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. 2. MONTHLY REPORT. JUNE, 1893.

Soils of Maryland.

BY MILTON WHITNEY.

In former numbers of this Report* I have briefly outlined the soil investigations at Clifton and discussed some of the fundamental principles of the relation of soils to the growth of crops, which these soil investigations are establishing. I showed that we have a large number of soil formations in the State, ranging in value from the light sandy soil of the pine barrens and of the truck lands, to the heavy limestone grass and wheat lands of western Maryland. I stated that the agricultural value of these lands and the crops best suited to them are more dependent upon the physical texture of the soils and the amount of heat and moisture they can maintain for the crop, than upon their chemical composition; for while plants require certain chemical elements, like potash and phosphoric acid, for their life and growth, yet there are not less than 5 or 10 tons of these mineral matters per acre at the disposal of the plants in any of the important soil formations in the State, and these soils do not differ in their chemical composition sufficiently to account for the difference in their agricultural value. I showed, further, that the climatic conditions of moisture and heat have much to do with the development of plants. The "season" has so much effect, indeed, that it is no uncommon thing for the crop of a large area to be twice as large one year as in another year in which the season has not been so favorable. It is an every-day matter for gardeners and florists to regulate the kind of development and the time of ripening of the crop or the flowering of plants, by judicious control of the conditions of moisture and heat. They can, indeed, force the plants to flower or fruit at will, or they can prolong the growth of the plants and prevent or greatly retard the maturity and induce a large leafy development.

Our different soil formations are very different in texture; some are very sandy, and others have but little sand in their composition, being composed mostly of clay and of fine silt. The sandy soils are coarse and open in texture and allow the rain to pass through them very readily. The soils have little power of maintaining this moisture for the plants, or of pulling it up from below to replace that lost by evaporation or used up by plants. The stiff clay soils, on the contrary, offer a great resistance to the rainfall, so that it moves down through them very slowly, and the soils have much more power of drawing it up again as needed than the sandy soils have. As a rule, these clay soils have four or five times as much moisture as the sandy soils, although the amount of rainfall, which is the source of supply of the water, is the same over both soils. If two plants were treated as differently as this in a greenhouse, one being given four or five times as much water as the other, the development of the plants would be very different; or, if during one season there were four or five times as much rainfall as in the preceding year, the effect on the crops would be greater than could be expected from any application of fertilizers.

It may be broadly stated, therefore, that the difference in the agricultural value of the soils of this State and their adaptation to the different crops is not due so much to the chemical composition of the soils and the amount of plant food they contain, as to their difference in texture and their relation to moisture and heat.

*Vol. II, Nos. 2 and 10.

Professor Clark has given in the last (May) number of this Report a carefully prepared summary of the principal climatic features of the State. The following table of the mean temperature and rainfall of the different seasons in the four main divisions of the State is reprinted here to show that the difference in climatic conditions in the different agricultural regions of the State is not as great as the difference in the temperature and moisture maintained by soils of different texture.

	Mean Temperature.					Rainfall.				
	Spring.	Summer.	Autumn.	Winter.	Year.	Spring.	Summer.	Autumn.	Winter.	Year.
Western Maryland	49.4	72.7	52.7	31.7	52.0	10.33	10.78	8.63	8.81	38.55
Northern-Central Maryland	50.6	73.5	54.3	33.1	53.0	12.07	11.91	10.02	9.73	43.73
Eastern Maryland	51.7	74.7	55.8	36.1	54.5	12.39	11.74	9.13	9.40	42.66
Southern Maryland	53.1	75.5	57.2	36.9	55.6	12.71	11.96	10.77	9.31	44.75

It will be seen by reference to the table that the mean temperature is lowest in western Maryland and is highest in southern Maryland, as would be expected on account of the elevated and mountainous character of the former region. It will be noticed that the difference in the mean temperature of these two divisions of the State is only 3.6°. Professor Clark points out that there is a difference of about 8° in the mean annual temperature of a place in the extreme northwestern part of the State and of a place in the extreme southern part of the State; and that in the mean temperature of the extremities of the State during the different seasons there is a difference of 12° in the spring, 8° in the summer, 10° in the autumn, and 13° in the winter months. The southern extremity is warmer by these amounts. There is a difference of 6.25 inches in rainfall between the western and southern sections of the State, which is equivalent to about one-seventh of the annual rainfall in southern Maryland.

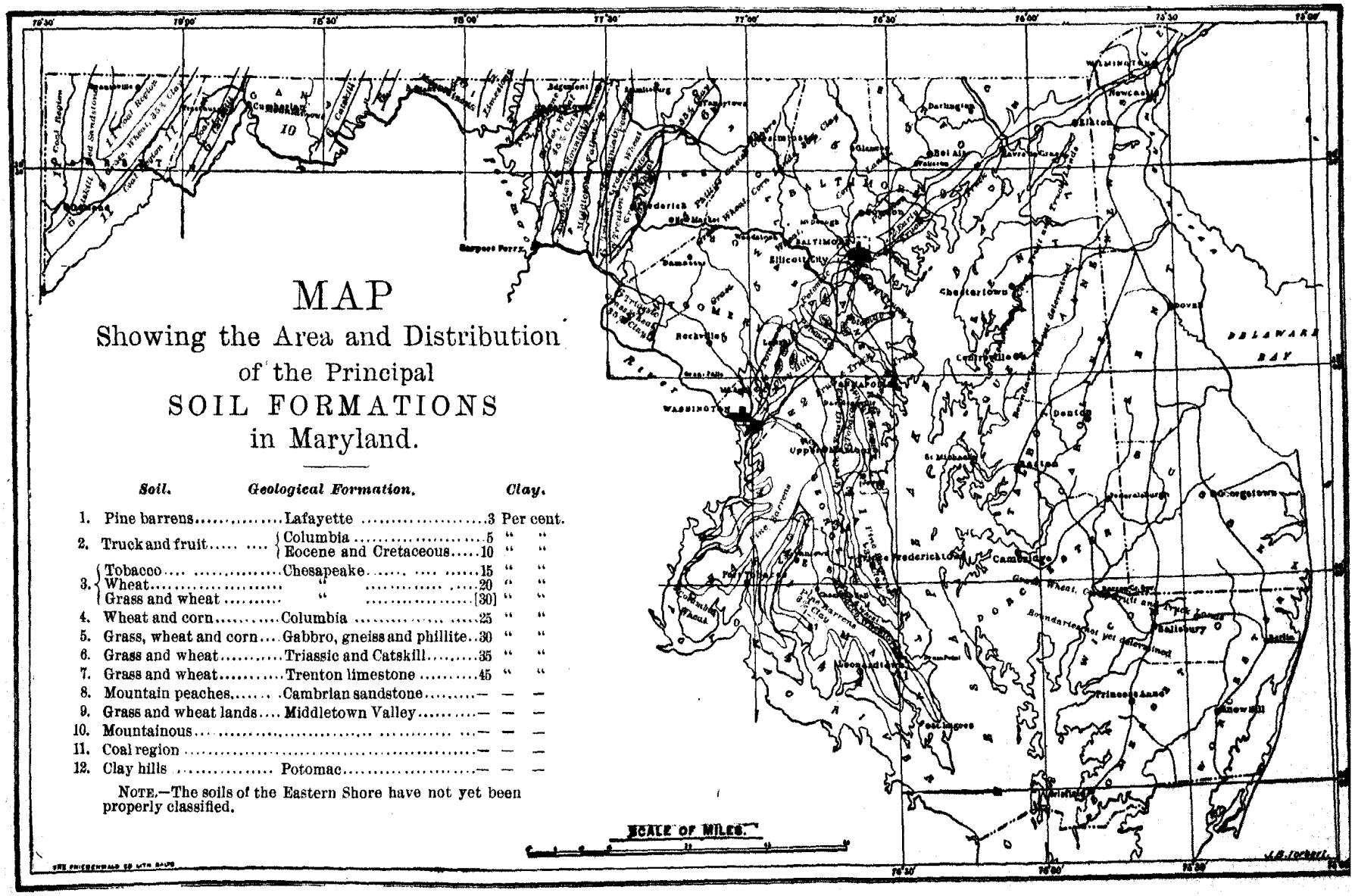
This difference of 3.6° in the mean annual temperature and of 6.25 inches in rainfall (about 0.5 inch per month) appears rather small, but no one doubts that it has a very marked effect upon the character of the crops in these two localities, and in the development and quality of the crops grown as well as in the time of ripening. No more striking illustration can be given of this than in the comparison of the peaches grown in southern and in western Maryland. The peach crop of southern Maryland is practically over before the mountain peaches come into the market, so that there is little or no competition from the two localities, but a lengthening of the season, as the mountain peaches ripen several weeks later. The mountain peaches also are very different from the southern crop in nearly all respects. There is a difference in the appearance, form, color, texture and flavor, and all of those properties which go to make up the quality of the peach. Similar effects of this apparently slight difference in climatic conditions are seen in the quality, yield and time of ripening of most of the staple crops grown in these two divisions of the State.

