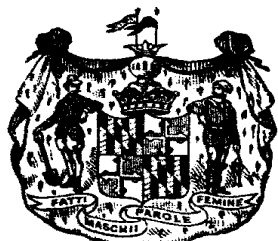


U. S. DEPARTMENT OF AGRICULTURE, WEATHER BUREAU,

CO-OPERATING WITH THE

MARYLAND STATE WEATHER SERVICE

Established by an Act of the General Assembly of the State of Maryland, 1892,
and Maintained in Connection with



The Johns Hopkins University and the Maryland Agricultural College.
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.

VOL. III, No. 6.

MONTHLY REPORT.

OCTOBER, 1893.

Influence of Forests on Climate and Agriculture.

BY C. P. CRONK.

When trees enough to make a forest are massed together they may exert a potent influence upon the climate and agriculture of a locality. The velocity of the wind along the surface of the earth is decreased, less air passes over the ground and, consequently, less moisture is taken up. The earth does not rapidly dry out, bake and crack open, thus becoming unfit for cultivation; and plants with weak stalks, like wheat and corn, are protected from gales that otherwise would overthrow them.

It is possible that protection from the tornado may be obtained by tree-planting. Certainly the presence of trees on the great plains of the West would tend to reduce the energy of the cyclonic disturbances which are, themselves, the tornado-producers. The cyclonic storms are originated by the overheating of a limited portion of the earth's surface. The air above expands and rises, and the surrounding air rushes in to take its place. The rotation of the earth sets up the necessary gyratory movement and gives direction to the disturbance; precipitation occurs, latent heat is liberated, and the storm is formed. Many of our great storms form on the great plateau east of the Rocky Mountains, and it has been advanced that the planting of trees in this region, to prevent the overheating of the earth's surface, would diminish the energy of these storms and thus lessen the frequency of tornados. The surface of the ground would be cooler in summer, a smaller amount of heat would be furnished, and

heat is essential to the production and life of these cyclonic areas. A forest is, also, a shield which offers a considerable degree of resistance to the tornado. Buildings in the open are more often destroyed than those in the lee of woods.

In winter, in those portions of the country exposed to chilling winds, trees are invaluable as wind-breaks. In the West and Northwest the timber belts that have been grown by the settlers are particularly valuable in the protection they afford to flocks and herds; and if a dense tree belt could be grown across northern Texas the terrors of the norther would be much lessened.

As the tree in the summer cools the surrounding atmosphere by the evaporation from its many surfaces, conversely, in winter it warms the surrounding air by radiating heat. It not only absorbs heat during the day, to be radiated back again into the atmosphere at night; it also makes heat—a certain amount of warmth is generated in it, as it is developed in the bodies of animals, by the physiological changes going on within. This heat also is radiated, as heat is radiated from animals, and the temperature of the surrounding air is raised. This warming influence may be proven by the thermometer; and in winter, when snow lies upon the ground, it is demonstrated by the bare spaces about the roots of trees. Trees, then, warm the winters and cool the summers, and bring nearer to each other the maximum temperature of the day and the minimum temperature of the night.

Forests protect from lightning. The trees of the forest, being very good conductors of electricity, relieve the electric tension of the earth and clouds, thus giving protection to the surrounding country. The lightning strikes the

isolated tree, but rarely one in the forest. For the same reason lightning rarely does damage in a city. The great mass of material of which a city is built acts as a mediator between earth and sky and the electricity is usually conducted quietly away. It is the solitary barn or dwelling in the country that is struck.

It is the ground itself, however, that is most perfectly protected by the forest of a country. The roots and rootlets of the trees bind together the particles of soil so that it is not readily washed away. As a matter of course, hills shorn of their forests suffer most, their soil being washed down into the river or the valley below. This is the reason why valleys are generally fertile and why so many hills are barren. But if the wooded hills and mountains are preserved as such, the rain or snow which falls upon them does not rush as floods into the valleys, overflowing rivers and creeks and carrying destruction to crops, animals, and perhaps to the inhabitants themselves. The roots of the trees and the accumulated mold have rendered the soil porous and capable of holding a great amount of moisture. The rain and the snow are conserved and gradually given to the streams (which have their headwaters there) and soil below. Before a country has been denuded of forests, its streams do not vary greatly in size from season to season. Rain or drought influences them but little; but after the trees have been taken away the rivers are roaring torrents during rains and mere threads during drought.

