		.06			3.61
Millville, N. J.							.27		.09	.38	.03		.08		.41					.02	.89				.14		.14					3.40
Cape Charles, Va				.06			.01	.14		.10			.07	.06		T				.01	.79				T	.50		.23		.60		2.42
Norfolk, Va.....							T	T			.01	.01	.06		.02					.04	.18	.01				.63	.23		.26	.64		2.07
Warsaw, Va.....				T			.02	.10	.02		.06	.06			1.14		.02			.25						.38	1.08		.26			3.89