It can be shown that even with the same temperature and the same rainfall, where soils differ as much in texture as ours do, the temperature and amount of moisture they can maintain for a crop will differ much more widely than these climatic conditions, and it must be supposed that these wide differences of climatic conditions *within* the soil will have a marked effect upon the development, yield, quality and time of ripening of the crop. For instance, if we had a heavy limestone soil adjoining some of our light truck land, and under precisely the same temperature and rainfall, we would find that the temperature in the light sandy soil at noon of a hot summer day was 10° or 15° *cooler* than in the heavy limestone soil, as I have myself noticed in comparing some of the light tobacco soils of North Carolina with the adjoining heavy wheat and cotton lands. It would be found, furthermore, that the clay land contained from 18 to 22 per cent of moisture, while the sandy land contained only 5 or 6 per cent of water.

The accompanying map shows the area of the principal soil formations in the State. The map is so small that the boundaries can, of course, be shown only in a very general way, and many small areas are entirely omitted.

The following is a brief description of the most important soil formations in the State, with the exception of those on the Eastern Shore, which have not yet been carefully studied. The soils are arranged about in the order of their relative agricultural value.

1. **Pine Barrens,** *Lafayette formation.* These sandy lands cover an extensive area in southern



MAP

Showing the Area and Distribution of the Principal SOIL FORMATIONS in Maryland.

	Soil.	*Geological Formation.*	*Clay.*
1.	Pine barrens	Lafayette	3 Per cent.
2.	Truck and fruit	Columbia	5 " "
		Eocene and Cretaceous	10 " "
3.	Tobacco	Chesapeake	15 " "
	Wheat	"	20 " "
	Grass and wheat	"	[30] " "
4.	Wheat and corn	Columbia	25 " "
5.	Grass, wheat and corn	Gabbro, gneiss and phillite	30 " "
6.	Grass and wheat	Triassic and Catskill	35 " "
7.	Grass and wheat	Trenton limestone	45 " "
8.	Mountain peaches	Cambrian sandstone	— — —
9.	Grass and wheat lands	Middletown Valley	— — —
10.	Mountainous		— — —
11.	Coal region		— — —
12.	Clay hills	Potomac	— — —

NOTE.—The soils of the Eastern Shore have not yet been properly classified.

SCALE OF MILES.

Maryland. The subsoil contains only about 3 per cent of clay. It has approximately 1,600,000,000 grains of sand and clay in one gram. These grains have about 496 square centimeters of surface for water to act on in dissolving food material and for roots to feed on. This is equivalent to about 23,940 square feet of surface area in one cubic foot of soil.

The grains are so large and there are relatively so few of them in this soil that the lands are coarse and sandy, and are so little retentive of moisture that they are not able to maintain over 3 or 4 per cent of moisture, which is too little for any agricultural crop. At present these lands are nearly valueless and are left out as pine barrens. They would make the very earliest truck lands, however, as crops would be forced to a very early maturity, and with the intense system of cultivation which prevails in truck farming, and when this part of the State is opened up and good transportation facilities are offered, these will probably be the most valuable lands in the State for early truck. Many of these lands also would bring a very fine grade of tobacco for flue-curing.

2. **Early Truck and Fruit Lands,** *Columbia, Eocene and Cretaceous formations.* The early truck lands of the Columbia formation, forming the river necks along the Bay shore and covering extensive areas on the Eastern Shore, have from 4 to 10 per cent of clay in the subsoil. The Eocene and Cretaceous formations contain rather more than this or from 8 to 15 per cent of clay, and are better adapted to fruit.

These light sandy lands along the Bay shore are altogether too light in texture for wheat, and with good treatment they would not bring over 5 or 10 bushels of wheat per acre. They are admirably adapted, however, to truck and fruit, and this industry has recently grown to very large proportions. These lands are so light in texture that they will only maintain, on an average, about 5 or 6 per cent of moisture for the crop, when the heavier soils in the western part of the State would have from 18 to 22 per cent. These drier conditions force the crop to an early maturity. Vegetables ripen on these early truck lands at least two or three weeks earlier than on any other soils of the State and bring a good market price.

These lands were formerly considered the very poorest lands in the State, and even now they have little value for general agricultural purposes when they are too remote from quick and easy transportation to enable truck to be grown on them. As a consequence, large areas of these lands are lying idle awaiting improved transportation facilities. Many of these idle lands have about the some texture as the bright tobacco lands of North Carolina, and they will probably raise a fine grade of this tobacco for flue-curing.