In the state of Iowa it has been conclusively proven, by comparison of the records of the State Weather Service, that the annual rainfall is more evenly distributed throughout the year in the more heavily wooded portions of the state. Data recorded in other portions of the country give the same evidence. This evenness of rainfall distribution is of unusual value to agriculturists, and the reason is obvious. The annual rainfall for a place varies but little from year to year. If a great deal of it falls at one time, or during one storm, crops are injured by the complete saturation of the ground or by the rush of waters. A drought succeeds the flood, and that portion of the crop not destroyed by the water very likely succumbs to extreme heat and dryness; but if the supply of rainfall occurs in showers, the ground each time receives the proper amount for the sustenance of the plants.

Trees and all plants favor the formation of dew. Dew is especially beneficial to vegetation when the annual rainfall is small. By the radiation of heat into the air at night the leaves of plants become colder than the surrounding atmosphere, and finally, if the conditions are favorable, their temperature sinks below that

of the dew-point, and the moisture of the atmosphere is condensed upon them in the form of dew.

Over a country denuded of forests the air is dry, for the trees are not there to draw up from the subsoil, even 20 feet below the surface, moisture to be contributed to the surrounding air through the many evaporating surfaces. The air becomes thirsty, as it were, and, in the absence of other moisture, parches and cracks the earth's surface and evaporates the waters of its lakes and rivers.

The effect of tree-destruction is not better illustrated than in the old world along the shores of the Mediterranean. This was once the garden region of the world; then it was protected by its trees. Since their destruction much of it has become an unproductive desert. Even in our own country the harm is already apparent in many sections. The streams have become smaller and the ground is less fertile than it was. In the great pine-producing states of the North—Michigan, Wisconsin, and Minnesota—the destruction during the last 20 years has been almost incredible. From the forests of Michigan in 1881 about 4,000,000,000 feet of lumber was manufactured, not including great quantities of square timber, shingles, staves, laths, etc. The trees destroyed that year brought in a revenue of about \$80,000,000. The result of the wholesale destruction is already apparent in the thousands of acres of fire-blackened pine-barrens, and in the deserted cities which owed their growth and life to the lumber trade.

The pioneers of the East found too many trees, but the settlers of the great plains of the West very soon found out that trees were a necessity and forthwith began growing them. The traveler who now crosses the continent through the states of Iowa, Kansas, or Nebraska will see the long belts of forest trees which the laws of the states have compelled the owners of land to plant. The results have been marked. The rainfall is more evenly distributed, crops are raised with less difficulty than formerly, and flocks and herds flourish where years ago they often perished from exposure.

In the States of the East it is time something were done to preserve the remaining forests. Good farmers know that there is profit in keeping a portion of their land in timber; but, on the other hand, many of the selfish and ignorant, intent only upon present gain, will persist in the wholesale destruction of timber, without a thought to the effect upon the future prosperity of the community. Protection lies in the enactment of wise forestry laws by the several States. It is believed that by such means will it be possible to preserve the forest trees and foster their growth in a degree adequate to the needs of our country.

Miscellaneous Notes.

Upon the application of President C. L. Keedy of Kee Mar College, Hagerstown, Md., that place has again been established as a voluntary observing station of the Maryland State Weather Service and U. S. Weather Bureau. The observations will be taken at the college.

Major George M. Thomas, President of the Charlotte Hall School, St. Mary's Co., Md., has turned the government instruments in his possession over to Prof. J. F. Coad, who has consented to take observations for the Maryland State Weather Service and U. S. Weather Bureau.

Mr. Emmit Dove, Rockville, Montgomery Co., Md., has been appointed weather signal displayman.

Mr. J. M. Myers, Bachman's Valley, Carroll Co., Md., has kindly volunteered to forward monthly meteorological reports to the Maryland Service, and the result of his first month's work is included in this report.

Another winter is close at hand, and the observers of the Maryland Weather Service are again requested to use the care necessary to obtain accurate snow measurements. The following paragraph bearing upon this important matter is quoted from a circular letter received from the Chief of the Weather Bureau:

"In the new Form No. 1009, Meteorological, (manifold copy) there should be entered in the column headed 'Snowfall in inches,' the amount of snow that falls each day, measured in accordance with the directions given on page 48 of 'Instructions for Voluntary Observers.' After snow has been measured it must not be remeasured each succeeding day until it finally disappears; but if in the meantime fresh snow should fall, it must be measured and recorded exactly as if there were no snow on the ground at the time it fell. If the snow cannot be melted as directed by the above-named Instructions, it is important that the equivalent of the unmelted snow, in water, be set down in the column headed 'Amount,' and it is of equal importance that the face of the record show that such has been done; it is preferred, however, that snow should always be measured and melted whenever there is any possibility of doing so. When there has been rain and snow during the same storm it is frequently impossible to tell whether the unmelted snow has been included in the total precipitation or not."