The lighter soils are more valuable for early truck because they force the crops to an early maturity so that they bring a good market price, while the heavier soils in this locality are better suited to fruit. Tomatoes, cabbage, and many other vegetables do better on the heavier lands and yield more per acre than on the lighter soils, but the crops are not so early and consequently do not bring so good a price. Tomatoes, for example, ripen at least a week earlier in a soil where there is only 5 per cent of clay in the subsoil than they do on land having 8 per cent of clay, and this difference in time of marketing the crop materially increases the value, as the earlier the crop is matured the less competition there will be from other parts of the State and the better price it will bring in the market. Every effort is made to have the early truck mature at the earliest possible moment, and no reasonable expense is spared to attain this end. The whole value of these truck lands lies in the possibility of producing these vegetables earlier than they can be produced elsewhere in the State, so that the value of these truck lands does not depend so much upon the amount of crop they will produce per acre as upon the time the crop matures. Two or three days difference in the marketing of a crop in this trucking business may make the difference between a brilliant success and a failure.

We have examined a great many samples of soil from this truck area, and as a result of our investigations it would appear that, as a rule, soils containing over 10 per cent of clay in the subsoil cannot compete for the very early markets unless they are so situated as to be nearly surrounded by water to insure an earlier planting season and freedom from late frosts. Soils having from 8 to 12 per cent of clay in the subsoils are better suited for fruit than the lighter truck soils.

3. **Tobacco, Wheat and Grass Lands of Southern Maryland,** *Chesapeake formation.* There are three grades of land in the Chesapeake formation. The best tobacco lands of southern Maryland have from 12 to 18 per cent of clay in the soil, and on an average about 15 per cent. These lands are rather too light for profitable wheat production, but they make the finest grade of tobacco produced in Maryland.

Wheat and tobacco are commonly grown on the same land in rotation periods of two or three years, but the best wheat lands are too heavy in texture for the finer grades of tobacco, as the leaf is coarse and sappy and does not take on color in curing. These finer tobacco lands, however, make a very fine grade of tobacco; it has a good

yellow color and is very mild and suitable for pipe-smoking. The tobacco is strictly an export tobacco, being sent principally to France and Holland.

The wheat lands of southern Maryland contain from 18 to 25 per cent of clay in the subsoil, and on an average about 20 per cent. They contain approximately 9,000,000,000 grains of sand and clay in one gram, and these grains have about 2000 square centimeters of surface.

These lands are sufficiently retentive of moisture to give fair yields of wheat, but they are near the limit of profitable wheat production, for soils lighter in texture than these are too light for wheat with the prevailing amount and distribution of rainfall. Subsoils having less than 18 per cent of clay, or approximately 9,000,000,000 grains of sand and clay in one gram, are, as a rule, rather too light in texture for profitable wheat production in this locality, as they are not sufficiently retentive of moisture and do not maintain a sufficient water supply for the plants. With the present prices of wheat it would be too costly to attempt to fill up the spaces in a lighter soil with organic matter, or to rearrange the grains of sand and clay so as to make the soil more retentive of moisture. The conditions in the lighter soils are not constant, and in unfavorable seasons the plants suffer and the yield is very small.

These wheat lands are too light in texture for grass or for permanent pasture, and, on the other hand, they are too heavy in texture and maintain too much moisture for the better grade of tobacco grown in southern Maryland, for the leaf produced is coarse and sappy, cures green and does not take on color, and brings a very low price.

A soil must have at least 25 or 30 per cent of clay in the subsoil to make a good grass land, unless, as before explained, there is more organic matter present than our Maryland soils usually contain, or the grains of sand and clay are differently arranged from what is generally the case here. There is a considerable area of land in this Chesapeake formation which has 30 per cent of clay and over, which is well suited to grass. These grass lands also make the very finest wheat lands in that portion of the State.

4. **Wheat and Corn Land**, *Columbia formation*. The fertile terraces bordering the Potomac and Patuxent rivers and their tributaries, and the Columbia formation where it occurs at high levels in other parts of the State, have from 20 to 30 per cent of clay in the subsoil, and on an average about 25 per cent. These lands are sufficiently retentive of moisture to make excellent wheat and corn lands. Some of these lands are known to have been cultivated for upwards of 200 years, yet they show no signs of deterioration.

5. **Grass, Wheat and Corn Lands**, *Gabbro, Gneiss and Phillite formations*. These three formations are so nearly alike in texture and in agricultural value that they may be described together. They contain on an average about 30 per cent of clay in the subsoil, and have about 14,400,000,000 grains of sand and clay in one gram. The gabbro lands are, as a rule, rather closer in texture than the others, and are rather better for general agricultural purposes for this reason. The land is sufficiently retentive of moisture to make very fine wheat and grass lands, and in favorable seasons and with good treatment from 20 to 30 bushels of wheat can be produced on this land. The land is well adapted to grazing purposes, and large numbers of store cattle are annually fattened for market on the gabbro soils of Harford County.

There is a much larger area of gneiss in the State than of gabbro. As a rule, the soil is sufficiently retentive of moisture to maintain good pasturage, and it makes excellent wheat and corn. A large number of store cattle are fattened on the heavier soils and the dairy interests are very extensive. Some of the soils are rather too light for profitable wheat production, and these are admirably adapted to truck and vegetables, but the crops ripen so late that they come into competition with crops from other parts of the State and they do not bring as good prices as crops from the lighter truck lands of southern Maryland and the Eastern Shore. Large crops of tomatoes and corn are raised on the lighter soils of the gneiss formation for canning, and this interest has replaced the cultivation of wheat to a large extent.

The phillite formation covers the northern part of Harford, Carroll, Howard and Montgomery, and the eastern part of Frederick counties. It has, as a rule, about the same texture and the same agricultural value for grass, wheat and corn as the two formations just described. Tobacco is grown to a limited extent on newly cleared phillite lands, but it is a very much larger and heavier leaf and has altogether a different texture from that grown on the lighter soils of southern Maryland.

6. **Grass and Wheat Lands**, *Triassic and Catskill Red Sandstone formations*. These subsoils contain about 35 per cent of clay, and have about equal agricultural value. The triassic red sandstone is locally known as the "red lands" of Carroll and Frederick counties. It is sufficiently retentive of moisture to make admirable grass and wheat lands. It lies next to the Trenton limestone, which is the strongest type of grass land in the State. In favorable seasons and with good treatment these triassic red sandstone soils will make about as much wheat per

acre as the adjoining limestone lands, but the crop is never as safe nor as certain, for the soil is not as heavy in texture as the limestone land; it is not as retentive of moisture, and the crop is much more affected by unfavorable seasons and by extremes of wet and dry weather. These lands, like the limestone lands, are greatly benefited by an application of lime. They are easier to work than the limestone lands, but, on the other hand, they cannot stand such hard farming as the heavier limestone soils can. The Catskill red sandstone forms some very fertile valleys in Garrett and Alleghany counties. They are very strong clay lands, very retentive of moisture and are admirably adapted to wheat and grass.