November's Past Weather Record.

The publication of the following data, compiled from the record of observations for the month of November, taken at Baltimore for a period of 22 years, and at Washington for a period of 23 years, is believed will prove of interest to the special student, showing as they do

the average and extreme conditions of the more important meteorological elements, and the range within which such variations may be expected to keep during any corresponding month.

BALTIMORE, MD.

TEMPERATURE.

Mean or normal temperature, 47°. The warmest November was that of 1881, with an average of 49°. The coldest November was that of 1873, with an average of 41°. The highest temperature during any November was 78° on the 12th, 1879. The lowest temperature during any November was 15° on the 22nd, 1880. Average date on which first "killing" frost occurred (in autumn), November 4th.

PRECIPITATION (rain and melted snow).

Average for the month, 3.10 inches. Average number of days with .01 of an inch or more, 10. The greatest monthly precipitation was 6.85 inches in 1877. The least monthly precipitation was 0.65 inch in 1882. The greatest amount of precipitation recorded in any 24 consecutive hours was 2.85 inches on November 23rd and 24th, 1877. The greatest amount of snowfall recorded in 24 consecutive hours (record extending to winter of 1884-5 only) was 1.2 inches on the 26th, 1888.

CLOUDS AND WEATHER.

Average number of clear days, 10. Average number of partly cloudy days, 11. Average number of cloudy days, 9.

WIND.

The prevailing winds have been from the northwest. The highest velocity of the wind during any November was 48 miles on the 18th, 1891.

WASHINGTON, D. C.

TEMPERATURE.

Mean or normal temperature, 44°. The warmest November was that of 1890, with an average of 48°. The coldest November was that of 1880, with an average of 40°. The highest temperature during any November was 80° on 13th, 1879. The lowest temperature during any November was 12° on 22nd, 1880. Average date on which first "killing" frost occurred (in autumn), October 22nd.

PRECIPITATION (rain and melted snow).

Average for the month, 2.91 inches. Average number of days with .01 of an inch or more, 10. The greatest monthly precipitation was 7.18 inches in 1877. The least monthly precipitation was 0.79 inch in 1890. The greatest amount of precipitation recorded in any 24 consecutive hours was 2.83 inches on November 24th, 1877. The greatest amount of snowfall recorded in 24

consecutive hours (record extending to winter of 1884-5 only) was 2.5 inches on November 5th, 1891.

CLOUDS AND WEATHER.

Average number of clear days, 9. Average number of partly cloudy days, 12. Average number of cloudy days, 9.

WIND.

The prevailing winds have been from the northwest. The highest velocity of the wind during any November was 54 miles on 23rd, 1891.

Review of the Month—September.

Temperature (degrees).—Monthly mean (for entire territory covered), 65.3; highest monthly mean, 71.2, at Cambridge; lowest monthly mean, 58.0, at Oakland; highest temperature, 93, at Cambridge, on the 7th; lowest temperature, 28, at Sunny Side, on the 29th and 30th. Mean monthly range, 48.5; greatest local monthly range, 56, at Boettcherville; least local monthly range, 41, at Receiving Reservoir, D. C. Mean maximum temperature, 74.6; mean minimum, 56.7.

Precipitation (in inches).—Average, 2.76; greatest amount, 6.17, at Millsboro, Delaware; least amount, 1.40, at Sunny Side.

Wind.—Prevailing direction, northwest. Total movement in miles, Baltimore, 5062; Norfolk, Va., 5571; Washington, D. C., 3851.

Thunderstorms.—At Bachman's Valley, on the 6th, 15th; at Baltimore, on the 15th, 25th; at Barron Creek Springs, on the 23rd; at Cumberland, on the 6th, 7th, 15th, 22nd; at Darlington, on the 5th, 7th, 15th, 22nd; at Dover, Del., on the 5th, 25th; at Easton, on the 15th; at Fallston, on the 15th, 16th, 22nd; at Federalsburg, on the 15th; at Frederick, on the 6th, 15th, 16th, 22nd; at Glyndon, on the 6th, 15th, 16th; at Mt. St. Mary's, on the 8th, 15th, 16th, 22nd; at Oakland, on the 6th, 15th; at Sunny Side, on the 5th, 7th, 15th, 22nd; at Woodstock, on the 15th.

Frost, killing.—At Boettcherville, on the 29th, 30th; at Cumberland, on the 29th, 30th; at Darlington, on the 29th, 30th; at Oakland, on the 29th, 30th; at Sunny Side, on the 29th, 30th.

Halos.—Lunar, at Cumberland, on the 23rd; at Darlington, on the 29th; at Sunny Side, on the 29th.

Meteors.—At Solomon's, on the 16th.

Hail.—At Dover, Del., on the 25th; at Oakland, on the 16th.

CROPS.

Week ending September 4th.

Growing crops greatly improved by soaking rains, but high winds damaged fruit, fruit-trees, corn-fodder, tomatoes, buckwheat and tobacco; considerable wheat sown; ground in excellent

condition; grass improved; corn cutting begun; fruit plenty; tomato-canning in progress.

Week ending September 11th.

Considerable tobacco housed, late benefited by rain; fair yield of buckwheat; corn and fodder damaged by high winds, cutting commenced; some fall seeding done; peach season approaching close in eastern and southern sections; late peaches in western section improved by rain.

Week ending September 18th.

Ground is in excellent condition for seeding, which is in progress; housed tobacco slightly injured by warm, wet weather early in week; pastures and vegetables greatly improved; corn cutting and fodder saving progressing rapidly; peaches nearly gone.

Week ending September 25th.

Good weather for plowing, corn cutting and wheat seeding; fodder and tobacco now in progress; pastures and late tobacco greatly improved; peaches and apples excellent in western sections; large quantities of tomatoes being picked in eastern portion.

Notes by Observers.

Bachman's Valley.—3rd, first wheat sown. 7th, wheat appears above the ground. 18th, 19th and 20th, large flocks of blackbirds passed over. 28th, 29th and 30th, light frost. J. M. MYERS.

Barron Creek Springs.—The total rainfall for the crop season was 18.95 inches, being 8.08 inches less than the average for the past 4 seasons, and 17.68 inches less than the wet season of 1889. The temperature was .1 of a degree below the average for the past 4 seasons, and .3 of a degree below the season of 1889. The warmest season was that of 1892, with an average of 68.3; the coldest season was that of 1891, with an average of 65.8. ALBERT E. ACWORTH.

Fenby.—During the past month the ground was in fine condition for seeding; weather was favorable for saving clover seed and cutting corn, which was done in good time; the yield of clover seed is heavier than it has been for the past few years; oats are coming up well; light frost on the 28th, 29th and 30th. WM. FENBY.

Fallston.—Mean temperature at this point, during September, for the past 20 years, 67.2 degrees. Average rainfall for 22 years, 4.48 in. G. G. CURTISS, A. M.

Oakland.—16th, the wheat is up and looks fine, and some that was planted 4 weeks ago is looking green and thick; the wheat crop for this year is very fine and a large yield; corn and oats show a moderate yield; grass revived and looks well; apples are wormy, irregular and small, and many falling off the trees; hay scarce; little plowing done, as farmers are busy caring for crops. 25th, trees losing their leaves; streams very low. 29th, ice $\frac{3}{8}$ of an inch thick last night. J. LEE MCCOMAS, M. D.

U. S. DEPARTMENT OF AGRICULTURE,
WEATHER BUREAU.

Monthly summary of meteorological observations taken at Baltimore, Md., during the month of September, 1893:

Mean barometer, 30.06. Highest barometer, 30.35; date 26th. Lowest barometer, 29.69; date 16th.

Mean temperature, 67. Highest temperature, 88; date 19th. Lowest temperature, 44; date 28th and 30th. Greatest daily range of temperature, 28; date 22nd. Least daily range of temperature, 4; date 11th.

MEAN TEMPERATURE FOR THIS MONTH IN

1871...63.	1877...68.	1883...65.	1889...65.
1872...69.	1878...69.	1884...72.	1890...68.
1873...67.	1879...65.	1885...67.	1891...71.
1874...70.	1880...68.	1886...70.	1892...66.
1875...66.	1881...77.	1887...65.	1893...67.
1876...65.	1882...69.	1888...64.	

Mean temperature for this month for 23 years, 68. Total deficiency in temperature during month, 48. Total deficiency in temperature since January 1st, 620. Prevailing direction of wind, west. Total movement of wind, 5062 miles. *Maximum velocity of wind, direction, and date, 36—NW—16th. Total precipitation, 1.80 inches. Number of days on which .01 inch or more of precipitation fell, 8.

TOTAL PRECIPITATION (IN INCHES) FOR THIS MONTH IN

1871...2.22.	1877...5.27.	1883...3.49.	1889...4.59.
1872...5.06.	1878...0.82.	1884...0.09.	1890...4.76.
1873...3.70.	1879...2.72.	1885...1.30.	1891...5.46.
1874...4.83.	1880...1.78.	1886...1.90.	1892...2.36.
1875...3.62.	1881...2.98.	1887...2.80.	1893...1.80.
1876...10.52.	1882...9.38.	1888...4.90.	