7. **Grass and Wheat Land,** *Trenton limestone.* This is the strongest and finest type of grass and wheat land in the State. The subsoil contains from 40 to 50 per cent of clay, which makes it very retentive of moisture. There is, on an average, about 45 per cent of clay, and approximately 22,000,000,000 grains of sand and clay in one gram of this subsoil, which divides up the empty space very much, and the rainfall has to pass down through the innumerable little passages between these grains. The grains of sand and clay in one cubic foot of this subsoil have no less than 158,000 square feet of surface for water to act on in dissolving food material and for roots to feed on. In a cubic foot of this subsoil there is therefore no less than 3½ acres of surface exposed to the action of the water and roots. This enormous extent of surface makes it possible, of course, for the plants to extract a considerable amount of food material from the soil. The large number of grains in this subsoil makes a very fine and close-textured, stiff clay, which is very retentive of moisture although it is also well drained. Good crops of grass and wheat are assured in all ordinary seasons, and with good treatment from 30 to 40 bushels of wheat per acre can be produced on this land.

These soils are the impurities originally contained in the limestone rock, which have been left behind as the lime has been dissolved and carried off by water. There is, of course, a very small amount of impurities in the limestone rock, and after the large amount of lime has been dissolved the impurities settle, and, as a consequence, the limestone soils are nearly always valley lands with ridges on either side formed of rocks which were much less soluble than the limestone. Another important fact is that the lime is in the form of a carbonate which is readily soluble in water containing carbonic acid gas in solution, whereas the lime in most ordinary soils is in the form of sulphate or silicate, either of which is much less soluble in water than the carbonate, so it happens that, strange as it may seem, these limestone soils are frequently deficient in lime, and there is no class of soils in the State which is more benefited by an application of lime than these same soils resulting from the disintegration of the limestone rocks. It is very frequently the practice in these limestone regions to get out the rock and burn it in kilns and spread it directly on the land from which it came.

Several of the other soil formations of the State deserve notice, although too little work has been done in them to warrant any detailed description.

The Cambrian sandstone is where the mountain peaches have been so successfully grown. The soil contains considerable clay, but it is filled with fragments of thin pieces of sandstone.

The very fertile soils of the famous Middletown Valley have not been studied, as the geology of that region has only been very recently worked out.

The soils of the mountainous and coal areas in Washington, Alleghany and Garrett counties have not been studied in much detail. There are large areas of these lands which have no agricultural value, but there are also fertile valley lands.

The Potomac formation crossing the State from Washington through Baltimore to the Delaware line is one of the poorest sections of the State. The prevailing soils are vari-colored clays containing from 40 to 50 per cent of clay, and these should make very fertile lands, but on account of the arrangement of the grains of sand and clay the soils are very close and so impervious to water that they are not suited to agricultural crops. The valley lands, however, where these clays are overlaid by the Columbia, give fertile wheat and corn lands.

The soils of the Eastern Shore have not been studied in sufficient detail to be described here.

In the soils which have been described the grains of sand and clay have nearly the same relative arrangement, and the amount of clay they contain practically determines their agricultural value. This is not necessarily so, however, for in the Potomac clays, which contain no more real clay than the limestone lands and which should have the same relation to water, the grains are so arranged as to make the soil almost impervious to water, as though it had been puddled, and the land has little agricultural value because the supply of water is not favorable to plant growth. It would be possible by injudicious methods of cultivation to get the limestone soil into such a condition as this, when it would have little or no agricultural value.

There are soils, on the other hand, which have a high percentage of clay, but in which the grains of sand and clay are so arranged as to give the appearance and properties of a coarse sandy

land. Water passes through these soils much more readily than it should, and it cannot be drawn up from below with so much power. The water supply is variable and crops suffer from the sudden and excessive changes.

Some such change as this in the arrangement of the soil grains and in the relation of the soils to water has undoubtedly taken place in some of the wheat and tobacco lands of southern Maryland, which would account for the deterioration of these lands; it is not known yet just what these changes have been, but this is the line which is next to be followed out to study the conditions in these lands which have deteriorated, and to see how the conditions of growth have departed from those most favorable to the plant or to those in which the soil in its best state would maintain.

A considerable amount of material has already been collected for this line of investigation, and it is hoped that good results will come from the season's work.

It is but a step further to study the effect of fertilizers on the texture of soils and on the relation of soils to moisture, so that we can know how to change the conditions of growth to increase the yield or quality of the crop. Much work has been done in this line also, and there is a large amount of literature on the subject. This line of investigation will be pushed to completion.

The following table gives the mechanical analyses of some typical Maryland soils, showing the amount of sand, silt and clay in the subsoil. Of these the amount of clay is relatively the most important, as this largely determines the ease with which water moves within the soil.

MECHANICAL ANALYSIS OF MARYLAND SOILS.

Diameter. mm.	Conventional Names.	472 Early Truck.	467 Truck and Fruit.	258 Tobacco.	180 Wheat.	480 Grass.	173 Lime-stone.
2–1	Fine gravel	0.49	0.76	1.53	0.00	0.00	.540
1–.5	Coarse sand	4.96	8.55	5.67	0.00	0.38	0.32
.5–.25	Medium sand	40.19	35.04	13.25	0.48	1.07	0.72
.25–.1	Fine sand	27.59	19.26	8.39	3.06	0.78	0.62
.1–.05	Very fine sand	12.10	8.42	14.95	50.32	3.41	4.03
.05–.01	Silt	7.74	11.38	28.86	14.19	43.08	36.02
.01–.005	Fine silt	2.23	4.13	7.84	6.78	13.81	14.99
.005–.0001	Clay	4.40	10.59	14.55	20.28	30.21	41.24
Total mineral matter		99.70	98.13	95.04	95.11	92.80	98.48
Organic matter, water, loss		0.30	1.87	4.96	4.89	7.20	1.52

No.	Crop.	Geological Formation.	Clay, per cent.	Surface Area, per Gram. Square Centimeters.	Approximate Number of Grains per Gram.
472	Early truck	Columbia	4.40	615	1,950,000,000
467	Truck and fruit	"	10.59	1244	4,767,000,000
258	Export tobacco	Chesapeake	14.55	1902	6,786,000,000
180	Wheat	"	20.28	2380	9,357,000,000
480	Grass and wheat	Gabbro	30.21	3479	14,457,000,000
173	Strong grass and wheat	Trenton limestone	41.24	4575	19,638,000,000

In these soils the agricultural value for such staple crops as grass and wheat regularly increases with the percentage of clay. Those containing the most clay are the strongest soils, and are best adapted to grass and wheat. 472, on the other hand, will hardly return the amount of seed sown, even under the best treatment in our average seasons, but it has the greatest value for early spring vegetables where the time of ripening is the all-important object, and this power of these light soils to force the crops to an early maturity gives them a high market value.

We thus have in Maryland a variety of soils adapted to a great variety of crops and of agricultural interests. We also have ready markets and ever extending markets for these different products and interests.

Wheat can be grown in the West and transported at such a low cost that we can no longer afford to give up our lands to this crop, except such as will bring a large yield per acre. Such lands as those represented by 480 and the limestone land (173), will always be adapted to wheat, for yields of 30 and 40 bushels per acre can be obtained from these lands by good treatment. But even on these lands other more profitable interests, such as the fattening of cattle, canning of vegetables, and the dairy interests, are growing. The Baltimore, Washington and Philadelphia markets consume enormous quantities of milk and butter, and the improved transportation facilities and the introduction of the creamery methods have opened up a wide territory for this dairy business.