Average precipitation for this month for 23 years, 3.75. Total deficiency in precipitation during month, 2.04. Total deficiency in precipitation since January 1st, 12.36. Number of

clear days, 12; partly cloudy days, 9; cloudy days, 9. Dates of frost, 28th, 29th, 30th.

Monthly summary of meteorological observations taken at Washington, D. C., during the month of September, 1893:

Mean barometer, 30.08. Highest barometer, 30.36; date 26th. Lowest barometer, 29.74; date 16th.

Mean temperature, 66. Highest temperature, 88; date 22nd. Lowest temperature, 42; date 30th. Greatest daily range of temperature, 30; date 4th. Least daily range of temperature, 4; date 1st.

MEAN TEMPERATURE FOR THIS MONTH IN

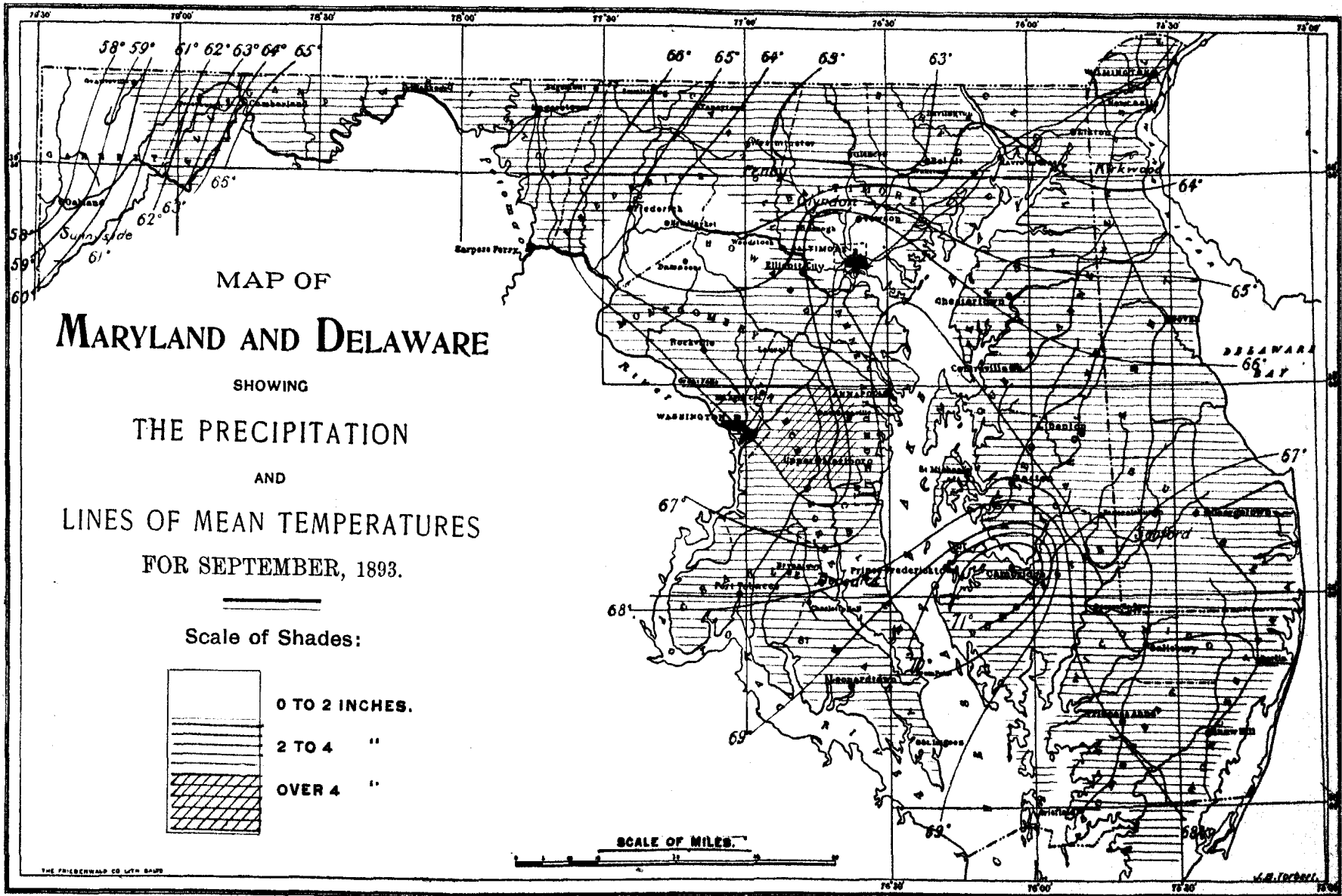
1871...62.	1877...67.	1883...65.	1889...66.
1872...69.	1878...69.	1884...72.	1890...68.
1873...68.	1879...64.	1885...66.	1891...70.
1874...70.	1880...68.	1886...69.	1892...66.
1875...65.	1881...77.	1887...65.	1893...66.
1876...65.	1882...69.	1888...65.	