The production of early vegetables and fruits has grown enormously as the markets have been widely extended by the improved transportation facilities. Refrigerator cars, carrying four tons of ice, will carry vegetables, fruits or berries to Canada or to Cincinnati and the far

West in a perfect state of freshness, and such car-loads are shipped through by the producers themselves without going through the hands of middlemen and agents in Baltimore. The canning of vegetables and fruits for winter use has also largely increased the demand, and in spite of the enormous increase in production the average market price of these crops is from four to ten times as much as it was 25 or 30 years ago.

Review of the Month—May.

WEATHER.

Rainy and Fair Periods as Related to the Non-periodic Variations of Atmospheric Pressure.—The table of Daily Precipitation for May, 1893, page 24, shows four well marked rainy periods, and four fair periods, a few scattered showers, only (usually in the extremes of the State), extending beyond the boundaries. The first rainy period extended from the 1st to the 6th, inclusive, followed by fair from the 7th to the 12th; the second, from the 13th to the 17th, followed by fair on the 18th and 19th; the third, from the 20th to the 24th, followed by fair on the 25th, and the fourth and last, from the 26th to the 29th, followed by fair on the 30th and 31st.

The first rainy period, from the 1st to the 6th, resulted from three storms. The first of these originated on the 27th of April, in Utah, from whence it passed eastward across the country and down the St. Lawrence Valley; the second made its appearance in the West Gulf region and, reaching the Atlantic, followed the coast northward, and the third, like the first, came from the West. Ordinarily there would have been an interval between the first and third storms, but the cyclone from the South filled it up. The high and damaging winds which prevailed along the Atlantic coast on May 3rd and 4th were due to this cyclone.

The first fair period, from the 7th to the 12th, came with an area of high barometric pressure from the Northwest. It moved slowly and, reaching the Middle Atlantic coast on the 8th, did not depart from it until the 12th. Then it was succeeded by a strongly developed storm from the Northwest, and the longest period of fair weather during the month gave way to rain which occurred in quite general, daily showers until the 17th. This period of rainfall was also prolonged by a secondary of the last mentioned storm. The secondary came from the Southwest.

Another high area from the Northwest gave Maryland, the District of Columbia, and Delaware the fair weather of the 18th and 19th. Then followed showers from the 20th to the 24th, caused by two storms which came from the West, with no well defined high area intervening.

The fair weather of the 25th was due to a high area from the West.

From the 26th to the 29th showers were again quite general. Low areas from the Southwest and Northwest brought them.

A high area which crossed, from West to East, the lower half of the United States, was passing northeastward along the Atlantic coast during the 30th and 31st. Fair weather was the result.

Precipitation (in inches).—Average, 4.78; greatest amount, 6.60, at Fenby; least amount, 3.06, at Milford, Del. Snow, to the amount of a trace only, was reported from the following stations: Baltimore, Glyndon, Oakland, and Sunny Side.

There was about the average amount of rainfall, and it was evenly distributed over the territory and throughout the month, as shown by the map, page 25, and by the table of Daily Precipitation, page 24.

Temperature (degrees).—Monthly mean (for entire territory covered), 61.2; highest monthly mean, 66.2, at Cambridge; lowest monthly mean, 53.2, at Sunny Side. Highest temperature, 92, at Boettcherville, and Millsboro, Del., on the 23rd; lowest temperature, 33, at Sunny Side, on the 10th. Greatest local monthly range, 55, at Millsboro, Del.; least local monthly range, 37, at Cambridge; mean monthly range, 46.2. Mean maximum temperature, 71.8; mean minimum temperature, 51.7.

The isotherms on the map, page 25, vary from the mean temperature line of 60°, which dips downward in northern-central Maryland, to the mean temperature line of 63°, which extends up into eastern and southern Maryland.

The month was much colder than usual. At Baltimore, with an average of 61°, it was the coldest May since the establishment of the station, in 1871, with the exception of the month in 1882, the mean temperature of which was 59°. The mean temperature of the month at Washington was 62°, and in 22 years it has not averaged lower except in 1882 (59°) and 1891 (61°). In 1880 the highest averages were recorded, 71° in Baltimore, and 70° in Washington. The normal temperature of the month, at both Baltimore and Washington, is 64°.

It may be conjectured that the low temperature was due, in part, to the slowness with which a cold winter relaxed its grip, and in part to the number and preponderance of the storms from the Southwest, which gave the cold, heavy air,

over the still frozen northern regions, an opportunity of flowing southward in unusual volume.

Wind.—Prevailing direction, southeast. Total movement in miles, Baltimore, 6588; Norfolk, Va., 6949; Washington, D. C., 5167.

Auroras.—At Glyndon, on the 7th; at Millsboro, Del., on the 11th, 19th.

Hail.—At Oakland, on the 5th, 20th; at Solomon's, on the 13th; at Sunny Side, on the 4th, 20th; at Woodstock, on the 21st.

Halos.—Lunar, at Glyndon, on the 23rd; at Sunny Side, on the 23rd.

Solar.—At Baltimore, on the 15th; at Barron Creek Springs, on the 13th, 15th, 19th, 23rd.

Parhelia.—At Barron Creek Springs, on the 20th.

Polar Bands.—At Cumberland (H. Shriver), on the 12th.

Thunderstorms.—At Baltimore, on the 3rd, 13th, 21st, 23rd; at Barron Creek Springs, on the 3rd, 5th, 13th, 21st, 23rd, 27th, 28th; at Cumberland (H. Shriver), on the 5th, 20th, 23rd, 31st; at Denton, on the 23rd; at Dover, Del., on the 23rd, 27th; at Fallston, on the 21st; at Glyndon, on the 1st, 3rd, 5th, 13th, 21st, 23rd; at Jewell, on the 5th, 13th, 20th, 21st, 23rd, 27th; at Mt. St. Mary's, on the 5th, 23rd; at New Market, on the 23rd; at Oakland, on the 1st, 5th, 20th, 21st, 23rd, 26th; at Solomon's, on the 13th, 21st, 23rd, 27th; at Sunny Side, on 1st, 5th, 20th, 23rd, 26th, 31st.

Average number of clear days, 15; fair days, 8; cloudy days, 8; rainy days (.01 of an inch or more), 10.

CROPS.

Week ending May 8th.

Wheat, oats, and rye growing well. Good growth of grass reported in some sections, but poor in others. Very little corn planted. Potatoes coming up. Tobacco plants thriving. Fruit prospects good.

Week ending May 15th.

Excellent week for farm work. Wheat, oats, rye, and potatoes getting a good growth. A great deal of corn planted, and early planted growing nicely. Grass excellent in some sections, but poor in others. Tobacco plants plentiful. Strawberries growing well. Excellent prospects of large crops of peaches and apples.

Week ending May 22nd.

Farm work somewhat retarded by rains. Wheat, rye, and oats show a healthy growth generally. Grass reported short in some localities. A large acreage of corn being planted; some coming up. Tobacco plants abundant. Planting commenced and large acreage anticipated. Strawberries ripening. Good prospects for fruit of all kinds, especially peaches.