Mean temperature for this month for 22 years, 67. Total deficiency in temperature during month, 42. Total deficiency in temperature since January 1st, 316. Prevailing direction of wind, northwest. Total movement of wind, 3851 miles. Maximum velocity of wind, direction, and date, 30—NW—16th. Total precipitation, 3.91 inches. Number of days on which .01 inch or more of precipitation fell, 9.

TOTAL PRECIPITATION (IN INCHES) FOR THIS MONTH IN



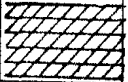
1871...2.70.	1877...4.93.	1883...4.33.	1889...3.88.
1872...3.92.	1878...2.46.	1884...0.14.	1890...4.22.
1873...3.48.	1879...1.56.	1885...2.15.	1891...3.12.
1874...7.84.	1880...3.42.	1886...1.79.	1892...3.55.
1875...1.98.	1881...2.19.	1887...3.12.	1893...3.91.
1876...10.81.	1882...7.84.	1888...6.82.	

Average precipitation for this month for 22 years, 3.98. Total deficiency in precipitation during month, .07. Total deficiency in precipitation since January 1st, 9.26. Number of clear days, 13; partly cloudy days, 7; cloudy days, 10. Dates of frost, 28th, 30th.

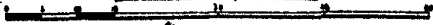


MAP OF
MARYLAND AND DELAWARE
 SHOWING
 THE PRECIPITATION
 AND
 LINES OF MEAN TEMPERATURES
 FOR SEPTEMBER, 1893.

Scale of Shades:

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

SCALE OF MILES.



THE FREEDMAN CO. LITH. BLDG.

J. H. TORRELL.

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.....		G. N. Wilson. A. T. Brewer, Ass't Editor of Monthly Report. H. D. Steuart. R. C. New, Ass't Editor of Weekly Bulletin.	
Bachman's Valley.....	Carroll.....	J. M. Myers.	
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.
Buckeystown.....	Frederick.....		A. W. Nicodemus.
Cambridge.....	Dorchester.....	Calvert Orem.....	Calvert Orem.
Chestertown.....	Kent.....	Hon. M. deK. Smith	
Cumberland.....	Alleghany.....	Howard Shriver. E. T. Shriver.	
Darlington.....	Harford.....	A. F. Galbreath.....	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.		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.
Glyndon.....	Baltimore.....	A. W. Nyce.....	A. W. Nyce.
Grantsville.....	Garrett.....		T. H. Bittinger.
Great Falls.....	Montgomery.....	Col. Elliot.	
Havre de Grace.....	Harford.....		W. S. McCombs.
Jewell.....	Anne Arundel.....	Jos. Plummer.	
Kirkwood, Del.....	New Castle.....	W. C. L. Carnagy.	
Leonardtown.....	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.....	Miss Margaret D. Hopkins.	
Oakland.....	Garrett.....	J. Lee McComas, M. D.	
Odenton.....	Anne Arundel.....		E. B. Watts.
Receiving Reservoir, D. C.		Col. Elliot.	
Rising Sun.....	Cecil.....		E. A. Reynolds.
Rockville.....	Montgomery.....		Emmit Dove.
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.
Sunny Side.....	Garrett.....	John G. Knauer.	
Upper Marlboro.....	Prince George's.....	J. B. Perrie.	
Washington, D. C.		S. W. Beall.	
Westover.....	Somerset.....		E. D. Long.
Wilmington, Del.....	New Castle.....		Wm. Lawton.
Woodsboro.....	Frederick.....		G. F. Smith.
Woodstock.....	Howard.....	T. J. A. Freeman, S. J.	
*Birdsnest, Va.....	Northampton.....	C. R. Moore.	
*Cape Charles, Va.....	Northampton.....	O. A. Browne.	
*Norfolk, Va.....	Norfolk.....	A. B. Crane.	
*Warsaw, Va.....	Richmond.....	C. H. Constable.	

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

MONTHLY SUMMARY OF REPORTS FOR SEPTEMBER, 1893.