Week ending May 30th.

Wheat heading; large harvest anticipated within a month. Oats growing well. Corn coming up nicely; some damage from cut-worms. Grass improving, but in some sections backward, and pasture short. Tomato plants scarce. Potatoes coming up. Gardens improving. Peas will be ready for market during the week. Vegetables promise well. Tobacco planting in progress, with plenty of plants. Strawberries ripening. Peaches and apples will be abundant.

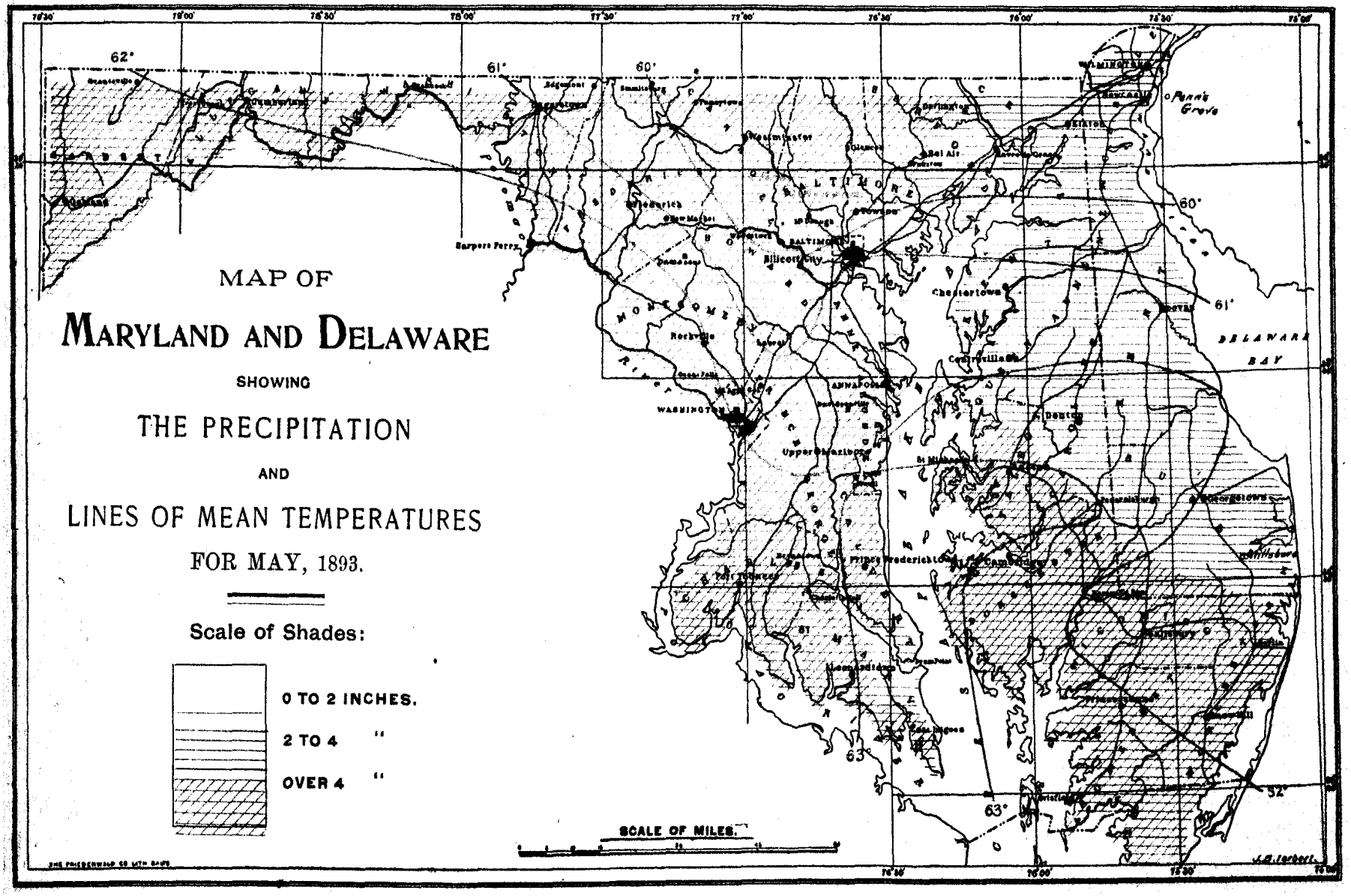
Notes by Observers.

Cumberland (H. Shriver).—The normal temperature of May, derived from 35 years' observations, is 61 degrees. The highest monthly average for any May is 67 degrees, in 1880; the lowest, 53.9 degrees, in 1866. The highest point reached by the thermometer in May, 1893, was 90 degrees, on the 23rd; the lowest was 41, on the 18th, at which time very light frosts occurred in places. During May just passed, the weather was characterized by warm or hot days and cool nights, not the most favorable conditions for vegetable growth. Owing to the comparatively mild Spring, the fruit crop has escaped injury from frost, and the outlook is very promising. The drought of last Summer, and the recent cold nights may have had a slightly unfavorable influence, but the general opinion is that we will have an abundant supply of fruit.

Thunderstorms, unusually light; high winds on the 17th and 23rd. The remainder of the month was free from severe storms.

Fallston.—The mean temperature during May, at this point, for the past 22 years, 61 degrees; warmest, in 1880, 67.5 degrees; coldest, in 1882, 55.4 degrees. Average rainfall, 3.85 inches.

Woodstock.—21st, about 6.15 p. m., a storm passed over, coming from the Northwest. A few drops of rain fell, and then a very severe hailstorm, lasting about ten minutes. Rain continued to fall till 7.30 p. m., when the sky cleared. The hailstorm was the most severe that has been experienced here for more than twenty years. The stones were from ½ of an inch to 1 inch in diameter, and covered the ground so that it appeared as after a snowstorm. Many window panes broken; small plants and foliage of trees riddled and beaten down. The noise was so great as to necessitate very loud talking to be heard.


MAP OF
MARYLAND AND DELAWARE
SHOWING
THE PRECIPITATION
AND
LINES OF MEAN TEMPERATURES
FOR MAY, 1893.
Scale of Shades:
0 TO 2 INCHES.
2 TO 4 "
OVER 4 "
SCALE OF MILES.
BALTIMORE
WASHINGTON
ANNAPOLIS
Harpers Ferry
Rockville
Chestertown
Centreville
Denton
DELAWARE BAY
Penn's Grove
62°
61°
60°
63°

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. Steuart. R. C. New, Ass't Editor of Weekly Bulletin.	
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.	
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	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.	
Upper Marlboro	Prince George's	J. B. Perrie.	
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	Northampton	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 MAY, 1893.

Stations.	Counties.	Altitude above sea in ft.	Latitude.	Longitude.	Temperature.								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.		Monthly Range.						
								Degrees	Date.	Degrees	Date.							
Baltimore		179	39°17′	76°36′	61.4	70.1	52.7	89	23	45	10	44	3.78	14	8	9	14	W.
Barron Ck. Springs	Wicomico	25	38 30	75 39	61.3	71.4	51.2	86	23	40	4 10	46	4.29	....	....	....	....	S. E.
Benedict	Charles	.....	38 31	76 39	63.2	73.3	53.3	91	22	43	8 9 10	48	4.14	20	0	11	7	.....
Boettcherville	Alleghany	.....	39 33	78 48	61 5	....	....	92	23	40	7	52	4.90	....	....	....	....	.....
Cambridge	Dorchester	.....	39 39	76 46	66.2	73.8	58.7	88	21 22 23	51	3 4 8	37	4.41	....	....	....	....	.....
Cumberland (*a*)	Alleghany	650	39 39	78 46	64.3	74.1	54.3	90	23	44	8 19	46	4.50	....	....	....	....	.....
Cumberland (*b*)	Alleghany	650	39 39	78 45	61.4	70.1	52.8	88	23	42	8 19	46	4.37	12	6	13	8	.....
Darlington	Harford	300	38 47	76 14	59.0	69.4	48.6	86	23	40	17	46	3.97	14	11	6	6	.....
*‡ Denton	Caroline	72	38 52	75 41	61.2	72.2	50.2	88	22	37	10	51	2.49	...	....	....	....	.....
Dist. Res., D. C.	.....	.....	39 9	77 0	62.3	....	....	86	21	45	8	41	4.81	....	....	....	....	.....
Dover, Del	Kent	.....	38 42	75 31	61.4	70.8	52.0	90	21	42	8 9	48	3.50	17	9	5	12	S. E.
Easton	Talbot	35	38 42	76 6	63.6	74.6	52.7	87	21	43	8	44	4.16	16	9	6	9	W.
Fallston	Harford	450	39 31	76 24	59.1	....	....	88	21	44	5 19	44	5.66	....	....	....	....	.....
Fenby	Carroll	950	39 33	77 5	59.2	....	....	82	21 23	44	4 9 19	38	6.60	10	13	8	8	N.W.
‡Frederick	Frederick	280	39 24	77 18	61.4	72.1	50.8	89	23	40	8	49	4.78	13	15	3	12	.....
Glyndon	Baltimore	280	39 24	77 41	59.8	69.2	50.4	88	23	41	3 4 8	47	5.08	18	8	5	12	S. W.
Great Falls	Montgomery	.....	39 0	77 14	62.6	....	....	87	23	45	8	42	3.44	....	....	....	....	.....
Jewell	Anne Arundel	.....	38 44	76 36	63.8	....	....	....	.....	....	.....	....	4.52	....	....	....	....	S. E.
Kirkwood, Del	New Castle	.....	39 35	75 40	58.0	....	....	....	.....	....	.....	....	....	....	....	....	....	.....
Leonardtown	St. Mary's	.....	38 18	76 40	62.8	71.0	52.5	84	21	35	4	49	4.71	21	7	3	7	S. E.
McDonogh	Baltimore	535	39 23	76 44	59.2	67.8	50.6	85	23	42	9	43	4.57	....	....	....	....	.....
Milford, Del	Kent	.....	38 56	75 25	62.8	73.6	51.9	89	23	41	9 10	48	3.06	23	6	2	10	W.
Millsboro, Del	Sussex	.....	39 41	75 15	61.2	72.2	50.3	92	23	37	9	55	3.54	17	7	7	11	N.
Mt. St. Mary's	Frederick	720	39 41	77 21	60.2	69.9	50.5	87	21 23	40	5	47	4.24	13	6	12	12	N.
New Market	Frederick	500	39 23	77 18	62.0	....	....	88	23	44	4	44	5.20	16	7	8	8	N.W.
Oakland	Garrett	2376	39 24	79 29	55.1	....	....	79	22	38	10 14	41	4.78	10	16	5	16	S. W.
Rec. Res., D. C.	.....	.....	38 52	77 0	62.6	....	....	85	23	46	8	49	4.77	....	....	....	....	.....
Seaford, Del	Sussex	.....	38 40	75 35	62.4	74.5	50.4	89	21 23	36	10	53	3.80	....	....	....	....	.....
Solomon's	Calvert	20	38 19	76 27	63.4	72.6	54.2	87	21	47	4 5 8 9 10	40	4.01	11	3	17	12	S. E.
Sunny Side	Garrett	.....	39 20	79 28	53.2	....	....	79	1 22	33	10	46	6.58	....	....	....	....	S. W.
Taneytown	Carroll	.....	38 40	77 9	....	....	....	....	.....	....	.....	....	3.66	....	....	....	....	.....
Upper Marlboro	Pr. George's	....	38 47	76 45	61.8	74.1	49.6	90	21 23	38	8	52	4.44	17	0	14	9	S. E.
Washington, D. C.	.....	112	38 52	77 0	61.6	71.9	51.2	89	21	40	8	49	5.41	11	13	7	14	S.
Woodstock	Howard	392	39 20	76 49	59.6	70.8	48.5	88	23	38	9	50	5.15	11	8	12	7	N.W.
‡ Birdsnest, Va.	Northampton	.....	.....	.....	65.4	....	....	90	26	52	8 9 10	38	4.40	13	8	10	7	N. E.
‡ Cape Charles, Va.	Northampton	.....	.....	.....	64.4	....	....	....	.....	....	.....	....	3.87	....	....	....	....	.....
‡ Norfolk, Va.	.....	.....	.....	.....	66.0	75.0	57.0	90	21	49	8	41	6.79	15	10	6	11	S. W.
‡ Warsaw, Va	Richmond	.....	.....	.....	63.5	76.3	50.7	90	1 26	40	8 10 25	50	4.37	8	17	6	8	S.
Averages	.....	.....	.....	.....	61.2	71.8	51.7	....	.....	....	.....	46.2	4.78	15.1	8.0	8.3	10.1	S. E.

"*a*"—H. Shriver. "*b*"—E. T. Shriver. * 1st to 6th inclusive, missing. ‡ Omitted in computing averages.