STATIONS.	COUNTIES.	Altitude above sea in ft.	Latitude.	Longitude.	TEMPERATURE.								Monthly Range.	Total Precipitation.	Clear Days.	Fair Days.	Cloudy Days.	Rainy Days. (0.1 or more.)	Prevailing Wind.
					Monthly Mean.	Mean of Max.	Mean of Min.	Max.		Min.									
								Degrees	Date.	Degrees	Date.								
WESTERN MARYLAND.																			
Boettherville	Alleghany		39°33'	78°48'	63.1			88	6, 7, 22	32	30	56	3.10						
Cumberland (1)	Alleghany	700	39 39	78 46	a66.0	74.1	58.0	87	4, 5, 6	38	30	49	1.99						
Cumberland (2)	Alleghany	700	39 39	78 45	64.0	72.4	55.6	86	7, 22	35	30	51	1.97	16	6	5	3		
Oakland	Garrett	2380	39 25	79 20	*58.0			*80	6, 15	*31	29, 30	49	1.84	17	8	5	10	S. W.	
Sunny Side	Garrett		39 20	79 28	e60.6	71.6	49.6	82	6, 7, 15	28	29, 30	54	1.40	12	9	9	7	S. W.	
NORTHERN-CENTRAL MARYLAND.																			
Bachman's Valley	Carroll		39 40	77 01	*60.2			82	5, 19	33	30	49	1.80	18	5	7		S.	
Baltimore		179	39 17	76 37	66.6	74.3	58.8	88	19	44	28, 30	41	1.80	12	9	9	8	W.	
Darlington	Harford	300	39 47	76 14	64.0	74.2	53.7	84	6, 8	40	23	44	2.98	19	5	6	5	N. W.	
Dist. Res., D. C.			39 9	77 0	+65.8			+83	22	+40	30	43	3.36						
Falston	Harford	300	39 30	76 24	*63.0			*86	19	*41	29	45	2.84						
Fenby	Carroll	950	39 33	77 5	*63.2			*82	22	*40	30	42	2.70	10	14	6	7	N. W.	
Frederick	Frederick	400	39 24	77 24	65.6	73.9	57.2	86	19, 22	37	30	49	2.09	12	11	7	11		
Glyndon	Baltimore	280	39 2	77 14	63.5	70.3	56.7	84	5, 19	41	29, 30	43	2.64	15	6	9	8	N. W.	
Great Falls	Baltimore		39 0	77 14	+65.2			85	5, 6	39	30	46	2.27						
McDonogh	Montgomery	545	39 23	76 46	e66.2	73.6	58.9	84	19	48	27	36	2.01						
Mt. St. Mary's	Frederick	715	39 43	77 20	e66.2	73.9	58.6	88	22	48	22	45	2.59	9	13	6	10	W.	
New Market	Frederick	500	39 10	77 15	*64.0			*89	5, 15	38	30	51	1.48	17	5	8	3	N. W.	
Rec. Res., D. C.			38 52	77 0	+60.0			+82	7	+41	30	41	3.18						
Washington, D. C.		112	38 52	77 0	66.0	74.5	57.4	88	22	42	30	46	3.91	13	7	10	9	N. W.	
Woodstock	Howard	400	39 19	76 51	64.0	73.0	55.0	86	7	37	30	49	2.03	15	10	5	3	N. W.	
SOUTHERN MARYLAND.																			
Benedict	Charles		33 31	76 39	68.2	77.9	58.5	91	20	42	30	49	1.41	19	0	11	4	W.	
Solomon's	Calvert	20	38 19	76 27	70.0	78.7	61.6	90	6	46	30	60	2.56	8	7	15	9	S. E.	
Upper Marlboro	Pr. George's		38 47	76 45	a65.5	75.5	55.3	89	7	39	30	50	4.42	18	5	7	8	N. W.	
EASTERN MD. AND DELAWARE.																			
Barron Ck. Springs	Wicomico	25	38 30	75 39	67.2	75.1	59.2	88	7	43	27, 30	45	3.61	11	8	11	7	N. W.	
Cambridge	Dorchester		38 39	76 7	71.2	78.3	64.0	93	7	50	30	43	2.49	22	0	8	8	S.	
Easton	Talbot	35	38 42	76 6	67.5	75.4	59.6	88	7	44	30	44	2.10	18	3	9	4	N. W.	
Dover, Del.	Kent	40	39 10	75 30	65.8	73.7	58.0	87	7	44	30	43	3.69	15	8	6	11	S. W.	
Kirkwood, Del.	New Castle		39 35	75 41	+63.9														
Millford, Del.	Kent		38 56	75 25	67.1	75.2	59.0	84	25	44	30	40	4.32	18	3	9	5	W.	
Millsboro, Del.	Sussex		38 41	75 15	66.2	75.6	56.8	88	7	43	30	45	6.17	12	10	8	10	N.	
Seaford, Del.	Sussex		38 40	75 35	67.4	77.3	57.6	88	7	40	30	48	3.76						
VIRGINIA.																			
Birdsnest	Northampton				69.5			88	25	49	30	39	7.75	9	12	9	13	N. E.	
Cape Charles	Northampton				66.9			84	19, 25	49	29	35	5.46	12	6	12	9		
Norfolk					71.0	78.0	64.0	89	23	51	29	38	6.29	14	8	8	9	S. W.	
Warsaw	Richmond				67.1	76.7	57.5	92	19	40	30	52	4.43	15	8	7	7	S.	
AVERAGES																			
Western Maryland					62.3	72.7	54.4					51.8	2.06	15.0	7.7	6.3	6.7	S. W.	
Northern-Cent'l Md.					64.1	73.4	57.0					44.6	2.54	14.2	8.2	7.5	5.9	N. W.	
Southern Maryland					67.9	77.4	58.0					53.0	2.80	15.0	4.0	11.0	7.0	N. W.	
Eastern Maryland					67.0	75.1	57.5					44.7	3.64	15.6	5.8	8.4	8.2	N. W.	
Entire territory					65.3	74.6	56.7					48.5	2.76	15.0	6.4	8.3	7.0	N. W.	