DAILY PRECIPITATION FOR MAY, 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	Total.
Baltimore	.02	...	1.13	1.18	T	.25	...	...	...	...	...	...	T	.23	.02	.31	T	...	...	T	.05	.13	.23	.10	...	T	.15	.04	.03	...	...	3.78
Barron C.S.	...	...	...	1.54	...	...	...	...	...	...	...	...	.31	...	.86	...	T	...	...	...	.26	...	...	.57	...	...	.08	...	.67	...	...	4.29
Benedict	...	...	1.60	...	...	...	...	...	...	...	...	...	.81	...	...	.08	...	...	...	•	.60	.18	...	...	...	.17	...	...	.70	...	...	4.14
Boettcherv.	.10	...	1.80	...	.50	...	...	...	...	...	...	...	T	T	.20	...	.70	...	...	.80	...	...	...	...	...	.70	...	.10	...	...	...	4.90
Cambridge	...	...	1.60	...	.20	...	...	...	...	...	...	...	.33	...	.40	.46	...	...	...	...	.77	...	.02	...	...	...	.25	.24	.34	...	...	4.41
Cumb. (*a*)	.15	...	...	1.50	...	.60	...	...	...	...	...	...	...	.02	...	.45	...	...	...	...	.85	...	.03	...	...	.75	...	...	...	...	.15	4.50
Cumb. (*b*)	.07	1.46	...	.60	...	...	...	...	...	...	...	...	...	...	.62	.15	...	...	...	.62	...	...	...	...	...	.73	.12	...	...	...	...	4.37
Darlington	...	...	2.22	...	.73	...	...	...	...	...	...	...	.03	...	T	.47	...	...	...	...	...	...	.46	...	...	...	.06	...	...	...	...	3.97
*Denton	...	...	...	...	...	...	...	...	...	...	...	...	...	.22	...	.62	T	...	...	...	.24	...	.44	...	...	...	.12	.25	.60	...	...	2.49
Dist. R., D.C	...	...	.04	2.33	.08	...	...	...	...	...	...	...	...	.48	...	.14	.10	...	...	...	...	.76	...	.17	...	...	.04	.28	.13	.26	...	4.81
Dover, Del.	.01	...	...	1.52	...	.08	...	...	...	...	...	...	.12	...	...	.62	T	T	...	...	...	...	.41	...	...	...	...	...	.74	...	...	3.50
Easton	...	...	1.63	...	.04	...	...	...	...	...	...	...	.31	...	...	.37	...	...	...	...	.31	...	.41	...	...	...	.23	.32	.54	...	...	4.16
Fallston	...	...	3.45	...	.50	...	...	...	...	...	...	...	.02	...	.54	.45	T	...	...	T	T	.57	...	...	...	T	T	.10	.03	...	...	5.66
Fenby	T	.10	1.90	1.10	.90	...	...	...	...	...	...	...	...	...	...	2.30	...	...	...	...	.10	...	.10	...	...	...	...	.10	...	...	...	6.60
Frederick	.13	...	...	2.61	.54	...	...	...	...	...	...	T	.27	...	.14	.52	...	...	...	...	.19	...	.24	...	...	.03	T	.03	.08	...	...	4.78
Glyndon	.02	...	2.09	1.50	.34	...	...	...	...	...	...	...	.23	T	.14	.39	T	...	...	.07	T	...	.16	...	...	T	.09	.03	.02	...	...	5.08
Great Falls	...	...	.12	1.03	...	.05	...	...	...	...	...	...	...	.13	...	.17	.71	...	...	...	.07	.59	...	.11	...	...	...	.06	.11	.29	...	3.44
Jewell	...	...	...	1.75	T	...	...	...	...	...	...	...	.55	...	T	.10	...	...	...	T	.37	...	.75	...	...	...	.25	...	.75	...	...	4.52
Leonardt'n	...	...	2.57	...	T	T	...	...	...	...	...	...	.21	...	...	...	...	...	...	...	.76	...	...	.45	...	...	...	...	.72	...	...	4.71
McDonogh	.02	...	1.25	1.15	.12	.26	...	...	...	...	...	...	.34	.04	.08	.69	...	...	...	...	...	...	.56	...	...	...	.02	.02	.02	...	...	4.57
Milford, Del	...	...	...	.95	.09	...	...	...	...	...	...	...	.09	...	...	.33	.02	...	...	...	.20	...	.61	...	...	T	.02	.19	.54	...	...	3.06
Millsb'o, Del	...	.03	1.06	.55	...	...	...	...	...	...	...	...	...	.21	...	.58	...	...	...	...	.02	.15	...	.30	...	...	.16	.11	.37	...	...	3.54
M.S. Mary's	.32	.32	.08	.20	...	.90	...	...	...	...	...	...	.47	.01	...	.91	...	...	...	...	.43	.01	.78	...	...	.06	...	.07	...	...	...	4.24
New Mark't	.15	...	2.10	...	.60	...	...	...	...	...	...	...	.40	T	...	1.22	...	...	...	T	.20	...	...	.32	...	...	T	...	.21	...	...	5.20
Oakland	.09	...	1.08	.09	.80	...	...	...	...	...	...	.01	.04	.16	.16	.50	.35	.15	...	.93	.11	...	.08	...	...	.12	.11	...	...	...	...	4.78
R. R., D. C.	...	...	.07	2.35	...	.09	...	...	...	...	...	...	...	.23	...	.21	.33	...	...	...	.04	.56	...	.25	...	...	.06	.18	.14	.26	...	4.77
Seaford Del	...	...	...	1.76	T	...	...	...	...	...	...	...	.04	.24	...	.55	T	...	...	.02	...	.40	...	21	...	...	.11	...	.47	...	...	3.80
Solomon's	...	.08	1.05	.67	T	...	...	...	...	...	...	...	.40	T	.01	.37	T	...	...	T	.40	.28	.01	...	...	.07	.43	.24	...	...	...	4.01
Sunny Side	.10	T	1.40	.40	1.00	.20	...	...	...	...	...	T	.13	.32	.20	.45	.53	.11	...	1.05	.32	...	.15	...	...	01	T	.16	T	T	T	6.56
Taneytown	.21	...	...	.29	.31	.85	...	...	...	...	...	...	.01	.11	.04	1.27	...	...	...	.04	.09	...	.25	...	...	...	...	...	.19	...	...	3.66
UpperMarl	.12	...	...	2.00	...	.10	...	...	...	...	...	...	.45	...	...	.17	T	...	...	...	...	.61	...	...	...	...	.29	.05	.65	...	...	4.44
Wash., D. C.	T	T	1.76	1.02	...	.07	...	...	...	...	...	...	.52	.02	.06	.33	T	...	...	...	.47	.15	.10	.06	...	...	.40	.01	.44	...	...	5.41
Woodstock	...	...	...	2.50	T	...	...	...	...	...	...	...	...	.30	...	1.30	T	...	...	...	.20	...	.40	...	...	T	.05	T	...	.40	...	5.15
Birdsn't, Va	...	.60	.40	...	...	...	.85	...	...	...	...	...	...	T	...	...	.90	...	...	...	...	.05	...	...	...	...	T	...	1.00	.60	...	4.40
C. Chas., Va.	...	.80	.49	...	...	.83	...	...	...	...	...	.15	.01	...	.75	...	...	...	...	...	.02	...	...	...	...	...	.29	.14	.40	...	...	3.87
Norfolk, Va	...	.46	.75	.10	...	T	.12	...	.78	T	...	...	.02	...	T	1.09	...	...	...	...	...	...	...	T	...	...	.74	1.38	1.30	.05	...	6.79
Warsaw, Va	...	...	...	1.84	...	.02	.34	...	...	...	...	...	.01	...	...	.66	...	...	...	...	...	.22	...	.20	...	...	...	...	1.06	...	...	4.37

* 1st to 6th inclusive, missing. Note.—"T" indicates a trace of rain or snow. A. T. B.