NOTE.—Letters of the alphabet are used to indicate the number of days that are missing from record: e. g. a—one day, b—two days, etc. (1)—H. SHRIVER. (2)—E. T. SHRIVER. *From tri-daily readings. †From bi-daily readings. ‡Omitted in computing averages.

DAILY PRECIPITATION FOR SEPTEMBER, 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	.24	T				.02					T	T	.21	.53	.29	T							.12		.28	.01						1.80	
Barron C.S.	.38										.26	.15	.38	.68										.10		1.66						3.61	
Benedict	.47									T	.13	.33													.48							1.41	
Boettherv.					.20	.40					.30	.40		1.00	T				T				T	.10		.40			.30		3.10		
Cambridge	.40					.08				.10	.10	.26	.30	.60										.07		.40	.30	.50				2.94	
Cumb (1)					.10	.10	.25				.10	.20	.50	.43										.07		.17	.07		.07			1.99	
Cumb (2)					.10	.30				.09	.18	.50	.43											.08		.22				.07		1.97	
Darlington	.21										.17	.36	.04	.67	.92		.22						.07		1.04							2.98	
Dist. R. D.C.	.08	.92									.17	.36	.04	.67	.92	.56									.04	.27						3.36	
Dover, Del.	.40													2.26	.06									.04	.59	.34						3.69	
Easton	.45												.88	.43											.59	.34						2.10	
Falston	.25				.02							.88	.10	.69	.30					T			T	T		.60	T					2.84	
Fenby	.20											.20	1.00	.50	.10								T	T	.40	T						2.70	
Frederick	.10				.13					T	.10	.02	.37	.84		.36								.01	T	.20						2.09	
Glyndon	.16											T	.93	.15	.27									.06	.10	.86							2.64
Great Falls		.70			.08					.40	.32	.25	.22	.44	.08									.11	.50	.15	.11						2.27
McDonogh					.06						.40	.32	.25	.22	.44	.08								.11	.50	.15	.11						2.01
Millford, Del.	.49					.06					.04	.12	1.68	1.31	1.69										.70	.23	1.15						4.32
Millsb'o, Del.	.34	.16								.06	.04	.90	1.11	.20	.04										.55	.54	.23	1.15					6.17
Mt. St Mary's					.05		.05				.04	.90	1.11	.20	.04									.12	.07	.70	.23	1.15					2.59
New Mark't	.25									.25													T	T	.98	.01							1.43
Oakland		.08								.25	.03	.08	.30		.02	.01		T						1.00						.05			1.54
R. R. D. C.	.04	.85				.04					.21	.45	.07	.84		.22	.18								.02	.10	.22						3.18
Seaford Del	.49									T	T	.25	.10	.65										T	.62	.70							3.76
Solomon's	.20									T	.04	T	.18	.04	.67	T								.06	.54	.62	.31						2.56
Sunny Side		T					T				.02	.06	T	.37	T									.05	.19	.60					.11		1.40
Upper Marl	.72									.31	1.12	.49	.21	.58										T	.32	.37	T						4.42
Wash. D. C.	1.00					T				.16	.48	T	.28	.62	.60	.28								T</									